REPORT

Tonkin+Taylor

Upper Stebbings and Glenside West

Development Concept

Transport Assessment

Prepared for
Wellington City Council
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Tonkin & Taylor Ltd
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Executive summary

This transport assessment has been prepared to help inform the Wellington City Council (WCC) structure planning process for growth in Upper Stebbings and Glenside West, two proposed areas for urban expansion located between Churton Park and Tawa in northern Wellington City.

Approximately 670 new residential sections are proposed in the two Development Concept areas as shown on the Isthmus Stebbings Development Concept Plan, connecting to Melksham Drive and Westchester Drive in Churton Park. These additional dwellings are expected to increase traffic around Churton Park. No road connections are proposed to Tawa as the development concept process has shown it to be uneconomic to achieve a new link across Marshall Ridge and down to Tawa. The Development Concept also includes provision for the extension of the bus route through Upper Stebbings and walking and cycling connections within the Development Concept areas and connecting to Tawa and the adjacent road network.

A summary of the transport effects and improvement options identified, as well as rough order cost ranges include:

- **Road safety:** The proposed Development Concept areas will be able to satisfy appropriate safety outcomes for a residential road network, with further stages of design review and safety auditing. Safety investigations/ improvements are recommended for specific intersections and mid-block road sections on the surrounding road network, specifically the Westchester Drive/Middleton Road roundabout, Middleton Road and Willowbank Road (between Westchester Drive and Main Road) and the Main Road/Sunrise Boulevard pedestrian crossing. Crime Prevention Through Environmental Design (CPTED) audits are recommended particularly of off-road bus access routes to identify any specific items for attention.
- **Road network:** The proposed roads provide logical and direct connections to the wider road network, and the proposed road hierarchy is considered suitable for the scale of development and proposed bus service extension into Upper Stebbings. At the detailed design stage, confirmation should be sought from WCC that proposed road gradients, which all comply with the New Zealand Standard for Land Development and Infrastructure but in some cases are slightly steeper than the maximum gradients permitted in the WCC Code of Practice for Land Development, are appropriate for the roads to be vested in Council ownership as public roads.
- **Road capacity:** Without intervention, we expect that all key intersections around the Development Concept areas will experience LOS F on at least one approach in either the morning or afternoon peak, or possibly both, within the next 15 years due to general traffic growth. The two key intersections in Churton Park will experience LOS F sooner than is otherwise expected as a result of the Development Concept areas. Even without development in the Development Concept areas of Upper Stebbings and Glenside West, underlying capacity issues and projected population growth in Tawa is contributing to a requirement for capacity improvements in the short term, 1-5 year window from 2020 on Main Road at Redwood Avenue, Takapu Road and Sunrise Boulevard. This indicates that the Development Concept areas do not in themselves have significant impact or bring forward the need to invest in upgrade of those intersections. Further detailed modelling of intersection capacity improvement options is recommended.

Intersecting Roads	Current intersection type	Upgrade required (due to general traffic growth only)	Upgrade required (including development of both Upper Stebbings and Glenside West)
Main Road / Redwood Avenue	Roundabout	AM = 2030 PM = 2033	AM = 2030 PM = 2033
Main Road / Sunrise Boulevard	T-intersection	AM = 2024 PM = 2021	AM = 2024 PM = 2021
Main Road / Takapu Road / Willowbank Road / Boscobel Lane	Roundabout	AM = 2032 PM = 2025	AM = 2032 PM = 2025
Westchester Drive / Melksham Drive / Lakewood Avenue	Staggered Crossroads	AM = 2052 PM = 2042	AM = 2028 PM = 2028
Westchester Drive / Middleton Road / Westchester Drive East	Roundabout	AM = 2044 PM = 2036	AM = 2035 PM = 2032

- **Walking and cycling:** The location of both Development Concept areas means that walking and cycling to work is likely to be limited due to the distance to travel and topography. An extensive and highly connected recreational path network should be provided along the blue and green corridors around and through the Development Concept areas. Some of the recreational access routes should be made suitable for bicycles. Additional investment in walking and cycling is recommended to provide routes between Glenside West cul-de-sacs, and improvements to the external pedestrian and cycling facilities along Willowbank Road. Confirmation should be sought of the footpath provision through the Reedy Block and the crossing facility on Westchester Drive.
- **Public transport:** GWRC have advised that Route 1 along Melksham Drive will be extended as development progresses through Upper Stebbings. A bus service is unlikely to be provided to Glenside West, with the nearest service along Middleton Road. Improvements are recommended including footpath connections from the Glenside West access track to Middleton Road bus stops and bus shelters and seats.

  Surrounding streets near the Takapu Train Station park and ride are likely to experience increased parking demand pressure. WCC are encouraged to consider parking management on the local streets. GWRC are investigating several minor changes to improve the functionality and attractiveness of the rail service. A feeder bus service is not being considered by GWRC for this area; however this may change if demand warrants a service.
- **Servicing:** The Development Concept allows for adequate servicing including rubbish trucks and fire appliances. This is to be further confirmed in subsequent design stages, such as to confirm that kerbside parking does not impede servicing.
- **Rough Order Cost Estimates:** The rough-order cost estimate ranges of $3.1M to $11M for the external road network improvements are based on a range of options contained in the Waka Kotahi Standard Safety Intervention Toolkit. Some of these improvements will be required to address population growth in the area, even in the absence of development in Upper Stebbings and Glenside West. A number of options, such as adding turning bays and additional lanes or upgrading to roundabouts or signals, are available to address safety and capacity improvements at these intersections. Cost estimates should be re-visited as part of further investigations and design for each improvement, which will quantify the work required and allow for a more accurate estimate of expected costs for inclusion in LTP budgets.

Further work is recommended as the Development Concept progresses to implementation.

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1 Introduction

1.1 Purpose and scope

Wellington City Council (WCC) is preparing a Spatial Plan to manage future housing development in Wellington City. The areas of Upper Stebbings and Glenside West, comprising of 260 hectares of undeveloped, rural zoned land located between Churton Park and Tawa, are some of the last remaining greenfield growth areas of Wellington. WCC has engaged Tonkin & Taylor Ltd (T+T) to undertake a high-level review of potential transport impacts of Development Concept scenarios in Upper Stebbings and Glenside West.

This report has been prepared to help inform the WCC structure planning process and identify, where appropriate, potential issues, opportunities and local transport infrastructure improvements for consideration prior to development of the area. This is also expected to inform WCC engagement with stakeholders regarding the expected impacts of proposed Development Concept and Long-Term Plan funding requirements.

This report has been prepared in accordance with the scope of works outlined in the Tonkin and Taylor Ltd proposal dated 14 August 2020.

1.2 Background

In 2017, T+T provided WCC advice on potential transport impacts of Development Concept scenarios to support urban development in the Upper Stebbings Valley (including both Upper Stebbings and Glenside West areas shown in Figure 1-1). This advice provided a high-level review of potential transport impacts of three Development Concept growth scenarios in the Upper Stebbings Valley. This involved a modelling exercise of predicted traffic effects from the three growth scenarios, a range of potential issues including intersection performance, through to estimated uptake in alternative transport modes.

Initial stages of the concept roading alignments for the key roads serving each Development Concept scenario were also developed in collaboration with Isthmus Group Ltd (Isthmus).

Since issue of the T+T report, a team of Isthmus, Orogen Ltd (Orogen) and Morphum Environmental Ltd (Morphum) undertook further development of a Concept Masterplan for Upper Stebbings. The Stebbings Structure Plan, Upper Stebbings Concept Masterplan Design Process & Thinking document, issued in February 2020 by Isthmus, arrived at an overall masterplan vision including 533 new homes and updated road alignments/hierarchy among other aspects for the Upper Stebbings Valley area. This puts the density of homes in Upper Stebbings in the lower range of the original scenarios provided for the assessment work undertaken by T+T in 2017 (Scenario 1 – Extend). Under this scenario, no new homes were proposed in the area shown as Glenside West.

The proposed developed location and adjacent areas are shown below in Figure 1-1.

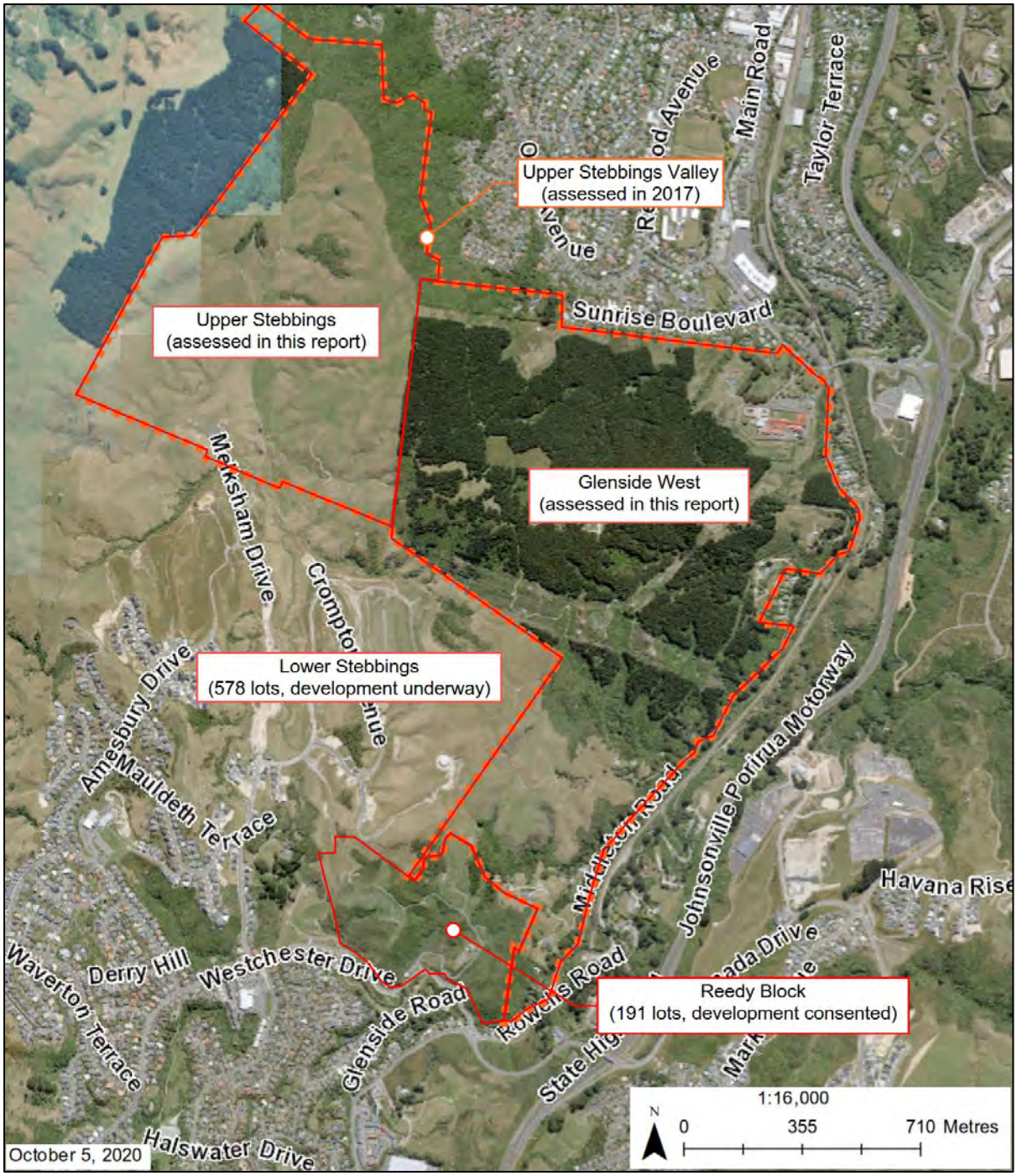


Figure 1-1 Proposed Development Concept areas

WCC are now progressing additional work considering Upper Stebbings and Glenside West as distinct areas within the Development Concept, the subject of this report.

1.3 Report structure

This report considers the expected impacts and effects of the Upper Stebbings and Glenside West Development Concept, on the transport networks (local roads, public transport, walking and cycling) external to the site. It has been prepared with the guidance specified in the following:

- Integrated Transport Assessment Guidelines - Research Report 422, published by Waka Kotahi NZ Transport Agency November 2010 (NZTA RR422);

- NZS4404:2010 Standard for Land Development and Subdivision Infrastructure, October 2010 (NZS4404);
- Wellington City Code of Practice for Land Development, December 2012 (WCC COP-LD); and
- Wellington City Council District Plan (District Plan).

This report provides the following;

- A summary review of the existing transport environment around the site;
- A description of the Development Concept developed by Isthmus, Orogen and Morphum;
- A summary of the traffic modelling inputs, assumptions and limitations;
- An assessment of the expected transport network performance in forecast years including for the Development Concept;
- Identifying existing and future issues and opportunities within the transport network around the Development Concept areas; and
- Conclusions and options for future planning work.

2 Current environment

2.1 Existing land use

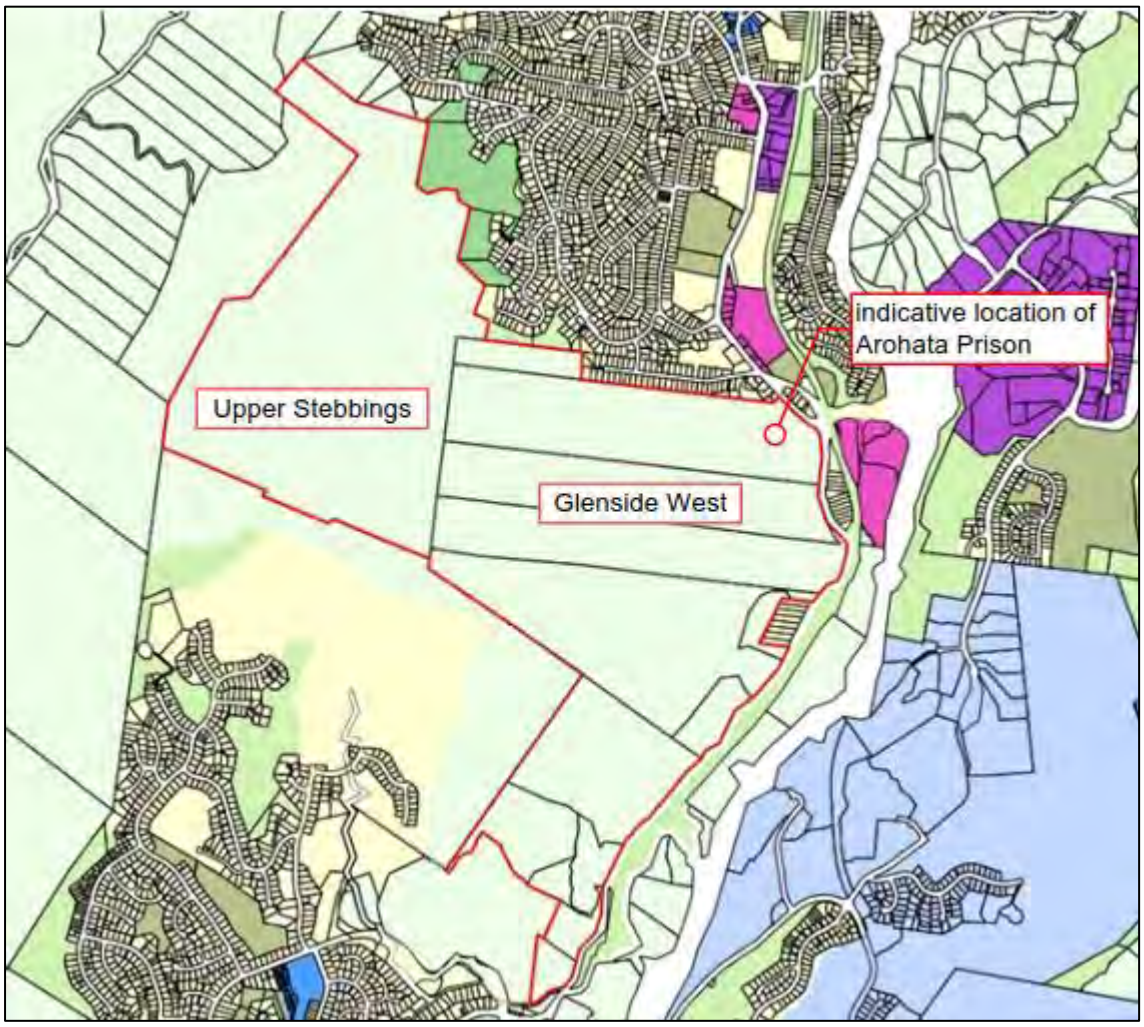


Figure 2-1 Upper Stebbins and Glenside West growth areas, light green for rural zoning (base map source Wellington City Council).

The existing land in Upper Stebbings and Glenside West is zoned Rural, including the Department of Corrections land which is currently occupied by the Arohata Prison.

Other land uses in this area are generally farming and some plantation forestry, with an easement corridor for high capacity power transmission lines running to the south near Churton Park. Many of the stream/ watercourse gullies are revegetating in native bush.

The area is bounded to the North by the residential suburb of Tawa. To the South and West the area is bounded by a mix of rural and residential zoned land, although as described subsequently in Section 3.1 this is subject to further residential development as part of the Churton Park, Lower Stebbings and Reedy Block subdivisions. To the East the area is bounded by the Porirua Stream and State Highway 1 (SH1) separating the site from a mix of residential, industrial and rural land between Grenada Village and Grenada North.

2.2 Population and demographics

Population and demographic information were sourced from Statistics New Zealand | Tatauranga Aotearoa (Stats NZ). The data varies slightly from that previously presented in 2017 due to differences in the population areas assessed.

Information for Churton Park / Glenside, and Tawa was compared between the 2006, 2013 and 2018 census years (refer tables below) to obtain a rate of change.

Table 2.1 Churton Park / Glenside population statistics

Data	2006	2013	2018	Annual change between 2006 and 2018
Total Households (no.)	1,947	2,217	2,412	1.8%
Total Population (no. people)	5,820	6,471	7,254	2.7%

Table 2.2 Tawa / Linden population statistics

Data	2006	2013	2018	Annual change between 2006 and 2018
Total Households (no.)	4,095	4,224	4,314	0.5%
Total Population (no. people)	11,679	11,940	12,516	0.6%

Generally, Churton Park appears to be populated by relatively high-income households in the 35 to 55 year of age bracket with children, a low unemployment rate, and a low rate of people without qualifications. Whereas Tawa has a mix of all age groups, employment positions, education background and children in the household.

Modes of travel by residents within Churton Park and Tawa were sourced from Stats NZ and summarised below in Table 2.3. Of note is that Tawa has higher public transport and lower private or company vehicle usage for travel to work, likely due to the access and level of service provided by the bus and train links through Tawa to Porirua and Wellington city centres.

Table 2.3 Resident modes of travel (source Stats NZ)

Suburb	Number of Dwellings	Travel to work trips[1]			Travel to education trips		
		Drive a private or company vehicle	Public Transport	Active modes	Drive or passenger in a vehicle	Public Transport	Active modes
Churton Park North	1,284	1,287 (1.00 trips per dwelling)	372 (0.29)	42 (0.03)	498 (0.39)	402 (0.31)	162 (0.13)
Tawa Central	1,059	687 (0.65)	462 (0.44)	78 (0.07)	255 (0.24)	99 (0.09)	243 (0.23)

[1] Numbers in brackets represent trips per dwelling for each mode of travel

2.3 Road network

The existing road network largely extends along the Eastern boundary of the site, with Middleton Road and SH1 providing the only two links between Churton Park and Tawa. Additional road connections to Churton Park are also expected as part of the Lower Stebbings and Reedy Block subdivisions, which are further discussed in Section 3. The existing road network and hierarchy are shown below in Figure 2-2 and described further in Table 2.4.

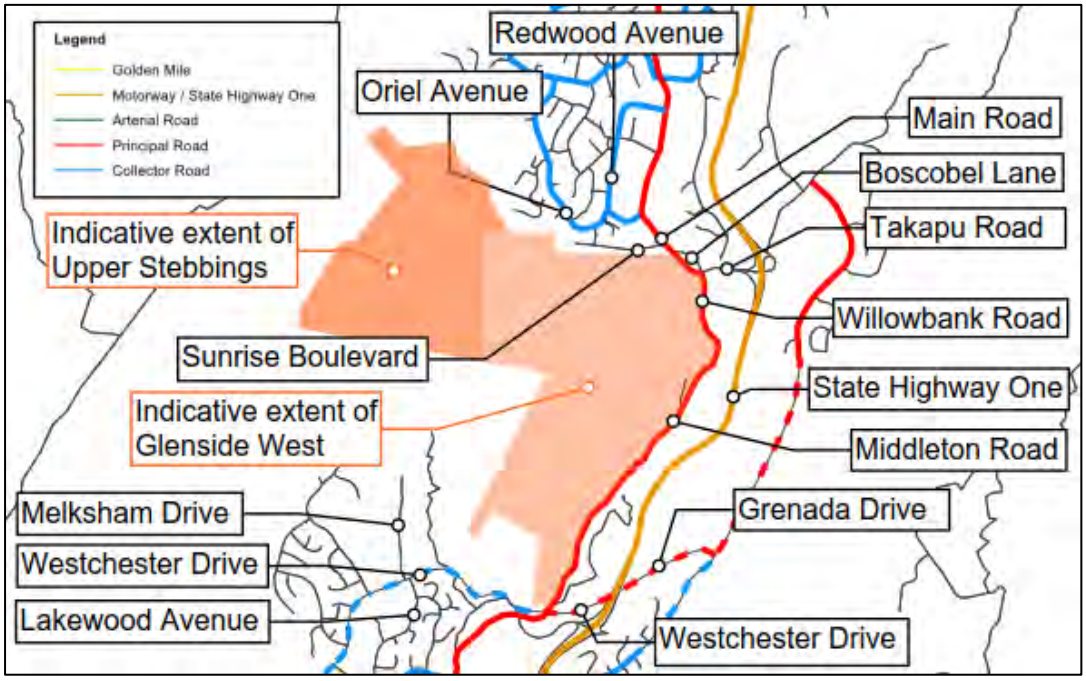


Figure 2-2 Road network around Glenside West growth area (base map source Wellington City Council)

The existing roads within the assessment area and their respective hierarchy from the District Plan, are listed in Table 2.4 below. Any not listed are local roads only.

Table 2.4 Existing road hierarchy

Hierarchy level	Road name
Motorway	State Highway One (SH1)
Principal	Main Road Willowbank Road Middleton Road Grenada Drive Westchester Drive (between Grenada Drive and Middleton Road)
Collector	Redwood Avenue Oriel Avenue Westchester Drive (west of Middleton Road)

Road width standards are described in the WCC COP-LD Part C, Table 1. These include minimum requirements for traffic lanes, parking, cycle lanes and footpaths.

In summary, most of the local roads around the proposed Development Concept areas meet the minimum requirements of the WCC COP-LD. Several of the collector and principal roads do not achieve all of the requirements, likely due to incremental increases in traffic volume and

connectivity from new development resulting in a higher hierarchy function but not reflected in the current constructed layout. Specifically;

- Most local and collector roads broadly meet the requirements, although marked cycle lanes are not provided;
- Westchester Drive between Melksham Drive and SH1 has a footpath on one side only and limited parking. We note that there is little residential development along this section of Westchester Drive presumably due to the steep terrain on either side of the road, which reduces demand for these facilities;
- Middleton Road does not have formal parking, footpath or cycling facilities. The land along Middleton Road is zoned rural, with little residential development. The steepness of the land to the west and presence of Porirua Stream to the east constrain the width of the corridor and opportunities for future improvements;
- Willowbank Road has a footpath on the eastern side only, with no formal parking or cycling facilities. Residential development has only occurred along the Eastern side of Willowbank Road, with the land along the western side currently zoned rural. The steepness of the land to the west and private property to the east constrain the width of the corridor and opportunities for future improvements; and
- Main Road along the Glenside West area frontage in Tawa has a footpath on the Western side only, with no formal parking or cycling facilities. There is no footpath or driveways along the Eastern side of the road, where access to properties is provided off Boscobel Lane.

2.4 Traffic volumes

Traffic volume information has been collated to create a local transport network gravity model for a base year of 2020. This model shows the traffic volumes and turning movements estimated to currently occur at each of the assessed intersections during both morning and evening peak times.

The gravity model is based on the following information;

- Pneumatic tube counts supplied by WCC. Where counts are not current, these have been scaled appropriately based on an assessment of historic growth and other factors;
- Traffic estimates reported on Mobile Road[2];
- Forecast traffic volumes from the GWRC Wellington Strategic Traffic Model (projected to 2043);
- Short duration surveys of turning movements undertaken in July 2017; and
- Site observations undertaken in September 2020.

The 2020 traffic volumes and turning percentages applied in the gravity model are provided in Appendix C for reference.

2.5 Walking and cycling network

As described in Section 2.3, footpaths are present along roads throughout Churton Park and Tawa where there are residential dwellings. There are no footpaths along Middleton Road, and no footpath provided along Main Road between the Arohata Prison access and Willowbank Drive.

In general, the footpaths provided meet the 1.5m width recommended in the WCC COP-LD, except along Willowbank Road where the footpath width is reduced. Footpath surfaces are typically either concrete or asphalt in varying condition.

[2] https://mobileroad.org/desktop.html

Although there is signage directing cyclists at key locations in this area, there are limited formal cycling facilities in the form of dedicated lanes or paths; on narrow roads, such as the northern part of Middleton where there are limited or no other options for connectivity further south, which is likely to discourage many potential cyclists.

2.6 Public transport network

Public transport links from Churton Park are orientated to the south connecting with Johnsonville and Wellington City;

- Bus route 1 via Westchester Drive and Melksham Drive servicing the route every 30 minutes throughout the day (15 minutes during peak periods); and
- Bus route 19 and 19e via Amesbury Drive and Westchester Drive servicing the route every 30 minutes throughout the day.

There are no train stations located within Churton Park, with the nearest available stations at Johnsonville and Takapu Road in Tawa.

Public transport from Tawa provides links both north and south to Porirua and Wellington city centres respectively;

- Bus route 60 and 60e via Middleton Road, Willowbank Road and Main Road servicing the route every 20 minutes throughout the day (60 minutes evenings and weekends); and
- The Kapiti Train Line via Takapu Road Station running every 30 minutes (20 minutes during peak periods).

2.7 Road safety

Crash records were obtained from the Waka Kotahi NZ Transport Agency (Waka Kotahi) Crash Analysis System (CAS) database for the five-year period between 2015 and 2020 inclusive. The reported injury crash history for the wider road network is shown schematically in Figure 2-3 below.

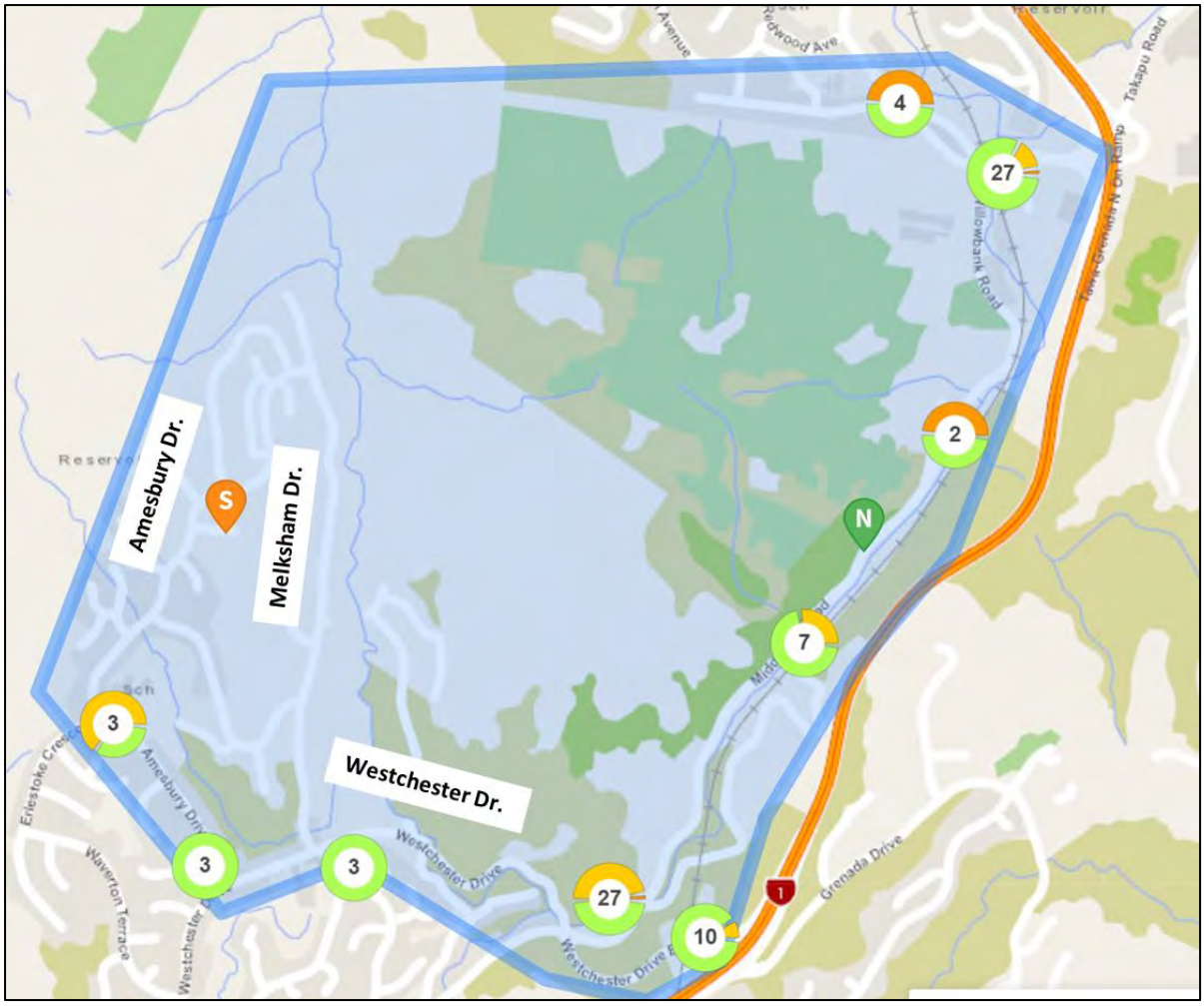


Figure 2-3 Reported crashes in the surrounding road network.

A total of 88 crashes were reported during the assessment period. There were zero fatalities, six serious injuries, 22 minor injuries and 60 non-injury crashes. The search highlighted that most injury crashes have occurred on the higher trafficked roads, with 70 percent of reported crashes occurring along Middleton Road, and 27 percent of the reported crashes occurring along Main Road in Tawa.

A detailed assessment of the crash groupings identified is presented in Appendix A. In summary;

No discernible crash trends or clusters were identified at the intersections of Main Road/ Sunrise Boulevard, Main Road/Redwood Avenue and Westchester Drive/Melksham Drive/Lakewood Avenue;

- The crash rate recorded for the Main Road/Takapu Road/Willowbank Road/Boscobel Lane intersection is less than the typical crash rate calculated for this intersection, indicating that this intersection does not have a high underlying risk of crashes;
- The crash rate recorded for the Westchester Drive/Middleton Road intersection exceeds the typical crash rate calculated for this intersection, indicating potential underlying safety concerns. No serious or fatal injury crashes were recorded, indicating that the urban speed environment is helping mitigate the severity of crashes; and
- The crash rate recorded along Middleton Road and Willowbank Road (between Westchester Drive and Main Road) broadly matches the typical crash rate calculated for this mid-block assessment area, indicating this mid-block section does not have a high underlying risk of crashes. This is despite this road section not being technically compliant with the WCC COP-

LD hierarchy standard. The Waka Kotahi Crash Estimation Compendium model indicates that the number of injury crashes recorded could be expected to approximately halve if this road section was made compliant with the WCC COP-LD Principal Road standard, however there are a number of physical constraints along this road corridor which limit the ability to practically achieve this standard.

3 Proposed transport network changes

3.1 Churton Park, Lower Stebbings and Reedy Block subdivisions

As shown in Figure 1-1, residential subdivision and development are proposed to the south and west of the Upper Stebbings and Glenside West areas which will extend the road network up to the boundaries of the Development Concept areas. The subdivisions allow for road connections at the North-West (via Lower Stebbings) and South (via the Reedy Block) edges to Upper Stebbings and Glenside West.

Development of the Lower Stebbings subdivision is underway. The Reedy Block subdivision has been consented and is expected to be developed, with an unconfirmed timeframe but a general assumption that this may occur over the next 10 to 15 years based on the progress of other developments around Churton Park.

These developments will increase traffic volumes around Churton Park. Additional trips have been included as a layer in the local transport network gravity model to represent expected trips from these developments, as described in Section 5.3.

3.2 Transmission Gully and Petone to Grenada

Transmission Gully is a 27 kilometre four-lane motorway that will run from Mackays Crossing to Linden. Four interchanges and two new link roads will connect the route to Mackays, State Highway 58 (SH58), eastern Porirua and Kenepuru. This route is scheduled to be open for traffic in 2021. The southern extent of Transmission Gully is located north of the Structure Plan area in Linden, access to the Development Concept areas from the state highway network will continue via the existing section of SH1 which passes to the east of Churton Park and Tawa.

Petone to Grenada is a proposed East-West motorway connection between Porirua/Northern Wellington and the Hutt Valley. It is not currently scheduled for construction and is under review, with Waka Kotahi currently reporting the project to be considered for funding in 2028. The location of the Eastern connection with SH1 is yet to be confirmed but likely to occur between the Churton Park and Tawa interchanges.

These projects are not expected to significantly impact traffic volumes on the local roads between Churton Park and Tawa. Specifically, this is because:

- These two infrastructure projects are unlikely to be an additional attractor; people who were wanting to go north or south will still need to go to the same intersection to get on the state highway network as they did before, their route may just change once they get to that decision point.
- Transmission Gully will have an intersection at State Highway 58, which will provide a route down into the Hutt Valley via SH58 Haywards Hill as an alternative to the Petone to Grenada and State Highway 1 and 2 routes. If this Petone to Grenada route does not get built, the Transmission Gully /SH58 route will still act as a relief route, somewhat reducing the congestion issues that occur on State Highway 1 near Tawa and Churton Park. This is considered in turn to reduce the likelihood of the local road route through Tawa and Churton Park being increasingly used as a “rat run” to avoid the current peak period SH1 congestion.
- It has been assumed that, other than a natural increase in the traffic figures which will capture some defections onto the local roads, the State Highway network in this area remains largely self-contained as the modelling method used cannot determine at what point the motorway system falls over. Further much more detailed analysis using the WTSM model would be necessary to reasonably predict the effects of these and any other infrastructure projects.

- In line with the above assumption, it has by implication also been assumed that should an issue be shown to occur within the WTSM then Waka Kotahi will enact works to ensure the continued functioning of the State Highway network to the minimal impact of the local road network.

This conclusion is supported by the Transmission Gully Project Assessment of Environmental Effects prepared by Beca in 2011 for consenting of the project. Table 13.1 of that report shows traffic volumes in Tawa reducing by approximately 13% as a result of the Transmission Gully Project. We have taken a conservative approach to modelling a constrained network and whilst understanding that the impact of Transmission Gully may indicate a reduction in general traffic within Tawa, population growth in the area forecast through the Spatial Plan will increase demand for travel. The challenge is identifying capacity improvements with some sort of sensitivity to changes in demand over time, as well as opportunities for promoting alternative modes to manage demand on the network.

3.3 Public transport improvements

A meeting was held with Greater Wellington Regional Council | Te Pane Matua Taiao (GWRC) on 29 September 2020 to discuss planning and proposed changes to the public transport network.

Other than continued extension of Bus route 1 along Melksham Drive through Lower Stebbings towards Upper Stebbings as development progresses, GWRC advised that no significant changes to the existing bus network are proposed in this area. If Glenside West progressed with a road connection between Upper Stebbings and Tawa, GWRC also confirmed that they would likely consider extending Bus route 1 to terminate at the Takapu Road Train Station. A number of factors (including the presence of streams, steep topography and visual impacts of constructing a road across the ridgeline) make such a connection unviable.

No physical changes to the Kapiti train line through Tawa, such as a new station at Glenside West, are being considered at this stage[3]. However, several minor changes to improve the functionality and attractiveness of the rail service are being considered including;

- Additional parking provision for Takapu Road Station, such as further development of Council land or additional leasing of space from Outlet City. However, there is limited space available and GWRC are unlikely to be able to easily increase park and ride at this station;
- Improved, all weather cycle storage options at stations, and limiting or removing cycle carriage on peak hour services where seating space is at a premium;
- Increasing peak hour frequency of services; and
- Options to manage park and ride parking demand such as pricing of spaces and bus route links are being considered as part of a GWRC review.

These changes are expected to continue to drive public transport uptake in Tawa, Churton Park and the new Development Concept areas. GWRC also requested that the Development Concept include bus stops and direct walking and cycling links between subdivision access roads, the bus routes and Takapu Road Train Station. This will be important to facilitate public transport use by residents of the new Development Concept areas. Based on the census data for travel to work and education trips by public transport, the level of potential increase in demand for these services from the Development Concept areas can be estimated.

[3] GWRC advised that they have previously considered a new station at Glenside West in response to community interest. This was not progressed due to the environmental impact on the Porirua Stream, a lack of space to form the necessary infrastructure and the low number of people within easy walking distance of proposed station locations. This may be re-visited with future network changes but not considered as a transport option for Upper Stebbings and Glenside West developments as part of this assessment.

4 Proposed Development Concept

4.1 Proposed development concept

The Development Concept has been prepared by Isthmus, Orogen and Morphum. Three external road connections are proposed to Lower Stebbings (Melksham Drive and Rochdale Drive) and to Churton Park from the Reedy Block as shown in Figure 4-1 below.

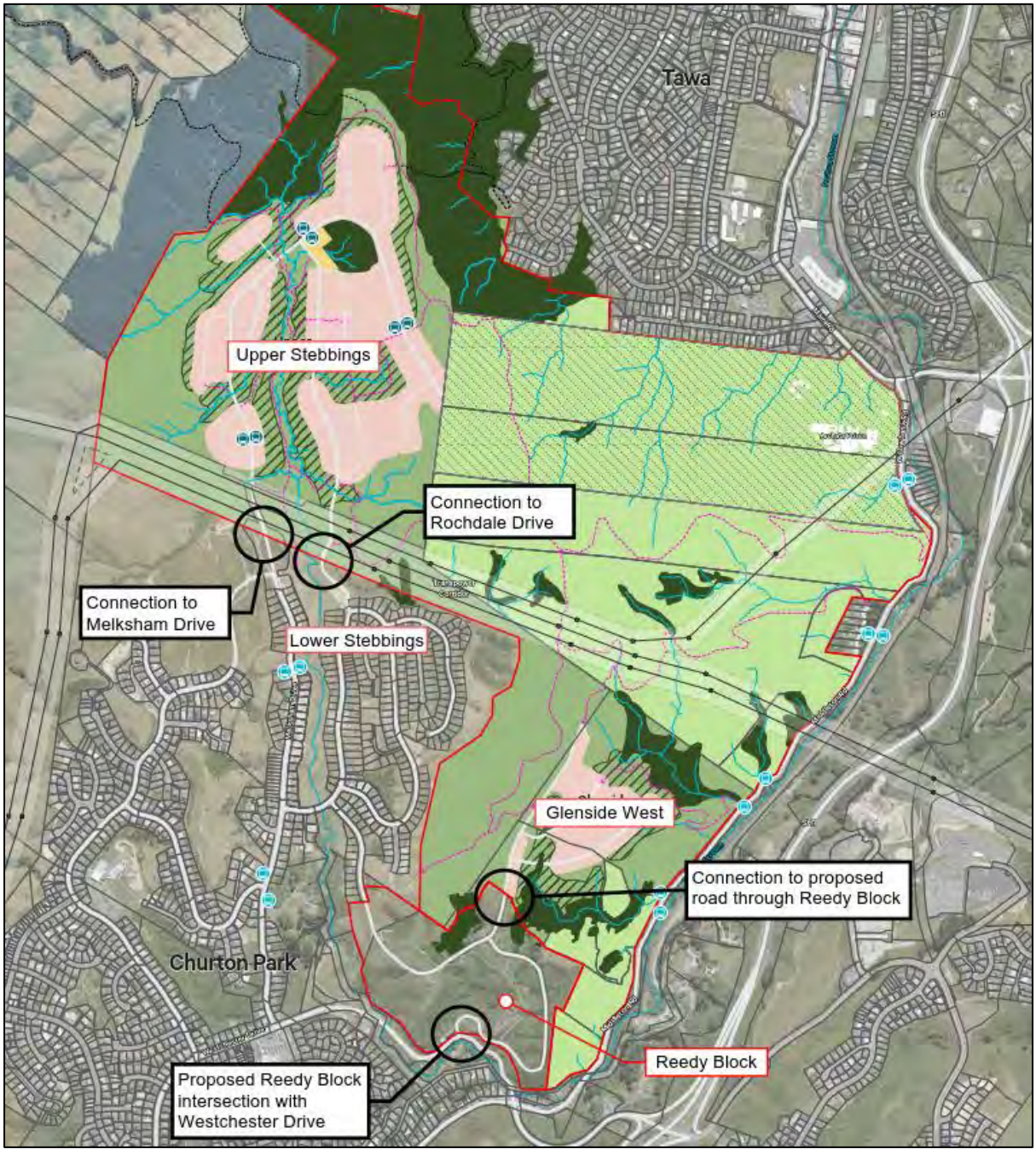


Figure 4-1 Proposed external road connections

Upper Stebbings has an estimated development yield of approximately 533 dwellings. Glenside West has a yield range of 86 to 137 dwellings located in the lower reach of the Development

Concept area adjacent to the Reedy Block. Proposed bus stops and cycling/walking connections are shown in the above Figure.

4.2 Road network

4.2.1 Layout

The Development Concept is shown on figure 4-1 above and in Appendix B.

4.2.2 Road hierarchy

The Melksham Drive extension through Upper Stebbings has been provided for as a Collector Route with a road reserve[4] width of 22m allowing for two traffic lanes, cycle lanes, parking, footpaths and berms. The NZS4404:2010 standard indicates this corridor width will also provide for public transport bus provision.

Other roads proposed through the Development Concept areas have been provided for as Local Roads with a road reserve width of 18m allowing for two traffic lanes, parking, footpaths and berms.

4.2.3 Gradient

The following maximum gradients have been applied;

- Collector road 1 in 10 (10%)
- Local road 1 in 8 (12.5%)

4.2.4 Intersections

New intersections within the Development Concept areas will be priority controlled. The Melksham Drive extension, as a higher road hierarchy, will have priority through all intersections with adjacent local roads.

As discussed previously in Section 4.1, new spine road connections to Churton Park and the Reedy Block will extend roads formed as part of those subdivisions, with no intersections required.

4.2.5 Alternative road connections considered

As part of the optioneering process to determine the road layout and connections for the Glenside West Development Concept area, a number of alternative road connections were considered but discounted. A summary of the assessment of these alternative road connections is provided below in Table 4.1.

Table 4.1 Alternative road connections considered

Connection	Description	Comments
Alternative connections between Upper Stebbings and Churton Park	Alternative to the proposed connection to Melksham Drive.	Proposed road connections for Upper Stebbings have been aligned to the designed road layout for Lower Stebbings/ Churton Park, ensuring continuity between the adjacent Development Concept areas. Alternative connections have not been considered as these roads have been designed to accommodate future connection to Upper Stebbings.

[4] Road reserve is the designated area of land for a road corridor (and associated functions such as footpaths, parking, berms, planting and utilities) between adjacent property boundaries.

Connection	Description	Comments
Alternative connections between Glenside West and the Reedy Block	Alternative to the proposed connection to the Reedy Block.	Proposed road connections for Glenside West have been aligned to the designed road layout for the Reedy Block, ensuring continuity between the adjacent Development Concept areas. Alternative connections have not been considered as these roads have been designed to accommodate future connection to Glenside West.
Connection between Glenside West and Lower Stebbings	Considered as a connection across Marshall Ridge (part of the Ridgeline Hilltops District Plan area) which extends between Glenside West and Lower Stebbings.	It is expected that there would be limited demand for this connection, with most residents of Glenside West expected to travel south via the Reedy Block connection. A road connection would require excessive cuts to achieve the required elevation changes (approximately 40m) to cross over this ridge between the roads on either side. The volume of earthworks required and restriction on the Development Concept area through the Ridgeline Hilltops area also means that this road may not achieve commercial viability or be consentable.
Connection between Upper Stebbings and Glenside West	Considered as a connection along Marshall Ridge (part of the Ridgeline Hilltops District Plan area) between the two Development Concept areas.	It is expected that there would be limited demand for this route, with few attractions encouraging residents of Glenside West to travel north to Upper Stebbings, and Melksham Drive providing a more convenient route south for residents of Upper Stebbings. In addition, the restriction on the Development Concept areas through the Ridgeline Hilltops area also means that this road may not achieve commercial viability or be consentable.
Connection between Upper Stebbings and Oriel Avenue	Considered as a connection across Marshall Ridge (part of the Ridgeline Hilltops District Plan area) which extends between Upper Stebbings and Tawa	A road connection would require excessive cuts to achieve the required elevation changes (approximately 140m) to cross over this ridge between the roads on either side. The volume of earthworks required, Significant Natural Areas to be crossed and the restriction on the Development Concept area for residential development through the Ridgeline Hilltops area also means that this road may not achieve commercial viability or be consentable.
Connection to Sunrise Boulevard	Considered as a connection to Tawa from Glenside West.	Sunrise Boulevard is a local road with a 15m wide road corridor and 12.5% gradient on the lower section. This limits the ability to retrofit to a collector standard and bus route required for the main route between Glenside West and Tawa. Consultation with residents on Sunrise Boulevard in 2017 also indicated a desire not to significantly increase traffic flows along this road.
Connection to Main Road between Sunrise Boulevard and Arohata Prison Access	Considered as a connection to Tawa from Glenside West.	A road connection would require earthworks and a winding alignment to achieve the required elevation changes between Marshall Ridge and Tawa (approximately 150m). The volume of earthworks required and slope profile restricting Development Concept area for residential development also means that this road may not achieve commercial viability or be consentable.

Connection	Description	Comments
Connections to Middleton Road and/ or Willowbank Road	Considered as a connection to Tawa from Glenside West.	Lower traffic flows compared with Main Road, with reduced capacity constraints. A road connection would require earthworks and a winding alignment to achieve the required elevation changes between Marshall Ridge and Tawa (approximately 150m). The volume of earthworks required and slope profile restricting the Development Concept developable areas also means that this road may not achieve commercial viability or be consentable.

4.3 Walking and cycling network

Pedestrian and cyclist permeability have been considered through the Development Concept areas and should be further refined in later planning and design stages. In summary;

- Footpaths have been assumed within the road typologies along all public roads formed within the Development Concept areas, although may be reduced to one side only for roads where the developable area is limited to one side of the road only;
- Width for pedestrian crossing points has been allowed for at each intersection in accordance with the Waka Kotahi Pedestrian Planning and Design Guide (PPDG);
- Access paths will be provided between parallel streets and cul-de-sac heads;
- Access paths will be provided to ensure a connected walking track network through the reserves created by the proposed Development Concept and the surrounding road network;
- Access paths to Middleton Road, Tawa and along the Marshall Ridge will be provided from and between the Development Concept areas;
- Initially, Melksham Drive may not have formal cycle lanes painted due to low traffic volumes meaning cyclists and vehicles will share the road space. The road reserve width will however allow for cycle lanes to be added as the development progresses and cyclists and traffic volumes warrant inclusion. Timing for the installation of these painted cycle lanes will be confirmed during detailed design;
- For local roads cyclists will be accommodated within the traffic lanes.

4.4 Public transport modes and accessibility

The Melksham Drive extension through Upper Stebbings will allow for a bus route. GWRC have advised that Route 1 will be extended accordingly as development progresses. A bus turnaround/ waiting area will be required to be provided at the end of each Development Concept stage.

No public transport routes are proposed to the Reedy Block and adjacent development proposed within the south part of Glenside West, and GWRC indicated that the number of dwellings proposed are unlikely to support a future service. Residents in this part of Glenside West will be able to walk to Middleton Road via the proposed access path to travel via public transport.

5 Appraisal of transport effects

5.1 Road safety

The Development Concept areas expected to have a legal speed limit of 50km/hr. Further to this, local roads should be designed to encourage slower speed environments of 20 to 40km/hr in accordance with the WCC COP-LD Table 1.

At concept level the plans show suitable intersection spacing and sight distance. This should be confirmed during detailed design, specifically;

- Vertical and horizontal geometry is designed to ensure Stopping Sight Distance (SSD) is achieved throughout the Development Concept areas;
- Intersections achieve Safe Intersection Sight Distance (SISD) on all approaches;
- Ensure a minimum spacing between intersections of 60m to reduce left-turn conflict overlap; and
- Clearly show intersection priority through environmental design and, if required, signage and markings.

The three external connections to Melksham Drive, Lower Stebbings and the Reedy Block extend existing roads, with no new intersections formed. These roads should be designed in a continuous manner with no abrupt changes in road widths or linear features to ensure safe transition between adjacent Development Concept areas.

As described in Section 2.7, the crash record indicates a higher than typical crash rate at the Westchester Drive/Middleton Road roundabout. This should be further assessed to determine improvements required, especially given the expected increase in traffic at this intersection as a result of further development.

Further assessment of Middleton Road and Willowbank Road (between Westchester Drive and Main Road) should consider if this road section could be made compliant with the WCC COP-LD Principal Road standard, however there are a number of physical constraints along this road corridor which limit the ability to practically achieve this standard.

Further investigation of the Main Road/Sunrise Boulevard pedestrian crossing should be considered to identify if there are existing safety issues contributing to the record of nose to tail crashes at this crossing.

No other significant crash clusters or trends were identified on the surrounding road network.

Road safety audits, including the Development Concept areas and the three external connections to Melksham Drive, Lower Stebbings and the Reedy Block, are recommended as design progresses to identify and address any specific safety concerns.

5.2 Road network

The proposed road hierarchy is considered suitable for the scale of development. The Melksham Drive extension is designated as a Collector Road, which allows for public transport provision, and potential extension into Corrections land if this is pursued in the future. Based on the topography and environmental constraints it is unlikely that the Glenside West roads will be extended to connect with Upper Stebbings or Tawa through the Development Concept area, meaning traffic on these roads will remain low supporting their designation as local roads.

The proposed maximum gradient for Melksham Drive (8%) is less than the maximum 10% specified in the WCC COP-LD Table 1 for a Collector Road. The proposed maximum gradient for local roads

(12.5%) exceeds the maximum 10% specified in the WCC COP-LD Table 1 but does comply with the maximum 12.5% gradient specified in NZS4404:2010. We are satisfied that the NZS4404:2010 standard is appropriate in this location, and that the maximum gradients proposed are not expected to result in concerns for residents of the Development Concept areas. Confirmation should be sought from WCC that this gradient, which complies with the New Zealand Standard for Land Development and Infrastructure but is slightly steeper than the maximum gradient permitted in the WCC COP-LD, is appropriate for the road to be vested in Council ownership as a public road.

The proposed roads provide logical and direct connections to the wider road network.

The road layout shows cul-de-sacs formed to access areas for Development Concept areas. We understand that road connectivity is restricted by vertical gradients and stream reserve areas. Paths are proposed to provide connectivity for pedestrians and cyclists, which we support to maximise pedestrian and cyclist connectivity between cul-de-sacs.

No-exit roads and lanes shall provide for road turning at the end of the road for an appropriate vehicle. Servicing requirements are described in Section 5.6. A GWRC approved bus turning area will be required at the end of the Melksham Drive extension to support the bus service.

5.3 Road capacity

We have assessed road capacity to identify how the surrounding road network will perform under increased traffic demand, especially for several key intersections where delay for drivers is expected to increase. As detailed below in Sections 5.3.1 to 5.3.4, we have;

- Assessed the current (2020) network performance and expected future (2043) performance under varying Development Concept scenarios;
- Forecast traffic flows to 2043 by scaling existing traffic volumes and adding in expected trips from developments in Churton Park, Lower Stebbings, Reedy Block, Upper Stebbings and Glenside West;
- Assessed five key intersections around the Development Concept areas; and
- Applied an industry standard intersection modelling package, SIDRA, to analyse the expected performance of each intersection as a high-level issues and opportunities study.

All five intersections assessed are expected to exceed an appropriate Level of Service (LOS F) by 2043 and will require further assessment to determine appropriate upgrades, and confirm through traffic volume monitoring when each upgrade is required.

5.3.1 Model scenarios assessed

Three scenarios have been considered for the assessment in forecast year 2043, specifically;

- The 2043 baseline scenario (includes Churton Park/Lower Stebbings developments and the Reedy Block development);
- A 2043 low density scenario (low density development, includes the baseline scenario and Upper Stebbings); and
- A 2043 high density scenario (high density development, includes the baseline scenario, Upper Stebbings and Glenside West development areas).

5.3.2 Forecast traffic flows

Applying the Stats NZ sourced travel mode data given in Section 2.2, we have estimated the peak hour private vehicle trips expected to be generated by new dwellings in these areas, as shown in Table 5.1 and Table 5.2 below.

Table 5.1 Estimated peak hour trip rate (calculated from Stats NZ data)

Suburb	Current Number of Dwellings	Estimated peak hour trip rate
		AM Peak; 80% travel to work + 50% travel to education **PM Peak; 80% travel to work**
Churton Park North	1,284	AM Peak 1,279 (1.00 trips per dwelling) PM Peak 1,030 (0.8 trips per dwelling)
Tawa Central	1,059	AM Peak 678 (0.64 trips per dwelling) PM Peak 551 (0.52 trips per dwelling)

Table 5.2 Estimated peak hour trips

Suburb	Proposed Number of dwellings	Peak hour trips
Churton Park/Lower Stebbings	578[5]	Applying proportions recorded for Churton Park North. AM Peak 1.00 trips per dwelling (578) PM Peak 0.8 trips per dwelling (462)
Reedy Block	191[6]	Applying proportions recorded for Churton Park North. AM Peak 1.00 trips per dwelling (191) PM Peak 0.8 trips per dwelling (153)
Upper Stebbings	533	Applying proportions recorded for Churton Park North. AM Peak 1.00 trips per dwelling (533) PM Peak 0.8 trips per dwelling (426)
Glenside West	137	Applying proportions recorded for Churton Park North. AM Peak 1.00 trips per dwelling (137) PM Peak 0.8 trips per dwelling (110)

We have undertaken the road capacity assessment at the higher end of the expected number of dwellings proposed for Glenside West, as a conservative measure due to the high-level nature of the modelling.

Expected trips have been assigned to the external road network using a gravity model prepared by T+T, which calculates the expected turning movements at each intersection assessed around the proposed Development Concept areas. Trip distribution has been assumed to follow approximately the same percentages as existing, except where directly affected by an increase in demand on the network (i.e. a new intersection or other Development Concept area connection). Trip distribution has also been estimated applying turning counts recorded by T+T in 2017 and factors assessed by T+T to assign traffic through the network based on expected origins/ destinations.

The traffic volumes estimated in the 2043 gravity model are in a range of approximately 30% of those predicted in the GWRC strategic model[7]. In general, the gravity model volumes were slightly higher, indicating a conservative approach. On this basis we are satisfied that the general assumptions in the changes in traffic volumes between 2020 and 2043 allowed for in the GWRC

[5] Estimated September 2020 from WCC GIS viewer on the number of lots without a dwelling (280 lots), consented lots shown on Beca Drawings 3322432-C-001 Revision G and 3322432-C-013 Revision C and estimate of remaining developable area (298). Roads assessed include Melksham Drive, Gatley Grove, Farnworth Terrace, Rochdale Drive, Poynton Grove, Crompton Avenue, Sanford Terrace, Midford Place, Bollington Rise, Amesbury Drive, Stockport Grove and Atherton Terrace.

[6] Refer lots for resource consented shown on Beca Drawing 3321886-S3-C-0002 Revision 1.

[7] Provided by email from Andrew Ford on 2 October 2020

Strategic Model are reflected in the gravity model, based on the standard traffic volume growth and population increase assumed.

5.3.3 Intersections assessed

The key intersections listed in Table 5.3 below were considered to be the most effected by the Development Concept areas in Upper Stebbings and Glenside West due to their proximity and location on higher volume collector and principal roads[8]. Other local intersections will likely also experience increased traffic as a result of Development Concept areas, but the impact of this growth is not expected to be as significant as the key intersections assessed.

Table 5.3: Existing intersections assessed

Intersecting Roads	Intersection Type
Main Road / Redwood Avenue	Roundabout
Main Road / Sunrise Boulevard	T-intersection
Main Road / Takapu Road / Willowbank Road / Boscobel Lane	Roundabout
Westchester Drive / Melksham Drive / Lakewood Avenue	Staggered Crossroads
Westchester Drive / Middleton Road / Westchester Drive East	Roundabout

5.3.4 Modelling results

The industry standard intersection modelling package, SIDRA[9], was used to analyse the expected performance of each intersection as a high-level issues and opportunities study. We have not modelled mitigation options as part of this study, and further analysis of intersections is recommended, including obtaining more up-to-date intersection turn counts as well as queue lengths to calibrate models for testing and design of mitigation options.

SIDRA modelling results are attached in Appendix D and summarised below.

Figure 5-1 and Figure 5-2 below show the Level of Service (LOS) expected at each key intersection during the morning and evening peak hours respectively. The following provides a guide to interpreting the figures;

- Each key intersection in shown in a different colour line;
- The three model scenarios assessed for each intersection are shown as solid, dashed and dotted lines respectively in the intersection colour[10]. These show that for the more intensive Development Concept scenarios, the intersection delays increase at a faster rate than the baseline scenario;
- The LOS thresholds, shown as horizontal black lines, indicates the performance of the intersection where it crosses the LOS thresholds over forecast years.
  - LOS A, B and C indicate that the intersection is performing well, with little or no delay or inconvenience for drivers;
  - LOS D indicates that there is noticeable delay and inconvenience for drivers;

[8] Refer road hierarchy discussed in Section 2.3

[9] SIDRA Intersection Version 9.0, Ackelik and Associates, 2020

[10] For some intersection such as Sushine Boulevard and Main Road (shown in orange), there is very little difference between the three development scenarios and the lines overlay one another.

  - LOS E and F indicate a high level of delay and inconvenience for drivers. At LOS F, the delays are usually unacceptable for drivers leading to a high likelihood of risk-taking behaviour.

- We recommend intervention to upgrade an intersection to improve capacity prior to it reaching LOS F, and that WCC should consider this as part of long-term planning. This is further summarised in Table 5.4 below.

Larger versions of these graphs are available in Appendix D.

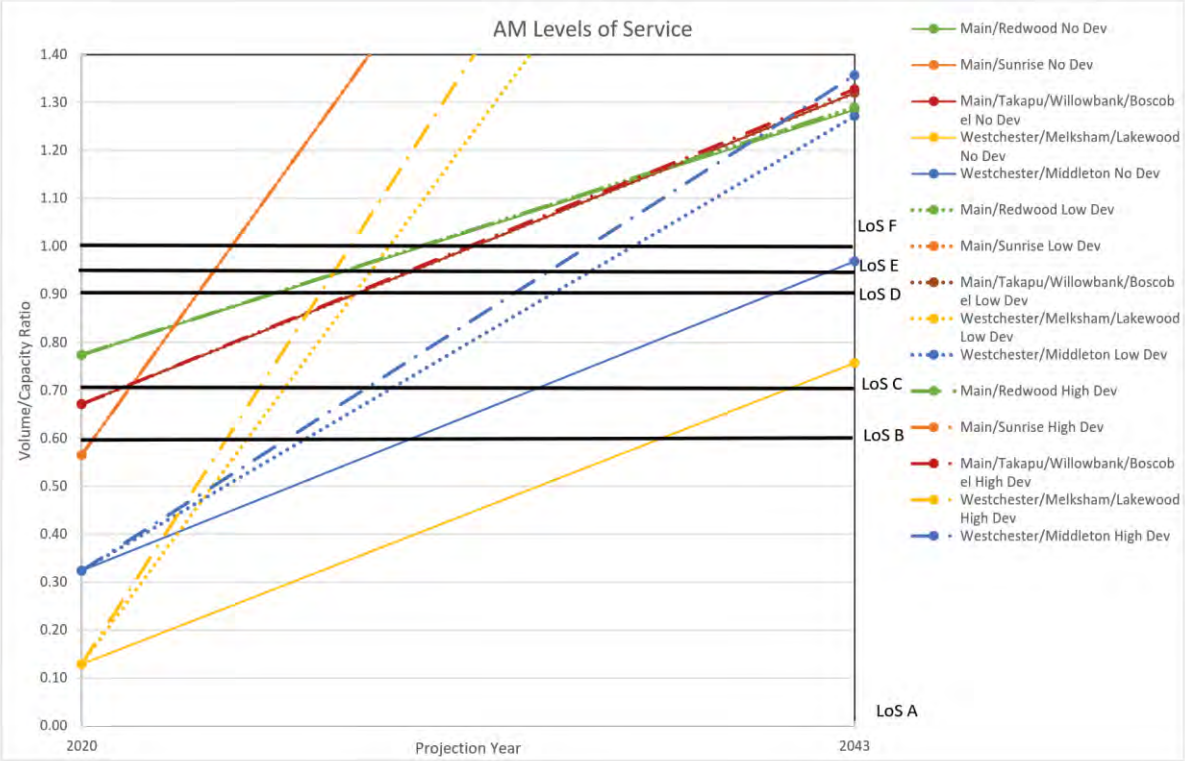


Figure 5-1: Morning Peak LOS Graph for all intersections, varying scenarios

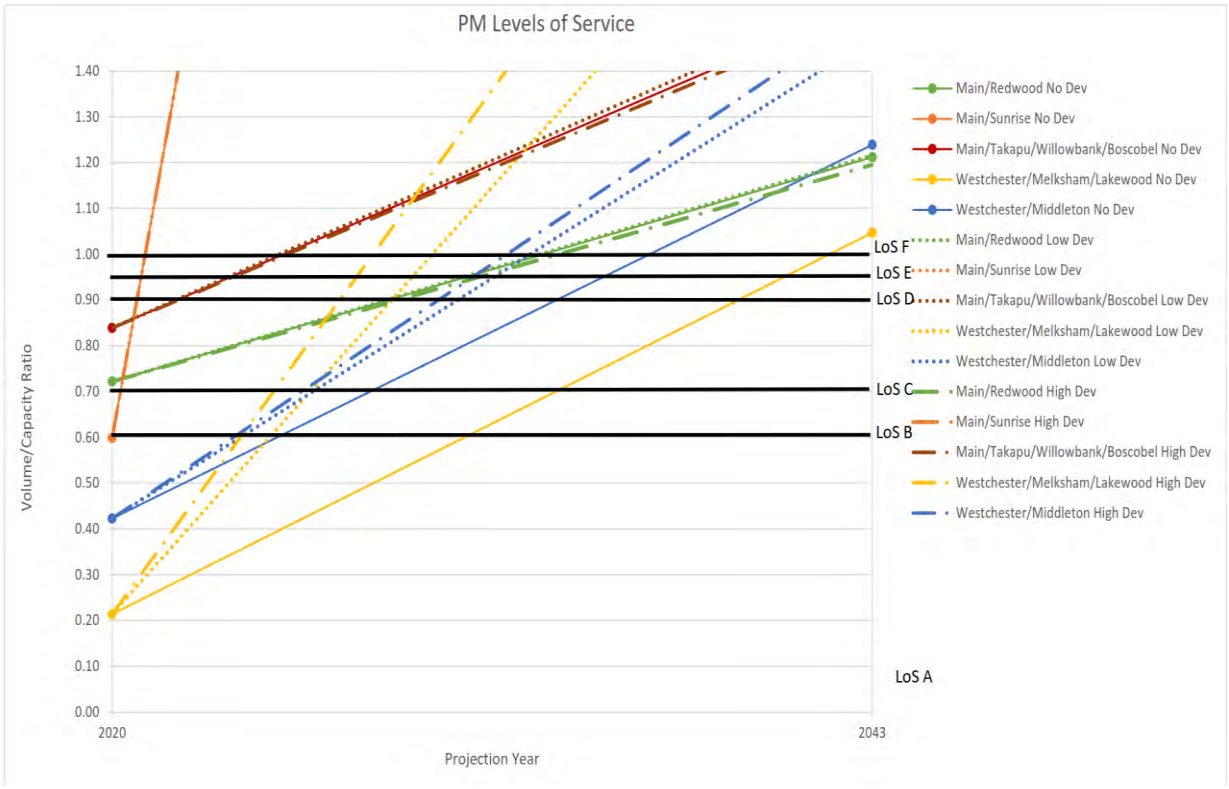


Figure 5-2: Afternoon Peak LOS Graph for all intersections, varying scenarios

Table 5.4: Expected earliest LOS 'F' year

Intersection	No Development (due to general traffic growth only)	Scenario 1 (Low Development) (including development of Upper Stebbings)	Scenario 2 (High Development) (including development of both Upper Stebbings and Glenside West)
Main Road / Redwood Avenue	AM = 2030 PM = 2033	AM = 2030 PM = 2033	AM = 2030 PM = 2033
Main Road / Sunrise Boulevard	AM = 2024 PM = 2021	AM = 2024 PM = 2021	AM = 2024 PM = 2021
Main Road / Takapu Road / Willowbank Road / Boscobel Lane	AM = 2032 PM = 2025	AM = 2032 PM =2025	AM = 2032 PM = 2025
Westchester Drive / Melksham Drive / Lakewood Avenue	AM = 2052 PM = 2042	AM = 2029 PM = 2030	AM = 2028 PM = 2028
Westchester Drive / Middleton Road / Westchester Drive East	AM = 2044 PM = 2036	AM = 2036 PM = 2033	AM = 2035 PM = 2032

The high-level modelling exercise undertaken shows that even without development in the Development Concept areas of Upper Stebbings and Glenside West, underlying capacity issues and projected population growth in Tawa is contributing to a requirement for capacity improvements in the short term, 1-5 year window on Main Road at Redwood Avenue, Takapu Road and Sunrise Boulevard. This indicates that the Development Concept areas do not in themselves have significant

impact or bring forward the need to invest in upgrade of those intersections. Other intersections reach an unsatisfactory LOS in later years as development increases over a longer timeframe.

5.4 Walking and cycling

Throughout this assessment we have assumed that the existing network(s) for pedestrians and cyclists remain in situ and do not erode in functionality or attractiveness.

The location of both Development Concept areas means that walking and cycling to work is likely to be limited due to the distance required to travel to workplaces in Tawa (7 km), Porirua City (12 km) or Wellington City (15 km). We expect a similar trip rate to that recorded for Churton Park during the 2018 census (0.03 trips per dwelling[11]), which equates to 4 trips from Glenside West and 16 trips from Upper Stebbings.

The nearest primary school (Amesbury) is located approximately 2 km from the Development Concept areas, which is considered unlikely to be close enough to significantly encourage alternative mode travel to education.

Walking and cycling is provided for short trips within the Development Concept areas through a continuous footpath network supported by off-road connections to and between cul-de-sacs and parallel streets. These are shown to link cohesively into the wider footpath network around Churton Park.

The design specifically provides width for future cycle lanes along Melksham Drive. Shared use along local roads meets Austroads[12] and Waka Kotahi[13] design guidance where traffic volumes are typically less than 300 vehicles per hour (typically 300 dwellings with one trip per dwelling in the peak hour, refer Section 2.2).

To further support amenity through the Development Concept areas, an additional route is recommended between Glenside West cul-de-sacs as shown in Figure 5-3 below.

Figure 5-3 Additional access route recommended for Glenside West

No details are provided in the consent drawings reviewed for the Reedy Block development regarding pedestrian connections. As shown in Figure 5-4 below, WCC should confirm that footpaths will be provided throughout the Development Concept areas, and that a suitable crossing facility is provided on Westchester Drive to link with the footpath on the southern side of the road

[11] Table 2.3, page 10.
[12] Figure 2.2, Cycling aspects of Austroads guides, 2017 (AP-G88-17)
[13] Waka Kotahi Cycle Network Guidance (CNG) portal Cycle route components between intersections, review date October 2020.

(there is no footpath along the northern side of Westchester Drive at this location). This will also provide amenity for residents within Glenside West.

Figure 5-4 Westchester Drive crossing to be confirmed

Recreational routes are shown along Marshall Ridge (connecting Upper Stebbings, Lower Stebbings and Glenside West), as well as across Marshall Ridge to Tawa, between Glenside West and Middleton Road, and along the numerous green/blue areas retained with the Development Concept areas. This provides an extensive and highly connected recreational network likely to be highly attractive to residents of the Development Concept areas.

Specific shared use/ walking only routes have not been assigned. We recommend as a minimum that a shared use route suitable for bicycles is provided along Marshall Ridge (between Upper Stebbings and Glenside West) and to Tawa (between Marshall Ridge and Willowbank Road). In addition, and as shown in Figure 5-5 below, we recommend WCC consider the following improvements to the external pedestrian and cycling facilities linking along Willowbank Road to Tawa;

- Ensure a crossing point across Willowbank Road between the Marshall Ridge access track and the existing footpath (provided on the Eastern side of Willowbank Road) has sufficient sight distance, and provide a suitable crossing facility;
- The existing footpath along Willowbank Road is of limited width and has poor surface condition. Consider upgrading the footpath to a shared path to facilitate a connection with Ara Tawa; and
- Provide a sealed connection to the Takapu Road Station Platform, with appropriate signage showing the route to pass under Main Road.

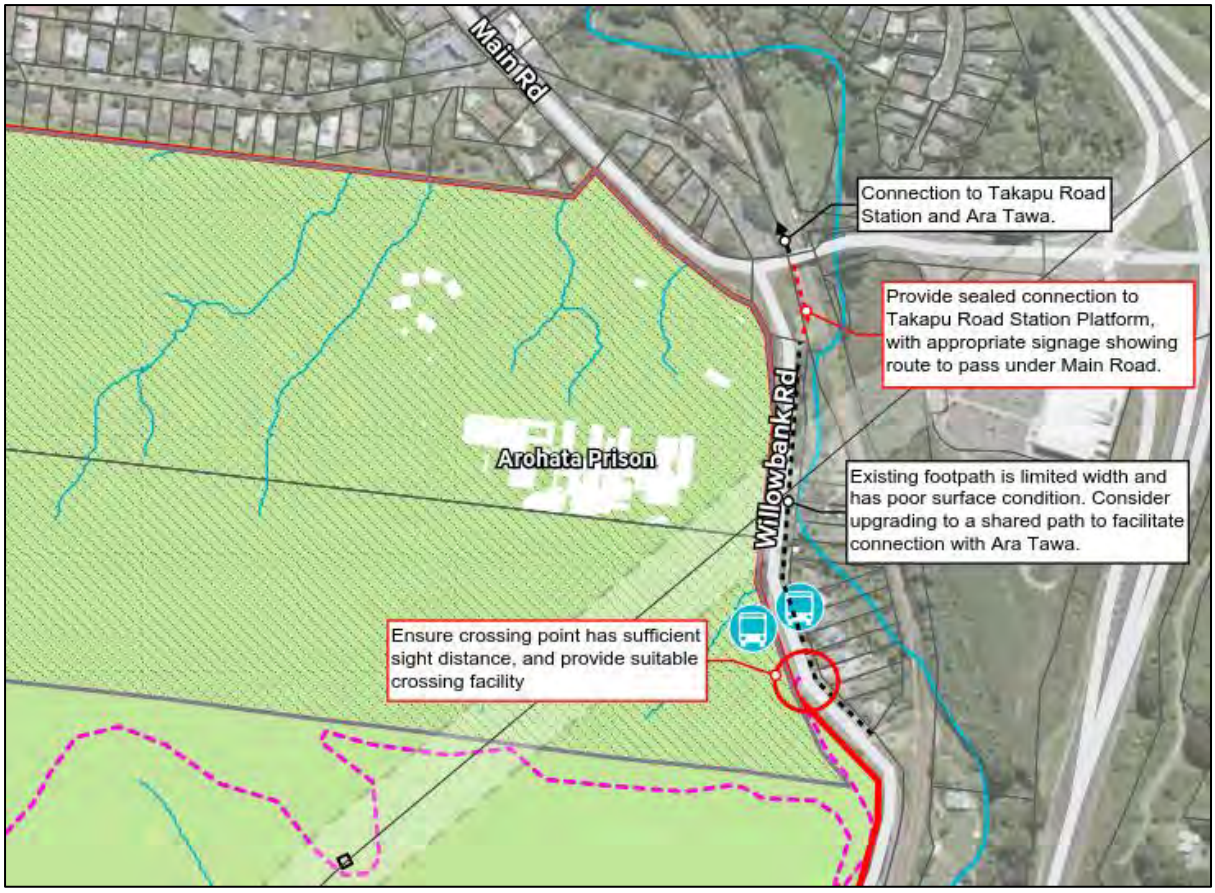


Figure 5-5 Recommended pedestrian and cycling improvements along Willowbank Road

5.5 Public transport

5.5.1 Bus

As described previously in Section 2.2, GWRC have indicated a bus service is unlikely to be provided to Glenside West. Residents who intend to take the bus will have to walk between approximately 600m and 1.2 km (depending on their location within Glenside West) to Bus Route 60 along Middleton Road. This is likely to appeal to only a small number of residents[14].

The existing bus stops on Middleton Road to be accessed from Glenside West do not have crossing or waiting facilities. To support residents using these stops, several improvements are recommended as shown on Figure 5-6 below;

- Provide a footpath connection from the Glenside West access track to the North bound bus stop;
- Ensure a crossing point to the southbound bus stop has sufficient sight distance, and provide a suitable crossing facility; and
- Provide bus shelters and seats in both directions for passengers waiting for the bus.

[14] Based on expected walking catchment sizes as described in Waka Kotahi Research Report 537 Improving the cost-benefit analysis of integrated PT, walking and cycling (2013)

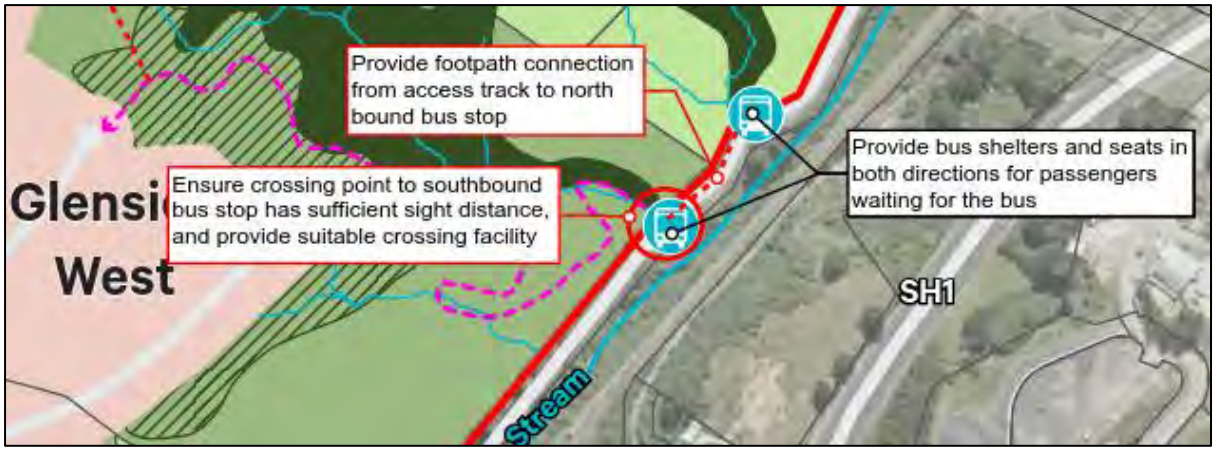
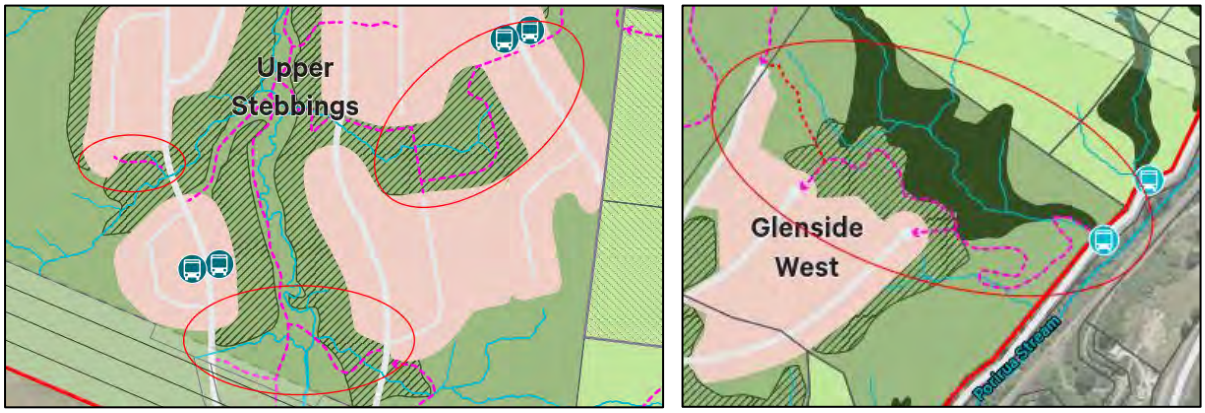


Figure 5-6 Recommended improvements to existing bus stops on Middleton Road for Glenside West residents

The Bus Route 1 extension through Upper Stebbings is expected to provide a high level of public transport accessibility, with approximately 80% of dwellings within 400m of a bus stop and all dwellings within 800m. This is expected to facilitate uptake of public transport for travel to work of between 0.29 and 0.44 trips per dwelling[15], or between 155 and 235 trips to/from Upper Stebbings.

GWRC have requested that bus stops and a bus turning and layover area at the end of Melksham Drive are identified early and provision made in the design plans.

For a number of residents, the most direct route to a bus stop is via an access track such as shown in Figures 5-7 and 5-8 below. Especially during winter when trips to and from work may be in the dark, residents will need to feel safe to continue using these tracks and by extension using the bus. Crime Prevention Through Environmental Design (CPTED) audits are recommended as design progresses to identify any specific items for attention.



Figures 5-7 and 5-8 Direct routes to bus stops via access tracks

5.5.2 Train

The distance (more than 2km) and lack of direct walking connections is likely to limit the attractiveness of existing train services for pedestrians within the Upper Stebbings and Glenside West development areas.

Residents are more likely to drive to park and ride facilities, or catch a bus service to Takapu Road or Johnsonville stations to travel by train. On the latter option, it is quicker, cheaper and more convenient for people travelling to the Wellington CBD to remain on a bus rather than transfer to

[15] Estimate based on the 2018 census data recorded for Churton Park and Tawa as described in Section 2.2.

train. There is no planned feeder bus service direct to the stations. Train users from the Upper Stebbings and Glenside West development areas are therefore likely to park and ride at the Takapu Road train station, or other stations in Redwood, Tawa or even potentially Johnsonville. This could lead to displacement of existing users towards other park and ride facilities, or increased demand for parking on the nearby streets and walking to the station. Given the very short train ride to the CBD and alternative of finding and paying for parking in the CBD, this is likely to remain an attractive option.

Surrounding streets near the park and ride are likely to experience increased parking demand pressure. WCC are encouraged to consider parking management on the local streets, potentially introducing parking time restrictions with resident or coupon parking zones to allow parking for longer periods.

As detailed in Section 3.3 of this report, GWRC are investigating several minor changes to improve the functionality and attractiveness of the rail service. These include improved cycle storage options, limiting or removing cycle carriage on peak hour services, increasing peak hour service frequency, accommodating active modes and emerging transport technologies such as mobility on demand drop off/pick up services, and options to manage park and ride parking demand such as pricing trials [16]. A feeder bus service is not being considered by GWRC for this area; however this may change if demand warrants a service.

A new station at Glenside West at 900m to 1.5km travel distance is further than the desirable walk catchment, but likely to have attractiveness for residents as a public transport alternative to bus services[17]. GWRC have advised a station at Glenside West is not planned at this stage.

5.6 Servicing

Servicing requirements in accordance with the WCC COP-LD shall be confirmed with the appropriate parties during subsequent design phases. As a minimum this should allow for;

- An 8.0m rigid truck for rubbish collection, furniture removal, etc; and
- Fire appliance access in accordance with F5-02-GD15.

5.7 Construction management

Construction access to the site will be available via existing roads previously constructed up to the boundaries of the sites, mitigating safety concerns of temporary accesses. We understand that a cut/fill balance is likely to be achieved on site, minimising the number of truck movements on the surrounding road network.

Prior to starting works on site, it is recommended that as per the Council's standard Construction Management Plan condition, the contractor shall prepare a Construction Traffic Management Plan (CTMP) for approval by WCC. For a site of this size and location, we recommend that the CTMP is a section within the overall Site Management Plan (SMP), rather than a standalone document.

Specific things to address in the CTMP are:

- Site access arrangements;
- Times and frequency of heavy vehicle movements;
- Parking provisions within the site (ensuring that all construction traffic parks off-street);
- How public access will be controlled along the boundaries of the site;

[16] Smarter Connections – A strategy for park and ride in the Wellington region, Metlink and GRWC (November 2018)

[17] Based on expected walking catchment sizes as described in Waka Kotahi Research Report 537 Improving the cost-benefit analysis of integrated PT, walking and cycling (2013)

- Methods for the public to contact the site manager for complaints;
- How the site will manage the site and truck movements to avoid tracking dirt and material onto the surrounding roads; and
- Estimated project duration.

In addition, for any works proposed in the road corridor, WCC approval of a Site-Specific Traffic Management Plan (SSTMP) will be required before works commence.

5.8 Rough order cost estimates

Rough order costs are provided to assist WCC with long term planning for transport network improvements. Costs have only been provided for improvements to the external road network.

These rough order cost estimates are based on;

- Waka Kotahi Standard Safety Intervention Toolkit, Version 1, February 2019; and
- Our experience of recent similar projects tendered within the Wellington Region.

A significant margin of uncertainty exists on the cost estimates and the contingency should be considered as part of the cost rather than a potential add on.

No allowance has been included for cost escalation beyond 2020.

COVID-19 impacts: The derived rates are based on information and data obtained prior to COVID-19 being declared a pandemic by the World Health Organisation. New Zealand subsequently entering COVID-19 Alert Level 4 "lockdown" plus the global economic impacts of COVID-19 will have an impact on the construction industry in at least the immediate and medium-term future. The significance and extent of COVID-19 impacts is uncertain at this time but likely to impact both labour and materials rates.

We have not made any attempt to allow for the impact of COVID-19 in this estimate and recommend you seek specialist economic advice on what budgetary allowances you should make for escalation and changed construction costs post COVID-19.

Table 5.5 Rough order cost estimates

Recommended improvement	Estimated year required	Rough order construction cost estimate
Middleton Road/ Westchester Drive intersection - Minor safety improvements such as signage and markings.	2020	$10k to $30k
Willowbank Road - Improvements to the external pedestrian and cycling facilities; • Widen existing footpath including new 1m high retaining wall; • Formalise connection to Takapu Road Station; and • Ancillary works such as signage, markings and crossings.	2020	$500k to $800k
Main Road/ Sunrise Boulevard intersection – Upgrade for safety and capacity	2024	$500k to $2m
Main Road/ Willowbank Road intersection – Upgrade for safety and capacity	2025	$500k to $2m
Westchester Drive/ Melksham Drive/ Lakewood Drive – Upgrade for safety and capacity	2028	$500k to $2m

Middleton Road - Improvements to the existing bus stops to be accessed from Glenside West	2030	$50k to $150k
Main Road/ Redwood Avenue intersection – Upgrade for safety and capacity	2030	$500k to $2m
Middleton Road/ Westchester Drive intersection – Upgrade for safety and capacity	2032	$500k to $2m

The estimate of costs to widen the Middleton Road and Willowbank Road carriageway to Principal Road standard has not been included in the above table of improvement options as it is not considered practically feasible due to the physical limitations, and whilst providing potential safety benefits, may not be warranted based on actual safety performance. If this was to be investigated as an option by WCC, the rough order cost range is estimated between $250k to $10m.

These cost estimates should be re-visited as part of further investigations and design for each improvement, which will quantify the work required and allow for a more accurate estimate of expected costs for inclusion in LTP budgets.

6 Conclusions and options

6.1 Conclusions

This Transportation Assessment report has been prepared to review the anticipated transportation effects of the proposed Upper Stebbings and Glenside West Development Concept areas for residential growth between Churton Park and Tawa, Wellington. WCC are proposing a Development Concept to facilitate development of between 619 and 670 new residential sites. The Development Concept will also include new roads and bus service extensions, footpaths and walking and cycling access tracks for access and amenity of the residents and to encourage a low speed environment.

Based on the review of potential transportation effects undertaken within this report, the following provides a summary of the key findings of this assessment:

- Existing safety concerns are identified for Middleton Road, Willowbank Road, the Middleton Road/ Westchester Drive intersection and Main Road/Sunrise Boulevard intersection. Safety improvement options are recommended to address these;
- We expected that the proposed Development Concept areas will be able to satisfy appropriate safety outcomes for a residential road network, with further stages of design review and safety auditing;
- The proposed road hierarchy is assessed to be appropriate for the scale of development in terms of traffic impact;
- The proposed roads provide logical and direct connections to the wider road network;
- Without intervention, high-level modelling indicates that all key intersections around the Development Concept areas are likely to experience LOS F on at least one approach in either the morning or afternoon peak, or possibly both, in all Development Concept scenarios modelled within the next 15 years.

  Even without development in the Development Concept areas of Upper Stebbings and Glenside West, underlying capacity issues and projected population growth in Tawa is contributing to a requirement for capacity improvements in the short term, 1-5 year window from 2020 on Main Road at Redwood Avenue, Takapu Road and Sunrise Boulevard. This indicates that the Development Concept areas do not in themselves have significant impact or bring forward the need to invest in upgrade of those intersections.

  The two key intersections in Churton Park will experience LOS F sooner than is otherwise expected as a result of the Development Concept areas, with intervention required at various trigger years within the medium timeframe (5-10+ years from 2020). Further detailed modelling of intersection capacity improvement options is recommended;
- An extensive and highly connected recreational path network will be provided along the blue and green corridors around and through the Development Concept areas;
- The location of both Development Concept areas means that walking and cycling to work is likely to be limited due to the travel distances and topography involved between home and workplace;
- We understand from GWRC that a bus service is unlikely to be provided to Glenside West, with the nearest service along Middleton Road for the Glenside West Development Concept area;
- The Bus Route 1 extension through Upper Stebbings signalled by GWRC is expected to provide a high level of public transport accessibility for that Development Concept area; and
- Surrounding streets near the Takapu Train Station park and ride are likely to experience increased parking demand pressure.

6.2 Transport improvement options and further work

The following transport improvement options have been identified by understanding existing issues (safety and capacity), as well as opportunities for improved connections between the Development Concept areas and existing public transport, walking and cycling networks. These options will provide alternative mode options and manage travel demand, as well as targeted areas for general traffic capacity improvements.

Road safety (refer Section 5.1)

- Intersection spacing and sight distance should be confirmed during detailed design;
- Connections with existing roads should be designed in a continuous manner with no abrupt changes in road widths or linear features;
- Road safety audits are recommended as design progresses;
- Safety investigations/ improvements are recommended for specific intersections and mid-block road sections on the surrounding road network, specifically the Westchester Drive/Middleton Road roundabout. Further assessment of Middleton Road and Willowbank Road (between Westchester Drive and Main Road) should consider if this road section could be made compliant with the WCC COP-LD Principal Road standard, however there are a number of physical constraints along this road corridor which limit the ability to practically achieve this standard;
- Further investigation of the Main Road/Sunrise Boulevard pedestrian crossing should be considered to identify if there are existing safety issues contributing to the record of nose to tail crashes at this crossing.

Road layout (refer Section 5.2)

- No-exit roads and lanes shall provide for road turning at the end of the road for an appropriate vehicle;
- At the detailed design stage, confirmation should be sought from WCC that proposed road gradients, which all comply with the New Zealand Standard for Land Development and Infrastructure but in some cases are slightly steeper than the maximum gradients permitted in the WCC Code of Practice for Land Development, are appropriate for the roads to be vested in Council ownership as public roads.

Road capacity (refer Section 5.3)

- Upgrade the Main Road/ Sunrise Boulevard intersection for safety and capacity (estimated to be required in 2024 irrespective of development in Upper Stebbings and Glenside West);
- Upgrade the Main Road/ Willowbank Road intersection for safety and capacity (estimated to be required in 2025 irrespective of development in Upper Stebbings and Glenside West);
- Upgrade the Westchester Drive/ Melksham Drive/ Lakewood Drive for safety and capacity (estimated to be required in 2028);
- Upgrade the Main Road/ Redwood Avenue intersection for safety and capacity (estimated to be required by 2030 irrespective of development in Upper Stebbings and Glenside West); and
- Upgrade the Middleton Road/ Westchester Drive intersection for safety and capacity (estimated to be required by 2032).

Further detailed intersection modelling of intersection capacity improvement options is recommended. This will allow refinement of cost estimates for LTP budgeting.

Walking and cycling (refer Section 5.4)

- Additional investment in walking and cycling is recommended to provide routes between Glenside West cul-de-sacs;
- Footpaths through the Reedy Block and the crossing facility on Westchester Drive should be confirmed;
- Some of the recreational access routes should be made suitable for bicycles; and
- Improvements to the external pedestrian and cycling facilities along Willowbank Road.

Public transport (refer Section 5.5)

- Improvements are recommended including footpath connections from the Glenside West access track to Middleton Road bus stops and bus shelters and seats;
- Confirm the Bus Route 1 extension bus stop locations and turning facilities through Upper Stebbings to provide a high level of public transport accessibility; and
- Crime Prevention Through Environmental Design (CPTED) audits particularly of off-road bus access routes to identify any specific items for attention.
- WCC are encouraged to consider parking management on the local streets, potentially introducing parking time restrictions with resident or coupon parking zones to allow parking for longer periods.
- GWRC are investigating several minor changes to improve the functionality and attractiveness of the rail service. These include improved cycle storage options, limiting or removing cycle carriage on peak hour services, increasing peak hour service frequency, accommodating active modes and emerging transport technologies such as mobility on demand drop off/pick up services, and options to manage park and ride parking demand such as pricing trials
- A feeder bus service is not being considered by GWRC for this area; however this may change if demand warrants a service.

Servicing (refer Section 5.6)

- The Development Concept allows for adequate servicing including rubbish trucks and fire appliances. This is to be further confirmed in subsequent design stages, such as to confirm that kerbside parking does not impede servicing.

Construction management (refer Section 5.7)

- Prior to starting works on site, it is recommended that the contractor prepares a Construction Traffic Management Plan (CTMP) for approval.

Cost Estimates (refer Section 5.8)

- Rough Order Cost Estimates: The rough-order cost estimate ranges of $3.1M to $11M for the external road network improvements are based on a range of options contained in the Waka Kotahi Standard Safety Intervention Toolkit. Some of these improvements will be required to address population growth in the area, even in the absence of development in Upper Stebbings and Glenside West. A number of options, such as adding turning bays and additional lanes or upgrading to roundabouts or signals, are available to address safety and capacity improvements at these intersections. Cost estimates should be re-visited as part of further investigations and design for each improvement, which will quantify the work required and allow for a more accurate estimate of expected costs for inclusion in LTP budgets.

7 Referenced Documents

- .ID NZ, http://forecast.idnz.co.nz/wellington, September 2020;
- Auckland Motorway Alliance (AMA) Mobile Road https://mobileroad.org/index.html, September 2020;
- Austroads Cycling aspects of Austroads guides, 2017 (AP-G88-17);
- Fire and Emergency New Zealand (FENZ) Designers Guide to Firefighting Operations Emergency Vehicle Access Guide 2018 (F5-02-GD);
- Greater Wellington Regional Council (GWRC) Wellington Transport Strategy Model (WTSM), sourced via contact Andrew Ford, October 2019;
- Google Maps, sourced October 2020;
- Metlink Network Maps https://www.metlink.org.nz/getting-around/network-map/, sourced September 2020;
- Standards New Zealand | Paerewa Aotearoa NZS4404:2010 Standard for Land Development and Subdivision Infrastructure, October 2010 (NZS4404);
- Statistics New Zealand | Tatauranga Aotearoa (Stats NZ) 2018 Census place summaries https://www.stats.govt.nz/tools/2018-census-place-summaries/, 2018;
- Waka Kotahi, Crash Analysis System (CAS), accessed September 2020;
- Waka Kotahi Integrated Transport Assessment Guidelines - Research Report 422, November 2010 (Waka Kotahi RR422);
- Waka Kotahi Pedestrian planning and design guide, 2009 (PPDG);
- Waka Kotahi Research Report 453 Trips and Parking Related to Land Use, 2011 (Waka Kotahi RR453);
- Waka Kotahi Standard Safety Intervention Toolkit, Version 1, February 2019;
- Waka Kotahi Research Report 537 Improving the cost-benefit analysis of integrated PT, walking and cycling (2013) (Waka Kotahi RR 537);
- Wellington City Council, Code of Practice for Land Development, 2012 (WCC COP-LD); and
- Wellington City District Plan, March 2010 (District Plan).

8 Applicability

This report has been prepared for the exclusive use of our client Wellington City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

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Billy Rodenburg

Civil & Transport Engineer

Reviewed by:

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Ryan Dunn

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Authorised for Tonkin & Taylor Ltd by:

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Appendix A: Crash records detailed assessment

A1 Main Road / Redwood Avenue

There were two crashes recorded at the Main Road/Redwood Avenue roundabout during the assessment period;

- One non-injury crash occurred when a towed vehicle lost control; and
- One non-injury crash was a rear-end as a vehicle on Main Road slowed to allow a pedestrian to cross and the following vehicle mis-judged.

No discernible crash trends or clusters were identified at this intersection, and the reported crash rate does not exceed the threshold for typical crash rate assessment.

A2 Main Road / Sunrise Boulevard

There were three crashes recorded at the Main Road/Sunrise Boulevard intersection during the assessment period. All three crashes (one serious injury and two non-injury) occurred as a result of rear-end collisions where a vehicle slowed/stopped for a pedestrian crossing the road and the following vehicle failed to safely stop behind.

The reported crash rate does not exceed the threshold for typical crash rate assessment, however further investigation of the Main Road/Sunrise Boulevard pedestrian crossing should be considered to identify if there are existing safety issues contributing to the record of nose to tail crashes at this crossing.

A3 Main Road / Takapu Road/Willowbank Road/Boscobel Lane

There were 13 crashes recorded at the roundabout intersection of Main Road/Willowbank Road/Takapu Road/Boscobel Lane during the assessment period;

- A minor injury crash occurred when a vehicle manoeuvring into a parking space on Boscobel Lane was rear-ended by a vehicle following too closely and failing to stop;
- One non-injury crash was the result of a vehicle failure;
- Three non-injury crashes occurred with a driver under instruction (two in cars and one in a truck); and
- Seven non-injury crashes were the result of a driver failing to give way or stop for opposing traffic.

The typical crash rate calculated for this intersection[18] is 0.47 injury crashes per year, or 2.6 injury crashes during the 5.5 year assessment period. The crash rate recorded in CAS is less than this, indicating that this intersection does not have a high underlying risk of crashes. Table 8.1 below summarises the crash history for the intersection during the assessment period.

Table 8.1: Crash history for Main Road/Takapu Road/Willowbank Road/Boscobel Lane

Year	Fatal	Serious	Minor	Non-Injury	Total
2015	0	0	1	2	3

[18] Calculated in accordance with the Waka Kotahi Crash Estimation Compendium Section 6.2 Urban Roundabouts 50-70 km/h

2016	0	0	0	0	0
2017	0	0	0	2	2
2018	0	0	0	3	3
2019	0	0	0	4	4
2020	0	0	0	1	1
Total	**0**	**0**	**1**	**12**	**13**

A4 Westchester Drive / Middleton Road roundabout

A total of 13 crashes were recorded at the Westchester Drive / Middleton Road roundabout during the assessment period;

- Ten of the crashes occurred on the eastern approach of Middleton Road. The primary cause is failing to give way to vehicles approaching from Westchester Drive northern approach; and
- Three crashes were attributed to environmental causes and including one crash due to sunstrike and two crashes in slippery conditions.

The typical crash rate calculated for this intersection[19] is 0.29 injury crashes per year, or 1.6 injury crashes during the 5.5-year assessment period. The crash rate recorded in CAS exceeds this, indicating potential underlying safety concerns at this intersection.

No serious or fatal injury crashes were recorded, indicating that the urban speed environment is helping mitigate the severity of crashes. Table 8.2 below summarises the crash history for the intersection during the assessment period.

Table 8.2: Crash history for Westchester Drive / Middleton Road roundabout

Year	Fatal	Serious	Minor	Non-Injury	Total
2015	0	0	1	3	4
2016	0	0	0	2	2
2017	0	0	0	0	0
2018	0	0	2	2	5
2019	0	0	2	1	2
2020	0	0	0	0	0
Total	**0**	**0**	**5**	**8**	**13**

A5 Westchester Drive/Melksham Drive/Lakewood Avenue

A single was crash was recorded along the staggered two-legged intersection of Westchester Drive/Melksham Drive/Lakewood Avenue during the assessment period. The crash was a non-injury crash and was a result of excessive speed while turning right into Melksham Drive from Westchester Drive.

[19] Calculated in accordance with the Waka Kotahi Crash Estimation Compendium Section 6.2 Urban Roundabouts 50-70 km/h

No discernible crash trends or clusters were identified at this intersection, and the reported crash rate does not exceed the threshold for typical crash rate assessment.

A6 Middleton/ Willowbank Roads

A total of 23 crashes were recorded along Middleton Road and Willowbank Road between Westchester Drive and Main Road during the assessment period;

- A total of 20 crashes (three serious, six minor and 11 non-injury crashes) were single party crashes resulting from a loss of control. This is likely exacerbated by the narrow and winding road alignment as described in Section 2.3;
- One minor injury crash occurred when a driver failed to give way to approaching traffic;
- One minor injury crash occurred between a van and a cyclist. Details were disputed as to who was at fault; and
- One minor injury crash when people in a passing vehicle threw a bottle at a cyclist causing them to crash.

The typical crash rate calculated for this mid-block section of road[20] is 2.10 injury crashes per year, or 11.5 injury crashes during the 5.5 year assessment period. The crash rate recorded in CAS (12 injury crashes during this period) broadly matches this.

The typical crash rate midblock calculation includes adjustment for the horizontal alignment, lane width and shoulder width. If compliant with the WCC COP-LD Principal Road standard, the Waka Kotahi Crash Estimation Compendium model indicates that the number of injury crashes recorded could be expected to approximately halve.

[20] Calculated in accordance with the Waka Kotahi Crash Estimation Compendium Section 6.2 Urban Roundabouts 50-70 km/h

Appendix B: Upper Stebbings & Glenside West Development Concept

- **Isthmus Development Concept, Proposed Concept Layout, October 2020**

Legend.

- Proposed residential area
- Proposed park & play area
- Draft Significant Natural Areas
- Proposed natural open space
- Proposed open space
- Existing rural area
- Existing Transpower corridor
- Existing streams
- Main roads
- Existing walking tracks
- Proposed walking tracks
- Existing bus stop
- Indicative future bus stop
- Department of Corrections Land*
- Study area

*This Crown owned land is managed by Corrections. The Crown has not made any decisions on the use or availability of this land for anything other than the Corrections purpose and its Treaty of Waitangi settlement obligations.

DRAFT

Stebbings Structure Plan.

Proposed Concept Layout.

Isthmus. orogen MORPHUM Absolutely Positively Wellington City Council Me Heke Ki Pōneke

1:5000 scale @ A1

0m 100m 300m 500m

Job: 4327 Date: 09.10.2020

Appendix C: Traffic volumes

- **Supporting information including pneumatic tube counts provided by WCC, Mobile Road estimates and turning counts recorded by T+T in 2017;**
- **2020 modelled values; and**
- **2043 base modelled values.**

Table A1 Traffic volumes

Road	Supporting information	2020 modelled values			2043 base modelled values		
		Heavy Commercial Vehicles (HCVs, %)	**2020 Average daily traffic (ADT, vehicles)**	**2020 peak hour volumes (vehicles)**	**Heavy Commercial Vehicles (HCVs, %)**	**2043 Average daily traffic (ADT, vehicles)**	**2043 peak hour volumes (vehicles)**
Boscobel Lane	Mobile Road estimate (2020) south of the Takapu Road roundabout showed; • 448 vehicles Average Daily Traffic (ADT); and • 6% HCVs. WCC count (2020) undertaken Main Rd To Main Rd-Willowbank Rd roundabout (449) showed; • 508 vehicles for 5-day Average Daily Traffic (ADT); • 64 vehicles (13% of ADT) recorded during AM peak, of which 24 (38%) were travelling northbound towards the Takapu Road roundabout; • 49 vehicles (10% of ADT) recorded during AM peak, of which 13 (27%) were travelling northbound towards the Takapu Road roundabout; and • 6.1% HCVs recorded during the survey period.	6% (2020 count applied)	508 (count date within the last year, no adjustment undertaken)	2020 counts applied • AM northbound; 24 • AM southbound; 40 • PM northbound; 13 • PM southbound; 36	6% (as per 2020 estimate)	896 (applying 2.5% annual growth factor to 2020 ADT)	Estimated 13% and 10% ADT in morning and evening peak periods respectively and 70:30 trip distribution during peak periods as per WCC count. • AM northbound; 35 • AM southbound; 82 • PM northbound; 27 • PM southbound; 63
Lakewood Avenue (approach to Westchester Drive intersection)	Mobile Road estimate (2019) south of Westchester Drive showed; • 2060 vehicles Average Daily Traffic (ADT); and • 4% HCVs. WCC count (2017) undertaken on adjacent section of Lakewood Road outside #46 (between Burbank Crescent and Maywood Grove) showed; • 1,242 vehicles for 5-day Average Daily Traffic (ADT); • 82 vehicles (7% of ADT) recorded during AM peak, of which 45 (55%) were travelling eastbound towards Burbank Crescent; • 124 vehicles (10% of ADT) recorded during AM peak, of which 48 (39%) were travelling northbound towards Burbank Crescent; and • 2.2% HCVs recorded during the survey period.	4% (applying Mobile Road estimate)	2060 (Mobile Road estimate within the last year, no adjustment undertaken)	Estimated 10% ADT and 40:60 trip distribution during peak periods. • AM northbound; 124 • AM southbound; 82 • PM northbound; 82 • PM southbound; 124	4% (as per 2020 estimate)	2,590 (applying 1% annual growth factor to 2020 ADT)	Estimated 10% ADT and 40:60 trip distribution during peak periods. • AM northbound; 155 • AM southbound; 104 • PM northbound; 104 • PM southbound; 155

Road	Supporting information	2020 modelled values			2043 base modelled values		
		Heavy Commercial Vehicles (HCVs, %)	**2020 Average daily traffic (ADT, vehicles)**	**2020 peak hour volumes (vehicles)**	**Heavy Commercial Vehicles (HCVs, %)**	**2043 Average daily traffic (ADT, vehicles)**	**2043 peak hour volumes (vehicles)**
Main Road (southern approach to the Redwood Avenue Roundabout)	Mobile Road estimate (2019) showed; • 17,000 vehicles Average Daily Traffic (ADT); and • 5% HCVs. WCC count (2020) undertaken on adjacent section of Main Road outside #80 (between Redwood Avenue and The Drive) showed; • 18,497 vehicles for 5-day Average Daily Traffic (ADT); • 1,617 vehicles (9% of ADT) recorded during AM peak, of which 703 (43%) were travelling northbound towards Porirua; • 1,690 vehicles (9% of ADT) recorded during AM peak, of which 853 (50%) were northbound towards Porirua; and • 7.0% HCVs recorded during the survey period.	7% (2020 count applied	18,497 (WCC count higher than mobile road estimate, count within the last year, no adjustment undertaken)	2020 counts applied • AM northbound; 703 • AM southbound; 914 • PM northbound; 853 • PM southbound; 837	7% (as per 2020 estimate)	32,640 (applying 2.5% annual growth factor to 2020 ADT)	Estimated 9% ADT and 50:50 trip distribution during peak periods as per WCC count. • AM northbound; 1,469 • AM southbound; 1,469 • PM northbound; 1,469 • PM southbound; 1,469
Melksham Drive	Mobile Road estimate (2019) north of Westchester Drive showed; • 1,530 vehicles Average Daily Traffic (ADT); and • 12% HCVs. WCC count (2019) undertaken on adjacent section of Melksham Drive between Rochdale Drive and Amesbury Drive outside #287 showed; • 931 vehicles for 5-day Average Daily Traffic (ADT); • 19.6% HCVs recorded during the survey period.	12% (assuming Churton Park development is ongoing)	1,530 (Mobile Road estimate within the last year, no adjustment undertaken)	Estimated 10% ADT and 50:50 trip distribution during peak periods reflecting mix of residents leaving and contractors arriving to Churton Park Development. • AM northbound; 77 • AM southbound; 77 • PM northbound; 77 • PM southbound; 77	3% (applying Mobile Road estimate for Lakewood Avenue, assuming Churton Park and Upper Stebbings developments are complete)	1,923 (applying 1% annual growth factor to 2020 ADT))	With no development: 2043 ADT is 1924 vph; assume 10% in peak time with a 50:50 directional split maintaining 2020 split and assumption (WCC survey) AM northbound 96 AM southbound 96 PM northbound 96 PM southbound 96
Middleton Road (north of Westchester Drive)	WCC count (2020) undertaken between Glenside Rd To Middleton Rd-Westchester Dr roundabout showed; • 5,765 vehicles for 5-day Average Daily Traffic (ADT); • 645 vehicles (11% of ADT) recorded during AM peak, of which 264 (41%) were travelling northbound towards the Westchester Drive roundabout; • 538 vehicles (9% of ADT) recorded during AM peak, of which 255 (47%) were travelling northbound towards the Westchester Drive roundabout; and • 5.9% HCVs recorded during the survey period.	6% (2020 count applied)	5,765 (count date within the last year, no adjustment undertaken)	2020 counts applied • AM northbound; 264 • AM southbound; 381 • PM northbound; 247 • PM southbound; 288	6% (as per 2020 estimate)	10,173 (applying 2.5% annual growth factor to 2020 ADT)	Estimated 11% and 9% ADT in morning and evening peak periods respectively and 60:40 trip distribution during peak periods as per WCC counts. • AM northbound; 448 • AM southbound; 671 • PM northbound; 366 • PM southbound; 549
Redwood Avenue	Mobile Road estimate (2019) west of Main Road showed; • 1,730 vehicles Average Daily Traffic (ADT); and •2% HCVs.	3% (conservative estimate for local road)	1,730 (estimate within the last year, no adjustment undertaken)	Estimated 10% ADT and 70:30 trip distribution during peak periods. • AM eastbound; 121 • AM westbound; 52 • PM eastbound; 52 • PM westbound; 121	3% (as per 2020 estimate)	2,175 (applying 1% annual growth factor to 2020 ADT)	Estimated 10% ADT and 70:30 trip distribution during peak periods. • AM eastbound; 152 • AM westbound; 65 • PM eastbound; 65 • PM westbound; 152

Road	Supporting information	2020 modelled values			2043 base modelled values		
		Heavy Commercial Vehicles (HCVs, %)	**2020 Average daily traffic (ADT, vehicles)**	**2020 peak hour volumes (vehicles)**	**Heavy Commercial Vehicles (HCVs, %)**	**2043 Average daily traffic (ADT, vehicles)**	**2043 peak hour volumes (vehicles)**
Rowell's Road	Mobile Road estimate (2019) east of Middleton Road showed; • 220 vehicles Average Daily Traffic (ADT); and • 10% HCVs.	10% (applying Mobile Road estimate)	220 (estimate within the last year, no adjustment undertaken)	Estimated 10% ADT and 70:30 trip distribution during peak periods. • AM eastbound; 7 • AM westbound; 15 • PM eastbound; 15 • PM westbound; 7	10% (as per 2020 estimate)	277 (applying 1% annual growth factor to 2020 ADT)	Estimated 10% ADT and 70:30 trip distribution during peak periods. • AM eastbound; 8 • AM westbound; 19 • PM eastbound; 19 • PM westbound; 8
Reedy Block Connection	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated
Sunrise Boulevard	WCC count (2012) undertaken 285m west of Main Road outside #33 showed; • 408 vehicles for 5-day Average Daily Traffic (ADT); • 22 vehicles (5% of ADT) recorded during AM peak, of which 14 (66%) were travelling eastbound towards Main Road; • 55 vehicles (13% of ADT) recorded during AM peak, of which 10 (18%) were travelling eastbound towards Main Road; and • 0.1% HCVs recorded during the survey period.	3% (conservative estimate for local road)	408 (No adjustment, visual review of aerials shows no significant changes in land use or number of dwellings since count was undertaken)	Estimated 10% ADT and 70:30 trip distribution during peak periods. • AM eastbound; 29 • AM westbound; 12 • PM eastbound; 12 • PM westbound; 29	3% (as per 2020 estimate)	513 (applying 1% annual growth factor to 2020 ADT)	Estimated 10% ADT and 70:30 trip distribution during peak periods. • AM eastbound; 36 • AM westbound; 15 • PM eastbound; 15 • PM westbound; 36
Takapu Road	WCC count (2020) undertaken between Main Rd-Willowbank Rd roundabout to Takapu Rd-William Earp Pl roundabout; • 17,166 vehicles for 5-day Average Daily Traffic (ADT); • 1,312 vehicles (8% of ADT) recorded during AM peak, of which 690 (53%) were travelling westbound towards Main Road; • 1,603 vehicles (9% of ADT) recorded during AM peak, of which 835 (52%) were travelling westbound towards Main Road; and • 5.4% HCVs recorded during the survey period.	6% (2020 count applied)	17,166 (count date within the last year, no adjustment undertaken)	2020 counts applied • AM eastbound; 622 • AM westbound; 690 • PM eastbound; 768 • PM westbound; 835	6% (as per 2020 estimate)	30,291 (applying 2.5% annual growth factor to 2020 ADT)	Estimated 8% and 9% ADT in morning and evening peak periods respectively and 50:50 trip distribution during peak periods as per WCC counts. • AM eastbound; 1,212 • AM westbound; 1,212 • PM eastbound; 1,363 • PM westbound; 1,363
Westchester Drive (west of Middleton Road)	Mobile Road estimate (2019) west of Melksham Drive showed; • 4,520 vehicles Average Daily Traffic (ADT); and • 3% HCVs. WCC count (2020) undertaken on adjacent section between Middleton Rd-Westchester Dr roundabout To Lakewood Ave (425) showed; • 7,159 vehicles for 5-day Average Daily Traffic (ADT); • 688 vehicles (10% of ADT) recorded during AM peak, of which 417 (61%) were travelling eastbound towards Main Road; • 652 vehicles (9% of ADT) recorded during AM peak, of which 280 (43%) were travelling eastbound towards Main Road; and • 5.4% HCVs recorded during the survey period.	3% (applying Mobile Road estimate)	4,520 (estimate within the last year, no adjustment undertaken)	Estimated 10% ADT and 60:40 trip distribution during peak periods. • AM eastbound; 271 • AM westbound; 180 • PM eastbound; 180 • PM westbound; 271	3%	5,682 (applying 1% annual growth factor to 2020 ADT)	Estimated 10% ADT and 60:40 trip distribution during peak periods. • AM eastbound; 341 • AM westbound; 227 • PM eastbound; 227 • PM westbound; 341

Road	Supporting information	2020 modelled values			2043 base modelled values		
		Heavy Commercial Vehicles (HCVs, %)	**2020 Average daily traffic (ADT, vehicles)**	**2020 peak hour volumes (vehicles)**	**Heavy Commercial Vehicles (HCVs, %)**	**2043 Average daily traffic (ADT, vehicles)**	**2043 peak hour volumes (vehicles)**
Westchester Drive (between Grenada Drive and Middleton Road)	WCC count (2020) undertaken between SH1 overbridge and Westchester Drive Roundabout; • 8,388 vehicles for 5-day Average Daily Traffic (ADT); • 922 vehicles (11% of ADT) recorded during AM peak, of which 305 (33%) were travelling westbound towards Main Road; • 721 vehicles (9% of ADT) recorded during AM peak, of which 424 (59%) were travelling westbound towards Main Road; and • 6.9% HCVs recorded during the survey period.	7% (2020 count applied)	8,388 (count date within the last year, no adjustment undertaken)	2020 counts applied • AM eastbound; 617 • AM westbound; 305 • PM eastbound; 297 • PM westbound; 424	7% (as per 2020 estimate)	14,802 (applying 2.5% annual growth factor to 2020 ADT)	Estimated 11% and 9% ADT in morning and evening peak periods respectively and 60:40 trip distribution during peak periods as per WCC counts. • AM eastbound; 977 • AM westbound; 651 • PM eastbound; 533 • PM westbound; 799
Willowbank Road	WCC count (2020) undertaken between Middleton Road and the Main Road roundabout; • 5,209 vehicles for 5-day Average Daily Traffic (ADT); • 824 vehicles (16% of ADT) recorded during AM peak, of which 224 (27%) were travelling northbound towards the Main Road roundabout; • 463 vehicles (9% of ADT) recorded during AM peak, of which 238 (51%) were travelling northbound towards the Main Road roundabout; and • 5.6% HCVs recorded during the survey period.	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated	NA – model calculated

Appendix D: Traffic modelling results

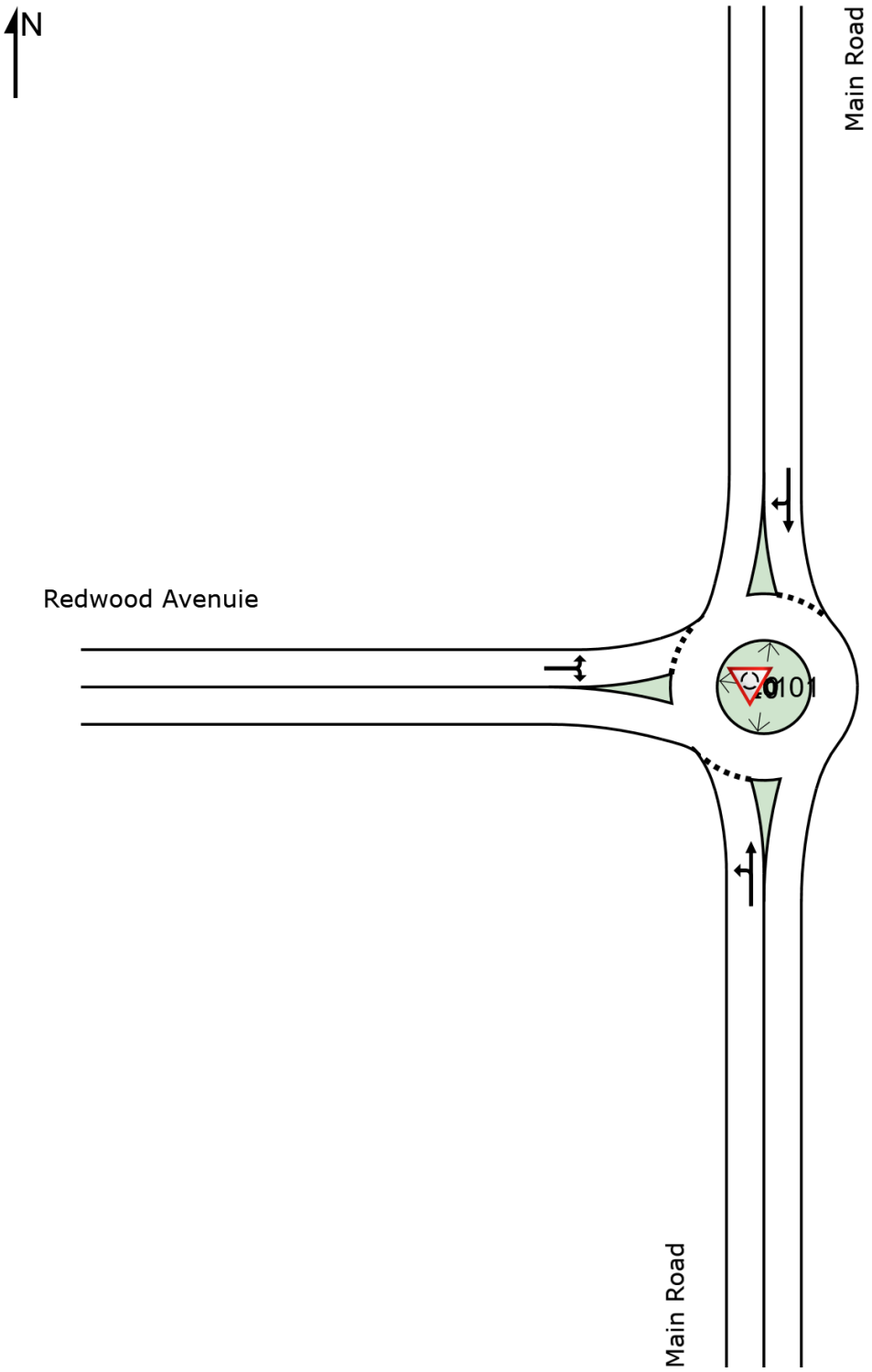
- **Main Road/ Sunrise Boulevard intersection**
- **Main Road/ Redwood Avenue intersection**
- **Main Road/ Willowbank Road intersection**
- **Westchester Drive/ Melksham Drive/ Lakewood Drive**
- **Middleton Road/ Westchester Drive intersection**

SITE LAYOUT

Site: 101 [Main-Redwood-2020- Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2020- Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	75	7.0	79	7.0	0.523	3.9	LOS A	5.4	40.3	0.19	0.40	0.19	41.2
2	T1	674	7.0	709	7.0	0.523	3.7	LOS A	5.4	40.3	0.19	0.40	0.19	45.2
Approach		749	7.0	788	7.0	0.523	3.7	LOS A	5.4	40.3	0.19	0.40	0.19	44.8
North: Main Road														
8	T1	896	7.0	943	7.0	0.774	5.3	LOS A	11.2	82.8	0.75	0.55	0.75	42.5
9	R2	18	7.0	19	7.0	0.774	8.4	LOS A	11.2	82.8	0.75	0.55	0.75	41.4
Approach		914	7.0	962	7.0	0.774	5.3	LOS A	11.2	82.8	0.75	0.55	0.75	42.5
West: Redwood Avenuie														
10	L2	15	3.0	16	3.0	0.189	9.2	LOS A	1.1	7.8	0.72	0.82	0.72	38.2
12	R2	106	3.0	112	3.0	0.189	12.2	LOS B	1.1	7.8	0.72	0.82	0.72	36.0
Approach		121	3.0	127	3.0	0.189	11.8	LOS B	1.1	7.8	0.72	0.82	0.72	36.3
All Vehicles		1784	6.7	1878	6.7	0.774	5.1	LOS A	11.2	82.8	0.51	0.50	0.51	43.0

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2020- Base Year_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	158	7.0	166	7.0	0.722	4.3	LOS A	9.9	73.5	0.40	0.42	0.40	40.1
2	T1	826	7.0	869	7.0	0.722	4.1	LOS A	9.9	73.5	0.40	0.42	0.40	44.2
Approach		984	7.0	1036	7.0	0.722	4.2	LOS A	9.9	73.5	0.40	0.42	0.40	43.6
North: Main Road														
8	T1	797	7.0	839	7.0	0.634	4.2	LOS A	7.8	57.7	0.40	0.43	0.40	43.9
9	R2	40	7.0	42	7.0	0.634	7.3	LOS A	7.8	57.7	0.40	0.43	0.40	42.8
Approach		837	7.0	881	7.0	0.634	4.3	LOS A	7.8	57.7	0.40	0.43	0.40	43.9
West: Redwood Avenuie														
10	L2	5	3.0	5	3.0	0.103	10.8	LOS B	0.6	4.5	0.80	0.83	0.80	37.0
12	R2	47	3.0	49	3.0	0.103	13.9	LOS B	0.6	4.5	0.80	0.83	0.80	34.6
Approach		52	3.0	55	3.0	0.103	13.6	LOS B	0.6	4.5	0.80	0.83	0.80	34.9
All Vehicles		1873	6.9	1972	6.9	0.722	4.5	LOS A	9.9	73.5	0.41	0.44	0.41	43.5

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2043- Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	130	7.0	137	7.0	0.911	4.5	LOS A	38.6	286.7	0.77	0.35	0.77	38.3
2	T1	1180	7.0	1242	7.0	0.911	4.4	LOS A	38.6	286.7	0.77	0.35	0.77	42.6
Approach		1310	7.0	1379	7.0	0.911	4.4	LOS A	38.6	286.7	0.77	0.35	0.77	42.2
North: Main Road														
8	T1	1446	7.0	1522	7.0	1.285	266.1	LOS F	256.7	1904.8	1.00	4.08	6.88	6.7
9	R2	30	7.0	32	7.0	1.285	269.2	LOS F	256.7	1904.8	1.00	4.08	6.88	6.6
Approach		1476	7.0	1554	7.0	1.285	266.1	LOS F	256.7	1904.8	1.00	4.08	6.88	6.7
West: Redwood Avenuie														
10	L2	18	3.0	19	3.0	0.668	47.4	LOS D	6.6	47.4	1.00	1.26	1.63	22.4
12	R2	134	3.0	141	3.0	0.668	50.5	LOS E	6.6	47.4	1.00	1.26	1.63	19.0
Approach		152	3.0	160	3.0	0.668	50.1	LOS E	6.6	47.4	1.00	1.26	1.63	19.4
All Vehicles		2938	6.8	3093	6.8	1.285	138.3	LOS F	256.7	1904.8	0.90	2.27	3.88	11.1

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2043- Base Year_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	255	7.0	268	7.0	1.212	198.5	LOS F	255.9	1898.5	1.00	2.02	3.62	6.5
2	T1	1334	7.0	1404	7.0	1.212	198.3	LOS F	255.9	1898.5	1.00	2.02	3.62	8.5
Approach		1589	7.0	1673	7.0	1.212	198.3	LOS F	255.9	1898.5	1.00	2.02	3.62	8.2
North: Main Road														
8	T1	1411	7.0	1485	7.0	1.119	115.9	LOS F	179.6	1332.7	1.00	1.34	2.49	13.0
9	R2	71	7.0	75	7.0	1.119	119.1	LOS F	179.6	1332.7	1.00	1.34	2.49	12.9
Approach		1482	7.0	1560	7.0	1.119	116.1	LOS F	179.6	1332.7	1.00	1.34	2.49	13.0
West: Redwood Avenuie														
10	L2	6	3.0	6	3.0	0.291	19.8	LOS B	2.1	15.3	1.00	1.00	1.00	31.9
12	R2	59	3.0	62	3.0	0.291	22.8	LOS C	2.1	15.3	1.00	1.00	1.00	28.8
Approach		65	3.0	68	3.0	0.291	22.5	LOS C	2.1	15.3	1.00	1.00	1.00	29.1
All Vehicles		3136	6.9	3301	6.9	1.212	155.8	LOS F	255.9	1898.5	1.00	1.68	3.03	10.2

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2043- Low Development_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	130	7.0	137	7.0	0.919	4.6	LOS A	41.7	309.2	0.81	0.34	0.81	38.1
2	T1	1192	7.0	1255	7.0	0.919	4.4	LOS A	41.7	309.2	0.81	0.34	0.81	42.4
Approach		1322	7.0	1392	7.0	0.919	4.4	LOS A	41.7	309.2	0.81	0.34	0.81	42.0
North: Main Road														
8	T1	1451	7.0	1527	7.0	1.290	269.7	LOS F	259.9	1928.3	1.00	4.12	6.94	6.6
9	R2	30	7.0	32	7.0	1.290	272.8	LOS F	259.9	1928.3	1.00	4.12	6.94	6.5
Approach		1481	7.0	1559	7.0	1.290	269.8	LOS F	259.9	1928.3	1.00	4.12	6.94	6.6
West: Redwood Avenuie														
10	L2	18	3.0	19	3.0	0.709	55.0	LOS E	7.3	52.5	1.00	1.30	1.73	20.7
12	R2	134	3.0	141	3.0	0.709	58.1	LOS E	7.3	52.5	1.00	1.30	1.73	17.3
Approach		152	3.0	160	3.0	0.709	57.7	LOS E	7.3	52.5	1.00	1.30	1.73	17.8
All Vehicles		2955	6.8	3111	6.8	1.290	140.2	LOS F	259.9	1928.3	0.92	2.29	3.93	11.0

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2043- Low Development_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	255	7.0	268	7.0	1.216	202.2	LOS F	259.0	1921.6	1.00	2.05	3.67	6.4
2	T1	1338	7.0	1408	7.0	1.216	202.1	LOS F	259.0	1921.6	1.00	2.05	3.67	8.4
Approach		1593	7.0	1677	7.0	1.216	202.1	LOS F	259.0	1921.6	1.00	2.05	3.67	8.1
North: Main Road														
8	T1	1420	7.0	1495	7.0	1.126	122.2	LOS F	186.2	1381.3	1.00	1.38	2.57	12.5
9	R2	72	7.0	76	7.0	1.126	125.4	LOS F	186.2	1381.3	1.00	1.38	2.57	12.4
Approach		1492	7.0	1571	7.0	1.126	122.4	LOS F	186.2	1381.3	1.00	1.38	2.57	12.5
West: Redwood Avenuie														
10	L2	6	3.0	6	3.0	0.291	19.7	LOS B	2.1	15.2	1.00	1.00	1.00	31.9
12	R2	59	3.0	62	3.0	0.291	22.8	LOS C	2.1	15.2	1.00	1.00	1.00	28.8
Approach		65	3.0	68	3.0	0.291	22.5	LOS C	2.1	15.2	1.00	1.00	1.00	29.1
All Vehicles		3150	6.9	3316	6.9	1.216	160.6	LOS F	259.0	1921.6	1.00	1.71	3.10	9.9

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2043- High Development_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	130	7.0	137	7.0	0.921	4.6	LOS A	42.5	315.3	0.82	0.34	0.82	38.0
2	T1	1195	7.0	1258	7.0	0.921	4.4	LOS A	42.5	315.3	0.82	0.34	0.82	42.4
Approach		1325	7.0	1395	7.0	0.921	4.5	LOS A	42.5	315.3	0.82	0.34	0.82	42.0
North: Main Road														
8	T1	1452	7.0	1528	7.0	1.290	270.4	LOS F	260.5	1933.1	1.00	4.13	6.96	6.6
9	R2	30	7.0	32	7.0	1.290	273.6	LOS F	260.5	1933.1	1.00	4.13	6.96	6.5
Approach		1482	7.0	1560	7.0	1.290	270.5	LOS F	260.5	1933.1	1.00	4.13	6.96	6.6
West: Redwood Avenuie														
10	L2	18	3.0	19	3.0	0.721	57.4	LOS E	7.5	54.1	1.00	1.31	1.75	20.2
12	R2	134	3.0	141	3.0	0.721	60.4	LOS E	7.5	54.1	1.00	1.31	1.75	16.9
Approach		152	3.0	160	3.0	0.721	60.1	LOS E	7.5	54.1	1.00	1.31	1.75	17.3
All Vehicles		2959	6.8	3115	6.8	1.290	140.5	LOS F	260.5	1933.1	0.92	2.29	3.94	11.0

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Redwood-2043- High Development_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	225	7.0	237	7.0	1.195	183.5	LOS F	239.9	1779.8	1.00	1.93	3.46	7.0
2	T1	1339	7.0	1409	7.0	1.195	183.3	LOS F	239.9	1779.8	1.00	1.93	3.46	9.1
Approach		1564	7.0	1646	7.0	1.195	183.3	LOS F	239.9	1779.8	1.00	1.93	3.46	8.8
North: Main Road														
8	T1	1422	7.0	1497	7.0	1.128	123.5	LOS F	187.5	1391.1	1.00	1.39	2.58	12.4
9	R2	72	7.0	76	7.0	1.128	126.7	LOS F	187.5	1391.1	1.00	1.39	2.58	12.3
Approach		1494	7.0	1573	7.0	1.128	123.6	LOS F	187.5	1391.1	1.00	1.39	2.58	12.4
West: Redwood Avenuie														
10	L2	6	3.0	6	3.0	0.303	20.7	LOS C	2.2	16.0	1.00	1.00	1.00	31.5
12	R2	59	3.0	62	3.0	0.303	23.7	LOS C	2.2	16.0	1.00	1.00	1.00	28.3
Approach		65	3.0	68	3.0	0.303	23.4	LOS C	2.2	16.0	1.00	1.00	1.00	28.7
All Vehicles		3123	6.9	3287	6.9	1.195	151.4	LOS F	239.9	1779.8	1.00	1.65	2.99	10.4

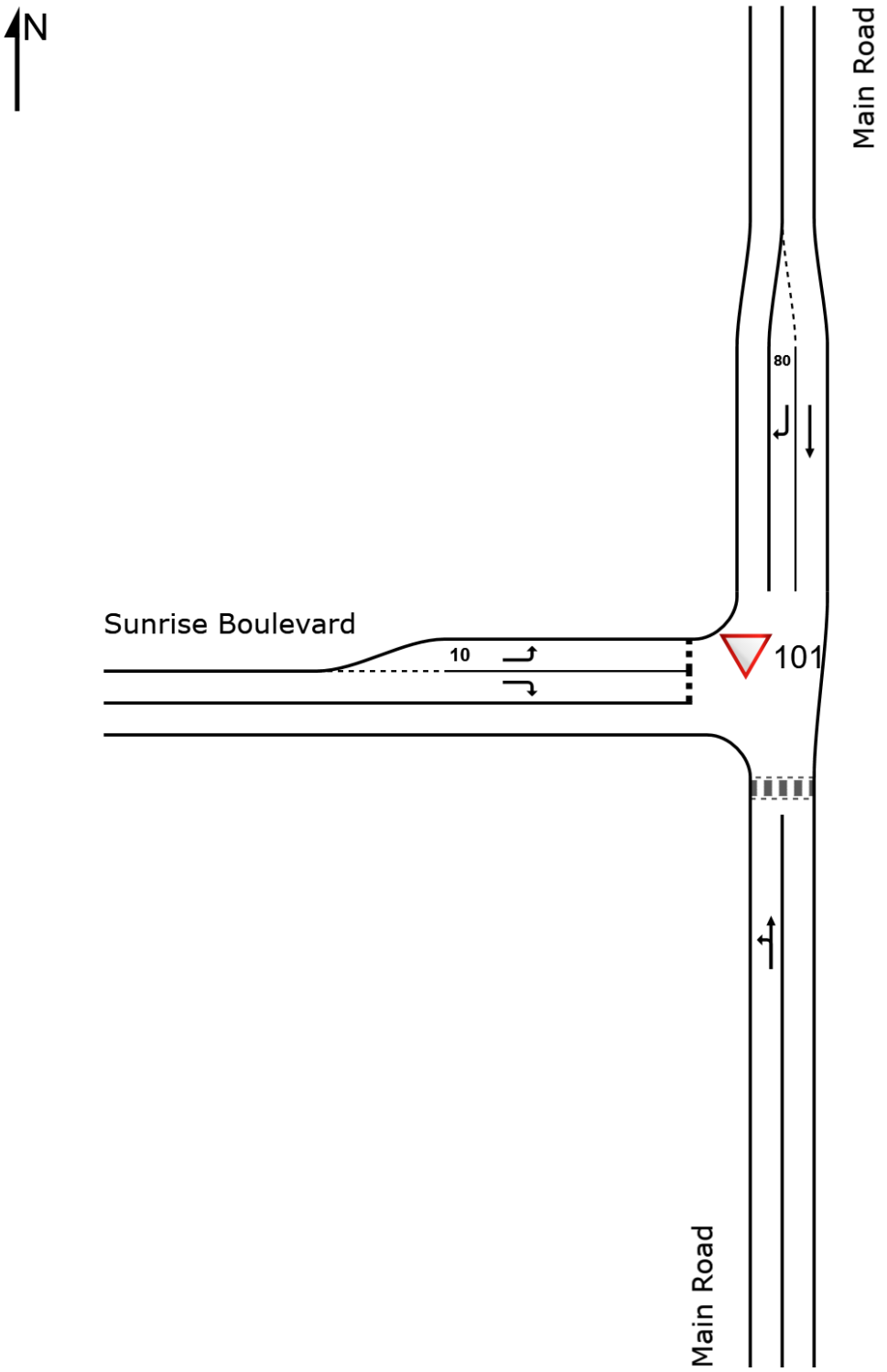
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Main-Sunrise-2020 - Base Year_AM (Site Folder: General)]

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

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2020 - Base Year_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	56	7.0	59	7.0	0.454	4.8	LOS A	0.0	0.0	0.00	0.04	0.00	46.4
2	T1	733	7.0	772	7.0	0.454	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	49.2
Approach		789	7.0	831	7.0	0.454	0.4	NA	0.0	0.0	0.00	0.04	0.00	49.0
North: Main Road														
8	T1	976	7.0	1027	7.0	0.565	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.5
9	R2	25	7.0	26	7.0	0.045	10.0	LOS A	0.2	1.2	0.68	0.82	0.68	35.4
Approach		1001	7.0	1054	7.0	0.565	0.4	NA	0.2	1.2	0.02	0.02	0.02	49.0
West: Sunrise Boulevard														
10	L2	16	3.0	17	3.0	0.018	6.4	LOS A	0.0	0.3	0.42	0.67	0.42	40.4
12	R2	13	3.0	14	3.0	0.150	39.5	LOS E	0.4	2.7	0.93	0.97	0.95	20.5
Approach		29	3.0	31	3.0	0.150	21.3	LOS C	0.4	2.7	0.65	0.81	0.66	28.4
All Vehicles		1819	6.9	1915	6.9	0.565	0.7	NA	0.4	2.7	0.02	0.04	0.02	48.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2020 - Base Year_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	61	7.0	64	7.0	0.599	4.8	LOS A	0.0	0.0	0.00	0.03	0.00	46.3
2	T1	980	7.0	1032	7.0	0.599	0.2	LOS A	0.0	0.0	0.00	0.03	0.00	49.0
Approach		1041	7.0	1096	7.0	0.599	0.4	NA	0.0	0.0	0.00	0.03	0.00	48.9
North: Main Road														
8	T1	811	7.0	854	7.0	0.468	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
9	R2	32	7.0	34	7.0	0.108	16.1	LOS C	0.4	2.7	0.84	0.93	0.84	30.9
Approach		843	7.0	887	7.0	0.468	0.7	NA	0.4	2.7	0.03	0.04	0.03	48.5
West: Sunrise Boulevard														
10	L2	4	3.0	4	3.0	0.006	7.6	LOS A	0.0	0.1	0.57	0.73	0.57	39.2
12	R2	8	3.0	8	3.0	0.114	46.3	LOS E	0.3	2.0	0.94	0.98	0.94	18.7
Approach		12	3.0	13	3.0	0.114	33.4	LOS D	0.3	2.0	0.82	0.89	0.82	22.8
All Vehicles		1896	7.0	1996	7.0	0.599	0.8	NA	0.4	2.7	0.02	0.04	0.02	48.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2043 - Base Year_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	98	7.0	103	7.0	0.797	4.9	LOS A	0.0	0.0	0.00	0.04	0.00	45.6
2	T1	1286	7.0	1354	7.0	0.797	0.4	LOS A	0.0	0.0	0.00	0.04	0.00	48.2
Approach		1384	7.0	1457	7.0	0.797	0.7	NA	0.0	0.0	0.00	0.04	0.00	48.0
North: Main Road														
8	T1	1540	7.0	1621	7.0	0.890	0.8	LOS A	0.0	0.0	0.00	0.00	0.00	47.4
9	R2	40	7.0	42	7.0	0.556	78.0	LOS F	1.7	12.9	0.98	1.06	1.22	13.5
Approach		1580	7.0	1663	7.0	0.890	2.8	NA	1.7	12.9	0.02	0.03	0.03	44.5
West: Sunrise Boulevard														
10	L2	20	3.0	21	3.0	0.056	11.5	LOS B	0.1	0.9	0.78	0.89	0.78	35.5
12	R2	16	3.0	17	3.0	2.807	2047.4	LOS F	12.4	88.7	1.00	1.33	2.51	0.6
Approach		36	3.0	38	3.0	2.807	916.4	LOS F	12.4	88.7	0.88	1.09	1.54	1.4
All Vehicles		3000	7.0	3158	7.0	2.807	12.8	NA	12.4	88.7	0.02	0.04	0.03	33.0

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2043 - Base Year_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	99	7.0	104	7.0	0.967	6.1	LOS A	0.0	0.0	0.00	0.03	0.00	42.8
2	T1	1583	7.0	1666	7.0	0.967	2.2	LOS A	0.0	0.0	0.00	0.03	0.00	43.2
Approach		1682	7.0	1771	7.0	0.967	2.4	NA	0.0	0.0	0.00	0.03	0.00	43.1
North: Main Road														
8	T1	1414	7.0	1488	7.0	7.350	8707.1	LOS F	2698.2	20020.9	1.00	0.00	4.18	0.2
9	R2	56	7.0	59	7.0	9.825	8208.1	LOS F	55.1	408.9	1.00	1.43	2.80	0.2
Approach		1470	7.0	1547	7.0	9.825	8688.1	NA	2698.2	20020.9	1.00	0.05	4.13	0.2
West: Sunrise Boulevard														
10	L2	5	3.0	5	3.0	0.044	27.6	LOS D	0.1	0.7	0.93	0.97	0.93	25.7
12	R2	10	3.0	11	3.0	1.754	1256.0	LOS F	6.3	44.9	1.00	1.24	2.08	1.0
Approach		15	3.0	16	3.0	1.754	846.5	LOS F	6.3	44.9	0.98	1.15	1.70	1.5
All Vehicles		3167	7.0	3334	7.0	9.825	4038.0	NA	2698.2	20020.9	0.47	0.05	1.92	0.3

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2043 -Low Development_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	98	7.0	103	7.0	0.806	5.0	LOS A	0.0	0.0	0.00	0.04	0.00	45.6
2	T1	1302	7.0	1371	7.0	0.806	0.4	LOS A	0.0	0.0	0.00	0.04	0.00	48.1
Approach		1400	7.0	1474	7.0	0.806	0.7	NA	0.0	0.0	0.00	0.04	0.00	47.9
North: Main Road														
8	T1	1545	7.0	1626	7.0	0.893	0.9	LOS A	0.0	0.0	0.00	0.00	0.00	47.3
9	R2	40	7.0	42	7.0	0.610	91.2	LOS F	1.9	14.3	0.98	1.07	1.27	12.0
Approach		1585	7.0	1668	7.0	0.893	3.1	NA	1.9	14.3	0.02	0.03	0.03	44.0
West: Sunrise Boulevard														
10	L2	20	3.0	21	3.0	0.058	11.9	LOS B	0.1	1.0	0.79	0.90	0.79	35.3
12	R2	16	3.0	17	3.0	2.807	2045.3	LOS F	12.3	88.6	1.00	1.33	2.51	0.6
Approach		36	3.0	38	3.0	2.807	915.6	LOS F	12.3	88.6	0.88	1.09	1.55	1.4
All Vehicles		3021	7.0	3180	7.0	2.807	12.9	NA	12.3	88.6	0.02	0.04	0.04	32.9

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.
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2043 -Low Development_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	99	7.0	104	7.0	0.970	6.2	LOS A	0.0	0.0	0.00	0.03	0.00	42.6
2	T1	1587	7.0	1671	7.0	0.970	2.3	LOS A	0.0	0.0	0.00	0.03	0.00	42.9
Approach		1686	7.0	1775	7.0	0.970	2.5	NA	0.0	0.0	0.00	0.03	0.00	42.9
North: Main Road														
8	T1	1423	7.0	1498	7.0	7.329	8670.4	LOS F	2714.9	20144.9	1.00	0.00	4.19	0.2
9	R2	56	7.0	59	7.0	9.825	8206.5	LOS F	55.0	408.4	1.00	1.43	2.81	0.2
Approach		1479	7.0	1557	7.0	9.825	8652.8	NA	2714.9	20144.9	1.00	0.05	4.14	0.2
West: Sunrise Boulevard														
10	L2	5	3.0	5	3.0	0.045	28.2	LOS D	0.1	0.7	0.93	0.97	0.93	25.5
12	R2	10	3.0	11	3.0	1.754	1254.4	LOS F	6.3	44.9	1.00	1.24	2.08	1.0
Approach		15	3.0	16	3.0	1.754	845.7	LOS F	6.3	44.9	0.98	1.15	1.70	1.5
All Vehicles		3180	7.0	3347	7.0	9.825	4029.7	NA	2714.9	20144.9	0.47	0.05	1.93	0.3

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2043 -High Development_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	98	7.0	103	7.0	0.808	5.0	LOS A	0.0	0.0	0.00	0.04	0.00	45.6
2	T1	1306	7.0	1375	7.0	0.808	0.4	LOS A	0.0	0.0	0.00	0.04	0.00	48.1
Approach		1404	7.0	1478	7.0	0.808	0.7	NA	0.0	0.0	0.00	0.04	0.00	47.9
North: Main Road														
8	T1	1546	7.0	1627	7.0	0.894	0.9	LOS A	0.0	0.0	0.00	0.00	0.00	47.3
9	R2	40	7.0	42	7.0	0.625	95.2	LOS F	2.0	14.6	0.99	1.07	1.28	11.7
Approach		1586	7.0	1669	7.0	0.894	3.2	NA	2.0	14.6	0.02	0.03	0.03	43.9
West: Sunrise Boulevard														
10	L2	20	3.0	21	3.0	0.059	12.0	LOS B	0.1	1.0	0.79	0.90	0.79	35.2
12	R2	16	3.0	17	3.0	2.807	2044.8	LOS F	12.3	88.6	1.00	1.33	2.51	0.6
Approach		36	3.0	38	3.0	2.807	915.4	LOS F	12.3	88.6	0.88	1.09	1.55	1.4
All Vehicles		3026	7.0	3185	7.0	2.807	12.9	NA	12.3	88.6	0.02	0.04	0.04	32.9

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.
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Sunrise-2043 -High Development_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Main Road														
1	L2	99	7.0	104	7.0	0.970	6.2	LOS A	0.0	0.0	0.00	0.03	0.00	42.5
2	T1	1588	7.0	1672	7.0	0.970	2.3	LOS A	0.0	0.0	0.00	0.03	0.00	42.8
Approach		1687	7.0	1776	7.0	0.970	2.5	NA	0.0	0.0	0.00	0.03	0.00	42.8
North: Main Road														
8	T1	1425	7.0	1500	7.0	7.324	8661.3	LOS F	2718.5	20171.6	1.00	0.00	4.19	0.2
9	R2	56	7.0	59	7.0	9.825	8206.0	LOS F	55.0	408.3	1.00	1.43	2.81	0.2
Approach		1481	7.0	1559	7.0	9.825	8644.1	NA	2718.5	20171.6	1.00	0.05	4.14	0.2
West: Sunrise Boulevard														
10	L2	5	3.0	5	3.0	0.046	28.3	LOS D	0.1	0.7	0.93	0.97	0.93	25.4
12	R2	10	3.0	11	3.0	1.754	1254.0	LOS F	6.3	44.9	1.00	1.24	2.08	1.0
Approach		15	3.0	16	3.0	1.754	845.5	LOS F	6.3	44.9	0.98	1.15	1.70	1.5
All Vehicles		3183	7.0	3351	7.0	9.825	4027.3	NA	2718.5	20171.6	0.47	0.05	1.93	0.3

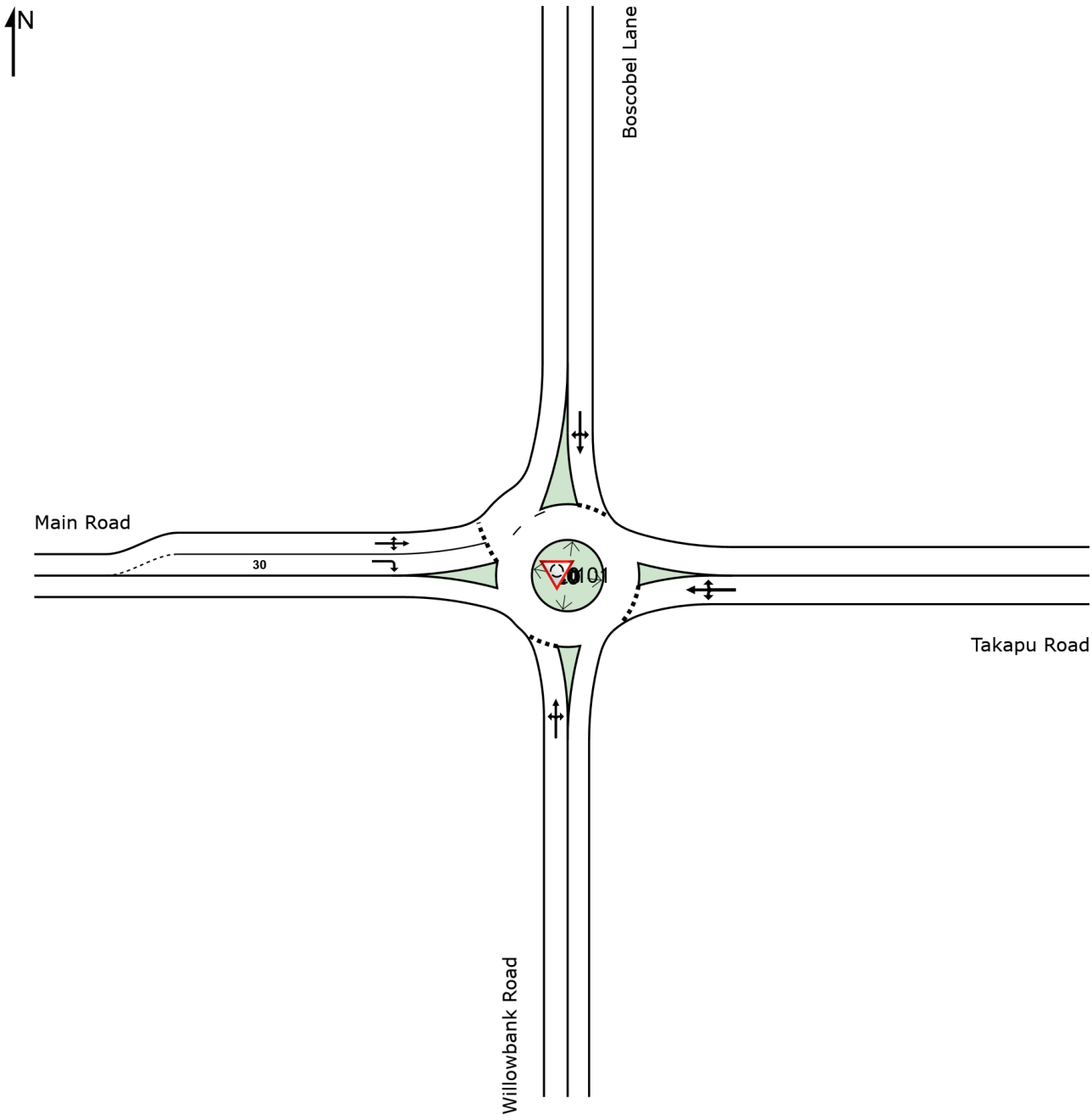
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Main-Takapu-Willow-2020 - Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2020 - Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	122	6.0	128	6.0	0.248	10.2	LOS B	1.7	12.3	0.85	0.86	0.85	40.5
2	T1	1	6.0	1	6.0	0.248	10.1	LOS B	1.7	12.3	0.85	0.86	0.85	41.3
3	R2	4	6.0	4	6.0	0.248	13.3	LOS B	1.7	12.3	0.85	0.86	0.85	40.2
Approach		127	6.0	134	6.0	0.248	10.3	LOS B	1.7	12.3	0.85	0.86	0.85	40.5
East: Takapu Road														
4	L2	32	6.0	34	6.0	0.671	7.0	LOS A	6.7	49.6	0.69	0.67	0.74	42.4
5	T1	658	6.0	693	6.0	0.671	6.8	LOS A	6.7	49.6	0.69	0.67	0.74	37.6
6	R2	1	6.0	1	6.0	0.671	10.1	LOS B	6.7	49.6	0.69	0.67	0.74	36.6
Approach		691	6.0	727	6.0	0.671	6.8	LOS A	6.7	49.6	0.69	0.67	0.74	38.0
North: Boscobel Lane														
7	L2	27	6.0	28	6.0	0.092	12.7	LOS B	0.6	4.1	0.84	0.80	0.84	21.7
8	T1	3	6.0	3	6.0	0.092	12.0	LOS B	0.6	4.1	0.84	0.80	0.84	26.4
9	R2	10	6.0	11	6.0	0.092	15.0	LOS B	0.6	4.1	0.84	0.80	0.84	24.3
Approach		40	6.0	42	6.0	0.092	13.2	LOS B	0.6	4.1	0.84	0.80	0.84	23.0
West: Main Road														
10	L2	3	5.0	3	5.0	0.482	4.1	LOS A	5.6	40.8	0.10	0.39	0.10	41.7
11	T1	785	5.0	826	5.0	0.482	3.7	LOS A	5.6	40.8	0.10	0.39	0.10	42.4
12	R2	202	5.0	213	5.0	0.179	6.9	LOS A	1.3	9.8	0.09	0.60	0.09	44.0
Approach		990	5.0	1042	5.0	0.482	4.3	LOS A	5.6	40.8	0.10	0.44	0.10	43.0
All Vehicles		1848	5.5	1945	5.5	0.671	5.9	LOS A	6.7	49.6	0.39	0.56	0.41	40.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2020 - Base Year_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	247	6.0	260	6.0	0.839	40.3	LOS D	12.3	90.4	1.00	1.46	2.06	27.3
2	T1	15	6.0	16	6.0	0.839	40.3	LOS D	12.3	90.4	1.00	1.46	2.06	27.0
3	R2	57	6.0	60	6.0	0.839	43.5	LOS D	12.3	90.4	1.00	1.46	2.06	25.8
Approach		319	6.0	336	6.0	0.839	40.9	LOS D	12.3	90.4	1.00	1.46	2.06	27.1
East: Takapu Road														
4	L2	28	6.0	29	6.0	0.807	9.4	LOS A	12.9	94.9	0.89	0.80	1.05	40.6
5	T1	790	6.0	832	6.0	0.807	9.3	LOS A	12.9	94.9	0.89	0.80	1.05	35.0
6	R2	18	6.0	19	6.0	0.807	12.5	LOS B	12.9	94.9	0.89	0.80	1.05	33.7
Approach		836	6.0	880	6.0	0.807	9.4	LOS A	12.9	94.9	0.89	0.80	1.05	35.3
North: Boscobel Lane														
7	L2	13	6.0	14	6.0	0.079	10.0	LOS A	0.5	3.5	0.83	0.75	0.83	23.4
8	T1	18	6.0	19	6.0	0.079	9.3	LOS A	0.5	3.5	0.83	0.75	0.83	27.4
9	R2	5	6.0	5	6.0	0.079	12.3	LOS B	0.5	3.5	0.83	0.75	0.83	25.9
Approach		36	6.0	38	6.0	0.079	10.0	LOS A	0.5	3.5	0.83	0.75	0.83	26.3
West: Main Road														
10	L2	1	5.0	1	5.0	0.480	4.8	LOS A	5.0	36.6	0.47	0.46	0.47	39.5
11	T1	635	5.0	668	5.0	0.480	4.5	LOS A	5.0	36.6	0.47	0.46	0.47	39.7
12	R2	184	5.0	194	5.0	0.214	8.1	LOS A	1.5	11.3	0.42	0.60	0.42	43.1
Approach		820	5.0	863	5.0	0.480	5.3	LOS A	5.0	36.6	0.46	0.49	0.46	41.0
All Vehicles		2011	5.6	2117	5.6	0.839	12.7	LOS B	12.9	94.9	0.73	0.78	0.96	34.3

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2043 - Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	212	6.0	223	6.0	0.709	31.7	LOS C	7.6	56.1	1.00	1.25	1.57	30.2
2	T1	1	6.0	1	6.0	0.709	31.7	LOS C	7.6	56.1	1.00	1.25	1.57	30.1
3	R2	7	6.0	7	6.0	0.709	34.9	LOS C	7.6	56.1	1.00	1.25	1.57	28.9
Approach		220	6.0	232	6.0	0.709	31.8	LOS C	7.6	56.1	1.00	1.25	1.57	30.2
East: Takapu Road														
4	L2	57	6.0	60	6.0	1.320	302.1	LOS F	217.6	1601.3	1.00	7.28	12.71	6.4
5	T1	1155	6.0	1216	6.0	1.320	301.9	LOS F	217.6	1601.3	1.00	7.28	12.71	3.5
6	R2	1	6.0	1	6.0	1.320	305.2	LOS F	217.6	1601.3	1.00	7.28	12.71	3.0
Approach		1213	6.0	1277	6.0	1.320	301.9	LOS F	217.6	1601.3	1.00	7.28	12.71	3.7
North: Boscobel Lane														
7	L2	55	6.0	58	6.0	1.000	276.0	LOS F	10.8	79.7	1.00	1.84	2.94	3.1
8	T1	7	6.0	7	6.0	1.000	293.2	LOS F	10.8	79.7	1.00	1.84	2.94	6.7
9	R2	21	6.0	22	6.0	1.000	296.2	LOS F	10.8	79.7	1.00	1.84	2.94	4.1
Approach		83	6.0	87	6.0	1.000	282.6	LOS F	10.8	79.7	1.00	1.84	2.94	3.7
West: Main Road														
10	L2	4	5.0	4	5.0	0.963	5.6	LOS A	21.2	154.5	0.23	0.37	0.24	40.3
11	T1	1229	5.0	1294	5.0	0.963	5.2	LOS A	21.2	154.5	0.23	0.37	0.24	40.8
12	R2	323	5.0	340	5.0	0.285	7.0	LOS A	2.5	18.5	0.12	0.59	0.12	43.8
Approach		1556	5.0	1638	5.0	0.963	5.6	LOS A	21.2	154.5	0.21	0.42	0.21	41.9
All Vehicles		3072	5.5	3234	5.5	1.320	132.0	LOS F	217.6	1601.3	0.60	3.23	5.32	8.8

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2043 - Base Year_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	385	6.0	405	6.0	1.516	494.8	LOS F	127.9	941.3	1.00	5.46	11.31	4.6
2	T1	24	6.0	25	6.0	1.516	494.8	LOS F	127.9	941.3	1.00	5.46	11.31	4.4
3	R2	87	6.0	92	6.0	1.516	498.0	LOS F	127.9	941.3	1.00	5.46	11.31	4.1
Approach		496	6.0	522	6.0	1.516	495.4	LOS F	127.9	941.3	1.00	5.46	11.31	4.5
East: Takapu Road														
4	L2	45	6.0	47	6.0	1.553	508.7	LOS F	342.8	2523.3	1.00	9.90	17.71	4.0
5	T1	1289	6.0	1357	6.0	1.553	508.6	LOS F	342.8	2523.3	1.00	9.90	17.71	2.2
6	R2	29	6.0	31	6.0	1.553	511.8	LOS F	342.8	2523.3	1.00	9.90	17.71	1.8
Approach		1363	6.0	1435	6.0	1.553	508.6	LOS F	342.8	2523.3	1.00	9.90	17.71	2.2
North: Boscobel Lane														
7	L2	23	6.0	24	6.0	0.738	124.4	LOS F	4.9	36.0	0.98	1.43	1.83	6.2
8	T1	32	6.0	34	6.0	0.738	123.8	LOS F	4.9	36.0	0.98	1.43	1.83	11.9
9	R2	8	6.0	8	6.0	0.738	126.8	LOS F	4.9	36.0	0.98	1.43	1.83	8.0
Approach		63	6.0	66	6.0	0.738	124.4	LOS F	4.9	36.0	0.98	1.43	1.83	9.6
West: Main Road														
10	L2	1	5.0	1	5.0	1.025	37.3	LOS D	62.9	458.9	1.00	0.92	1.65	20.6
11	T1	1094	5.0	1152	5.0	1.025	36.9	LOS D	62.9	458.9	1.00	0.92	1.65	19.2
12	R2	329	5.0	346	5.0	0.365	8.2	LOS A	3.1	22.6	0.48	0.60	0.48	42.9
Approach		1424	5.0	1499	5.0	1.025	30.3	LOS C	62.9	458.9	0.88	0.84	1.38	24.8
All Vehicles		3346	5.6	3522	5.6	1.553	295.9	LOS F	342.8	2523.3	0.95	5.23	9.51	4.6

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2043 - Low Development_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	224	6.0	236	6.0	0.748	35.4	LOS D	8.5	62.8	1.00	1.29	1.68	29.0
2	T1	1	6.0	1	6.0	0.748	35.3	LOS D	8.5	62.8	1.00	1.29	1.68	28.7
3	R2	7	6.0	7	6.0	0.748	38.6	LOS D	8.5	62.8	1.00	1.29	1.68	27.5
Approach		232	6.0	244	6.0	0.748	35.5	LOS D	8.5	62.8	1.00	1.29	1.68	28.9
East: Takapu Road														
4	L2	57	6.0	60	6.0	1.320	302.1	LOS F	217.6	1601.3	1.00	7.28	12.71	6.4
5	T1	1155	6.0	1216	6.0	1.320	301.9	LOS F	217.6	1601.3	1.00	7.28	12.71	3.5
6	R2	1	6.0	1	6.0	1.320	305.2	LOS F	217.6	1601.3	1.00	7.28	12.71	3.0
Approach		1213	6.0	1277	6.0	1.320	301.9	LOS F	217.6	1601.3	1.00	7.28	12.71	3.7
North: Boscobel Lane														
7	L2	55	6.0	58	6.0	1.000	276.0	LOS F	10.8	79.7	1.00	1.84	2.94	3.1
8	T1	7	6.0	7	6.0	1.000	293.2	LOS F	10.8	79.7	1.00	1.84	2.94	6.7
9	R2	21	6.0	22	6.0	1.000	296.2	LOS F	10.8	79.7	1.00	1.84	2.94	4.1
Approach		83	6.0	87	6.0	1.000	282.6	LOS F	10.8	79.7	1.00	1.84	2.94	3.7
West: Main Road														
10	L2	4	5.0	4	5.0	0.963	5.6	LOS A	21.2	154.5	0.23	0.37	0.24	40.3
11	T1	1229	5.0	1294	5.0	0.963	5.2	LOS A	21.2	154.5	0.23	0.37	0.24	40.8
12	R2	323	5.0	340	5.0	0.285	7.0	LOS A	2.5	18.5	0.12	0.59	0.12	43.8
Approach		1556	5.0	1638	5.0	0.963	5.6	LOS A	21.2	154.5	0.21	0.42	0.21	41.9
All Vehicles		3084	5.5	3246	5.5	1.320	131.9	LOS F	217.6	1601.3	0.60	3.22	5.31	8.8

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2043 - Low Development_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	389	6.0	409	6.0	1.493	474.6	LOS F	125.6	924.3	1.00	5.42	11.18	4.8
2	T1	24	6.0	25	6.0	1.493	474.6	LOS F	125.6	924.3	1.00	5.42	11.18	4.5
3	R2	87	6.0	92	6.0	1.493	477.8	LOS F	125.6	924.3	1.00	5.42	11.18	4.2
Approach		500	6.0	526	6.0	1.493	475.2	LOS F	125.6	924.3	1.00	5.42	11.18	4.7
East: Takapu Road														
4	L2	45	6.0	47	6.0	1.571	524.8	LOS F	349.3	2570.5	1.00	10.08	18.15	3.9
5	T1	1289	6.0	1357	6.0	1.571	524.7	LOS F	349.3	2570.5	1.00	10.08	18.15	2.1
6	R2	29	6.0	31	6.0	1.571	528.0	LOS F	349.3	2570.5	1.00	10.08	18.15	1.8
Approach		1363	6.0	1435	6.0	1.571	524.8	LOS F	349.3	2570.5	1.00	10.08	18.15	2.1
North: Boscobel Lane														
7	L2	23	6.0	24	6.0	0.784	141.5	LOS F	5.2	38.4	0.99	1.49	1.95	5.6
8	T1	32	6.0	34	6.0	0.784	140.9	LOS F	5.2	38.4	0.99	1.49	1.95	11.0
9	R2	8	6.0	8	6.0	0.784	143.8	LOS F	5.2	38.4	0.99	1.49	1.95	7.2
Approach		63	6.0	66	6.0	0.784	141.5	LOS F	5.2	38.4	0.99	1.49	1.95	8.8
West: Main Road														
10	L2	1	5.0	1	5.0	1.027	38.3	LOS D	63.2	461.7	1.00	0.94	1.68	20.2
11	T1	1094	5.0	1152	5.0	1.027	38.0	LOS D	63.2	461.7	1.00	0.94	1.68	18.9
12	R2	338	5.0	356	5.0	0.372	8.2	LOS A	3.2	23.3	0.48	0.61	0.48	42.9
Approach		1433	5.0	1508	5.0	1.027	31.0	LOS C	63.2	461.7	0.88	0.86	1.39	24.5
All Vehicles		3359	5.6	3536	5.6	1.571	299.5	LOS F	349.3	2570.5	0.95	5.29	9.66	4.6

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2043 - High Development_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	227	6.0	239	6.0	0.751	35.4	LOS D	8.6	63.5	1.00	1.30	1.69	28.9
2	T1	1	6.0	1	6.0	0.751	35.3	LOS D	8.6	63.5	1.00	1.30	1.69	28.7
3	R2	7	6.0	7	6.0	0.751	38.6	LOS D	8.6	63.5	1.00	1.30	1.69	27.5
Approach		235	6.0	247	6.0	0.751	35.5	LOS D	8.6	63.5	1.00	1.30	1.69	28.9
East: Takapu Road														
4	L2	57	6.0	60	6.0	1.328	309.5	LOS F	221.1	1627.6	1.00	7.41	13.00	6.3
5	T1	1155	6.0	1216	6.0	1.328	309.4	LOS F	221.1	1627.6	1.00	7.41	13.00	3.4
6	R2	1	6.0	1	6.0	1.328	312.6	LOS F	221.1	1627.6	1.00	7.41	13.00	2.9
Approach		1213	6.0	1277	6.0	1.328	309.4	LOS F	221.1	1627.6	1.00	7.41	13.00	3.6
North: Boscobel Lane														
7	L2	55	6.0	58	6.0	1.000	271.1	LOS F	10.8	79.7	1.00	1.81	2.90	3.1
8	T1	7	6.0	7	6.0	1.000	299.6	LOS F	10.8	79.7	1.00	1.81	2.90	6.7
9	R2	21	6.0	22	6.0	1.000	302.6	LOS F	10.8	79.7	1.00	1.81	2.90	4.1
Approach		83	6.0	87	6.0	1.000	281.5	LOS F	10.8	79.7	1.00	1.81	2.90	3.7
West: Main Road														
10	L2	4	5.0	4	5.0	0.963	5.6	LOS A	21.2	154.5	0.23	0.37	0.24	40.3
11	T1	1229	5.0	1294	5.0	0.963	5.2	LOS A	21.2	154.5	0.23	0.37	0.24	40.8
12	R2	329	5.0	346	5.0	0.289	7.0	LOS A	2.6	18.8	0.12	0.59	0.12	43.8
Approach		1562	5.0	1644	5.0	0.963	5.6	LOS A	21.2	154.5	0.21	0.42	0.21	41.9
All Vehicles		3093	5.5	3256	5.5	1.328	134.4	LOS F	221.1	1627.6	0.60	3.26	5.41	8.7

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Main-Takapu-Willow-2043 - High Development_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Willowbank Road														
1	L2	390	6.0	411	6.0	1.502	482.5	LOS F	127.1	935.4	1.00	5.46	11.28	4.8
2	T1	24	6.0	25	6.0	1.502	482.5	LOS F	127.1	935.4	1.00	5.46	11.28	4.5
3	R2	87	6.0	92	6.0	1.502	485.7	LOS F	127.1	935.4	1.00	5.46	11.28	4.2
Approach		501	6.0	527	6.0	1.502	483.1	LOS F	127.1	935.4	1.00	5.46	11.28	4.6
East: Takapu Road														
4	L2	45	6.0	47	6.0	1.537	494.8	LOS F	330.1	2429.7	1.00	9.77	17.60	4.1
5	T1	1289	6.0	1357	6.0	1.537	494.7	LOS F	330.1	2429.7	1.00	9.77	17.60	2.2
6	R2	1	6.0	1	6.0	1.537	497.9	LOS F	330.1	2429.7	1.00	9.77	17.60	1.9
Approach		1335	6.0	1405	6.0	1.537	494.7	LOS F	330.1	2429.7	1.00	9.77	17.60	2.3
North: Boscobel Lane														
7	L2	23	6.0	24	6.0	0.836	163.7	LOS F	5.7	41.6	0.99	1.56	2.10	4.9
8	T1	32	6.0	34	6.0	0.836	163.1	LOS F	5.7	41.6	0.99	1.56	2.10	10.0
9	R2	8	6.0	8	6.0	0.836	166.1	LOS F	5.7	41.6	0.99	1.56	2.10	6.5
Approach		63	6.0	66	6.0	0.836	163.7	LOS F	5.7	41.6	0.99	1.56	2.10	7.9
West: Main Road														
10	L2	1	5.0	1	5.0	1.019	32.3	LOS C	66.5	485.4	1.00	0.76	1.46	22.3
11	T1	1094	5.0	1152	5.0	1.019	31.9	LOS C	66.5	485.4	1.00	0.76	1.46	21.0
12	R2	340	5.0	358	5.0	0.360	7.9	LOS A	3.2	23.4	0.44	0.59	0.44	43.0
Approach		1435	5.0	1511	5.0	1.019	26.2	LOS C	66.5	485.4	0.87	0.72	1.22	26.6
All Vehicles		3334	5.6	3509	5.6	1.537	285.1	LOS F	330.1	2429.7	0.94	5.07	9.31	4.8

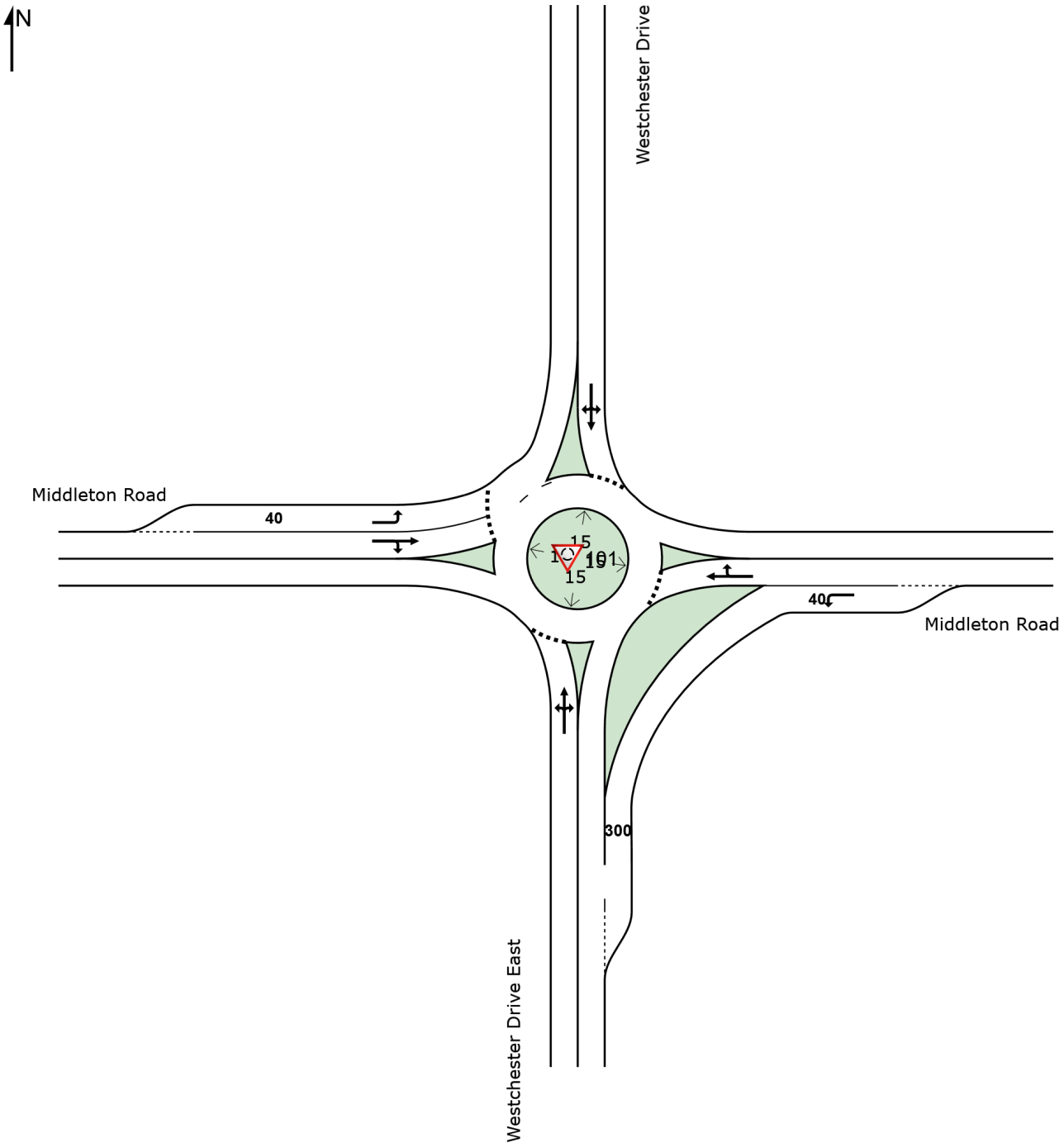
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Westchester-Middleton-2020 - Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2020 - Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	122	7.0	128	7.0	0.282	4.4	LOS A	1.8	13.5	0.42	0.49	0.42	46.3
2	T1	173	7.0	182	7.0	0.282	4.3	LOS A	1.8	13.5	0.42	0.49	0.42	47.2
3	R2	10	7.0	11	7.0	0.282	8.3	LOS A	1.8	13.5	0.42	0.49	0.42	47.1
Approach		305	7.0	321	7.0	0.282	4.5	LOS A	1.8	13.5	0.42	0.49	0.42	46.8
East: Middleton Road														
4	L2	100	6.0	105	6.0	0.057	4.8	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	109	6.0	115	6.0	0.138	6.7	LOS A	0.8	6.0	0.58	0.65	0.58	49.4
6	R2	29	6.0	31	6.0	0.138	10.7	LOS B	0.8	6.0	0.58	0.65	0.58	49.2
Approach		238	6.0	251	6.0	0.138	6.4	LOS A	0.8	6.0	0.34	0.58	0.34	51.7
North: Westchester Drive														
7	L2	37	3.0	39	3.0	0.324	6.2	LOS A	2.1	14.8	0.55	0.62	0.55	48.9
8	T1	266	3.0	280	3.0	0.324	6.4	LOS A	2.1	14.8	0.55	0.62	0.55	50.0
9	R2	9	3.0	9	3.0	0.324	10.4	LOS B	2.1	14.8	0.55	0.62	0.55	49.9
Approach		312	3.0	328	3.0	0.324	6.5	LOS A	2.1	14.8	0.55	0.62	0.55	49.8
West: Middleton Road														
10	L2	9	6.0	9	6.0	0.012	6.2	LOS A	0.1	0.4	0.42	0.54	0.42	49.3
11	T1	79	6.0	83	6.0	0.214	5.5	LOS A	1.3	9.3	0.43	0.63	0.43	49.0
12	R2	176	6.0	185	6.0	0.214	9.5	LOS A	1.3	9.3	0.43	0.63	0.43	48.9
Approach		264	6.0	278	6.0	0.214	8.2	LOS A	1.3	9.3	0.43	0.62	0.43	48.9
All Vehicles		1119	5.4	1178	5.4	0.324	6.3	LOS A	2.1	14.8	0.44	0.58	0.44	49.1

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2020 - Base Year_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	93	6.0	98	6.0	0.423	5.2	LOS A	2.9	21.7	0.56	0.61	0.56	45.6
2	T1	249	6.0	262	6.0	0.423	5.1	LOS A	2.9	21.7	0.56	0.61	0.56	46.4
3	R2	82	6.0	86	6.0	0.423	9.1	LOS A	2.9	21.7	0.56	0.61	0.56	46.4
Approach		424	6.0	446	6.0	0.423	5.9	LOS A	2.9	21.7	0.56	0.61	0.56	46.2
East: Middleton Road														
4	L2	22	6.0	23	6.0	0.013	4.1	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	50	6.0	53	6.0	0.175	5.5	LOS A	1.0	7.5	0.43	0.63	0.43	48.8
6	R2	157	6.0	165	6.0	0.175	9.5	LOS A	1.0	7.5	0.43	0.63	0.43	48.7
Approach		229	6.0	241	6.0	0.175	8.1	LOS A	1.0	7.5	0.39	0.62	0.39	49.3
North: Westchester Drive														
7	L2	72	6.0	76	6.0	0.259	6.5	LOS A	1.6	11.5	0.56	0.64	0.56	48.8
8	T1	140	6.0	147	6.0	0.259	6.7	LOS A	1.6	11.5	0.56	0.64	0.56	49.9
9	R2	23	6.0	24	6.0	0.259	10.7	LOS B	1.6	11.5	0.56	0.64	0.56	49.8
Approach		235	6.0	247	6.0	0.259	7.0	LOS A	1.6	11.5	0.56	0.64	0.56	49.5
West: Middleton Road														
10	L2	24	5.0	25	5.0	0.040	8.5	LOS A	0.2	1.5	0.61	0.67	0.61	47.9
11	T1	164	5.0	173	5.0	0.230	7.1	LOS A	1.5	10.7	0.65	0.70	0.65	49.1
12	R2	58	5.0	61	5.0	0.230	11.1	LOS B	1.5	10.7	0.65	0.70	0.65	48.9
Approach		246	5.0	259	5.0	0.230	8.2	LOS A	1.5	10.7	0.64	0.70	0.64	48.9
All Vehicles		1134	5.8	1194	5.8	0.423	7.1	LOS A	2.9	21.7	0.54	0.64	0.54	48.1

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2043 - Base Year_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	260	7.0	274	7.0	0.817	10.7	LOS B	13.9	103.0	0.99	0.95	1.24	43.3
2	T1	502	7.0	528	7.0	0.817	10.7	LOS B	13.9	103.0	0.99	0.95	1.24	44.1
3	R2	21	7.0	22	7.0	0.817	14.7	LOS B	13.9	103.0	0.99	0.95	1.24	44.1
Approach		783	7.0	824	7.0	0.817	10.8	LOS B	13.9	103.0	0.99	0.95	1.24	43.9
East: Middleton Road														
4	L2	160	6.0	168	6.0	0.091	7.5	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	174	6.0	183	6.0	0.463	15.4	LOS B	4.2	31.1	1.00	1.03	1.14	44.6
6	R2	53	6.0	56	6.0	0.463	19.4	LOS B	4.2	31.1	1.00	1.03	1.14	44.5
Approach		387	6.0	407	6.0	0.463	12.7	LOS B	4.2	31.1	0.59	0.81	0.67	48.4
North: Westchester Drive														
7	L2	63	3.0	66	3.0	0.969	38.6	LOS D	30.9	221.8	1.00	1.70	2.73	34.5
8	T1	640	3.0	674	3.0	0.969	38.8	LOS D	30.9	221.8	1.00	1.70	2.73	35.0
9	R2	37	3.0	39	3.0	0.969	42.8	LOS D	30.9	221.8	1.00	1.70	2.73	35.0
Approach		740	3.0	779	3.0	0.969	39.0	LOS D	30.9	221.8	1.00	1.70	2.73	35.0
West: Middleton Road														
10	L2	26	6.0	27	6.0	0.054	9.4	LOS A	0.3	2.2	0.73	0.73	0.73	47.3
11	T1	135	6.0	142	6.0	0.551	9.9	LOS A	5.4	39.5	0.92	0.94	1.05	46.7
12	R2	299	6.0	315	6.0	0.551	13.9	LOS B	5.4	39.5	0.92	0.94	1.05	46.6
Approach		460	6.0	484	6.0	0.551	12.5	LOS B	5.4	39.5	0.91	0.93	1.03	46.6
All Vehicles		2370	5.4	2495	5.4	0.969	20.2	LOS C	30.9	221.8	0.91	1.16	1.57	41.7

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2043 - Base Year_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	175	7.0	184	7.0	1.239	231.6	LOS F	156.3	1159.5	1.00	5.94	10.50	12.0
2	T1	715	7.0	753	7.0	1.239	231.6	LOS F	156.3	1159.5	1.00	5.94	10.50	12.1
3	R2	154	7.0	162	7.0	1.239	235.6	LOS F	156.3	1159.5	1.00	5.94	10.50	12.1
Approach		1044	7.0	1099	7.0	1.239	232.2	LOS F	156.3	1159.5	1.00	5.94	10.50	12.0
East: Middleton Road														
4	L2	38	6.0	40	6.0	0.022	4.5	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	86	6.0	91	6.0	0.369	6.8	LOS A	2.7	19.6	0.68	0.75	0.68	48.2
6	R2	281	6.0	296	6.0	0.369	10.8	LOS B	2.7	19.6	0.68	0.75	0.68	48.0
Approach		405	6.0	426	6.0	0.369	9.4	LOS A	2.7	19.6	0.62	0.72	0.62	48.7
North: Westchester Drive														
7	L2	97	3.0	102	3.0	0.540	9.2	LOS A	4.7	33.7	0.83	0.87	0.93	47.5
8	T1	281	3.0	296	3.0	0.540	9.5	LOS A	4.7	33.7	0.83	0.87	0.93	48.4
9	R2	38	3.0	40	3.0	0.540	13.5	LOS B	4.7	33.7	0.83	0.87	0.93	48.4
Approach		416	3.0	438	3.0	0.540	9.8	LOS A	4.7	33.7	0.83	0.87	0.93	48.2
West: Middleton Road														
10	L2	57	6.0	60	6.0	0.194	16.2	LOS B	1.2	9.1	0.92	0.95	0.92	43.5
11	T1	243	6.0	256	6.0	0.715	28.6	LOS C	9.2	67.9	1.00	1.26	1.67	38.4
12	R2	86	6.0	91	6.0	0.715	32.6	LOS C	9.2	67.9	1.00	1.26	1.67	38.3
Approach		386	6.0	406	6.0	0.715	27.7	LOS C	9.2	67.9	0.99	1.22	1.56	39.1
All Vehicles		2251	5.9	2369	5.9	1.239	115.9	LOS F	156.3	1159.5	0.90	3.26	5.42	19.9

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2043 - Low Development_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	260	7.0	274	7.0	0.915	17.4	LOS B	23.5	174.3	1.00	1.17	1.60	40.2
2	T1	593	7.0	624	7.0	0.915	17.4	LOS B	23.5	174.3	1.00	1.17	1.60	40.9
3	R2	21	7.0	22	7.0	0.915	21.4	LOS C	23.5	174.3	1.00	1.17	1.60	40.8
Approach		874	7.0	920	7.0	0.915	17.5	LOS B	23.5	174.3	1.00	1.17	1.60	40.6
East: Middleton Road														
4	L2	160	6.0	168	6.0	0.091	7.8	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	174	6.0	183	6.0	0.508	17.9	LOS B	4.8	35.6	1.00	1.07	1.23	43.3
6	R2	58	6.0	61	6.0	0.508	21.9	LOS C	4.8	35.6	1.00	1.07	1.23	43.1
Approach		392	6.0	413	6.0	0.508	14.4	LOS B	4.8	35.6	0.59	0.84	0.73	47.4
North: Westchester Drive														
7	L2	75	3.0	79	3.0	1.273	262.8	LOS F	159.9	1147.8	1.00	5.44	11.24	11.1
8	T1	852	3.0	897	3.0	1.273	263.0	LOS F	159.9	1147.8	1.00	5.44	11.24	11.2
9	R2	49	3.0	52	3.0	1.273	267.0	LOS F	159.9	1147.8	1.00	5.44	11.24	11.2
Approach		976	3.0	1027	3.0	1.273	263.2	LOS F	159.9	1147.8	1.00	5.44	11.24	11.2
West: Middleton Road														
10	L2	30	6.0	32	6.0	0.071	10.5	LOS B	0.4	3.0	0.79	0.79	0.79	46.6
11	T1	135	6.0	142	6.0	0.633	13.2	LOS B	7.1	52.1	1.00	1.06	1.27	44.9
12	R2	299	6.0	315	6.0	0.633	17.2	LOS B	7.1	52.1	1.00	1.06	1.27	44.7
Approach		464	6.0	488	6.0	0.633	15.6	LOS B	7.1	52.1	0.99	1.04	1.24	44.9
All Vehicles		2706	5.2	2848	5.2	1.273	105.3	LOS F	159.9	1147.8	0.94	2.64	4.89	21.2

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2043 - Low Development_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	175	7.0	184	7.0	1.472	436.8	LOS F	278.8	2068.5	1.00	8.94	16.25	7.2
2	T1	886	7.0	933	7.0	1.472	436.8	LOS F	278.8	2068.5	1.00	8.94	16.25	7.2
3	R2	154	7.0	162	7.0	1.472	440.8	LOS F	278.8	2068.5	1.00	8.94	16.25	7.2
Approach		1215	7.0	1279	7.0	1.472	437.3	LOS F	278.8	2068.5	1.00	8.94	16.25	7.2
East: Middleton Road														
4	L2	38	6.0	40	6.0	0.022	4.7	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	86	6.0	91	6.0	0.412	7.4	LOS A	3.1	22.9	0.76	0.79	0.76	47.9
6	R2	290	6.0	305	6.0	0.412	11.4	LOS B	3.1	22.9	0.76	0.79	0.76	47.7
Approach		414	6.0	436	6.0	0.412	10.0	LOS A	3.1	22.9	0.69	0.77	0.69	48.3
North: Westchester Drive														
7	L2	101	3.0	106	3.0	0.636	10.5	LOS B	6.6	47.1	0.88	0.94	1.06	46.7
8	T1	353	3.0	372	3.0	0.636	10.7	LOS B	6.6	47.1	0.88	0.94	1.06	47.6
9	R2	42	3.0	44	3.0	0.636	14.7	LOS B	6.6	47.1	0.88	0.94	1.06	47.6
Approach		496	3.0	522	3.0	0.636	11.0	LOS B	6.6	47.1	0.88	0.94	1.06	47.4
West: Middleton Road														
10	L2	66	6.0	69	6.0	0.229	16.6	LOS B	1.5	10.7	0.93	0.97	0.93	43.2
11	T1	243	6.0	256	6.0	0.729	30.5	LOS C	9.6	70.6	1.00	1.29	1.72	37.7
12	R2	86	6.0	91	6.0	0.729	34.5	LOS C	9.6	70.6	1.00	1.29	1.72	37.6
Approach		395	6.0	416	6.0	0.729	29.0	LOS C	9.6	70.6	0.99	1.23	1.59	38.5
All Vehicles		2520	5.9	2653	5.9	1.472	219.2	LOS F	278.8	2068.5	0.92	4.81	8.41	12.7

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2043 - High Development_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	260	7.0	274	7.0	0.944	22.0	LOS C	28.6	212.5	1.00	1.31	1.83	38.2
2	T1	616	7.0	648	7.0	0.944	22.0	LOS C	28.6	212.5	1.00	1.31	1.83	38.9
3	R2	21	7.0	22	7.0	0.944	26.0	LOS C	28.6	212.5	1.00	1.31	1.83	38.8
Approach		897	7.0	944	7.0	0.944	22.1	LOS C	28.6	212.5	1.00	1.31	1.83	38.7
East: Middleton Road														
4	L2	160	6.0	168	6.0	0.091	7.8	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	174	6.0	183	6.0	0.513	18.2	LOS B	4.9	36.2	1.00	1.08	1.24	43.1
6	R2	59	6.0	62	6.0	0.513	22.2	LOS C	4.9	36.2	1.00	1.08	1.24	43.0
Approach		393	6.0	414	6.0	0.513	14.6	LOS B	4.9	36.2	0.59	0.84	0.73	47.3
North: Westchester Drive														
7	L2	79	3.0	83	3.0	1.357	337.0	LOS F	202.9	1456.9	1.00	6.39	13.39	9.1
8	T1	907	3.0	955	3.0	1.357	337.2	LOS F	202.9	1456.9	1.00	6.39	13.39	9.1
9	R2	59	3.0	62	3.0	1.357	341.2	LOS F	202.9	1456.9	1.00	6.39	13.39	9.1
Approach		1045	3.0	1100	3.0	1.357	337.4	LOS F	202.9	1456.9	1.00	6.39	13.39	9.1
West: Middleton Road														
10	L2	34	6.0	36	6.0	0.083	10.8	LOS B	0.5	3.6	0.80	0.81	0.80	46.4
11	T1	135	6.0	142	6.0	0.656	14.4	LOS B	7.6	56.0	1.00	1.09	1.32	44.2
12	R2	299	6.0	315	6.0	0.656	18.4	LOS B	7.6	56.0	1.00	1.09	1.32	44.1
Approach		468	6.0	493	6.0	0.656	16.7	LOS B	7.6	56.0	0.99	1.07	1.28	44.3
All Vehicles		2803	5.2	2951	5.2	1.357	137.7	LOS F	202.9	1456.9	0.94	3.10	5.89	17.9

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Middleton-2043 - High Development_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Westchester Drive East														
1	L2	175	7.0	184	7.0	1.534	492.3	LOS F	310.7	2305.6	1.00	9.58	17.52	6.5
2	T1	929	7.0	978	7.0	1.534	492.3	LOS F	310.7	2305.6	1.00	9.58	17.52	6.5
3	R2	154	7.0	162	7.0	1.534	496.3	LOS F	310.7	2305.6	1.00	9.58	17.52	6.5
Approach		1258	7.0	1324	7.0	1.534	492.8	LOS F	310.7	2305.6	1.00	9.58	17.52	6.5
East: Middleton Road														
4	L2	38	6.0	40	6.0	0.022	4.8	LOS A	0.0	0.0	0.00	0.50	0.00	55.3
5	T1	86	6.0	91	6.0	0.425	7.6	LOS A	3.3	24.0	0.79	0.81	0.79	47.8
6	R2	292	6.0	307	6.0	0.425	11.6	LOS B	3.3	24.0	0.79	0.81	0.79	47.6
Approach		416	6.0	438	6.0	0.425	10.2	LOS B	3.3	24.0	0.71	0.78	0.71	48.2
North: Westchester Drive														
7	L2	102	3.0	107	3.0	0.661	10.9	LOS B	7.2	51.7	0.89	0.96	1.11	46.4
8	T1	372	3.0	392	3.0	0.661	11.2	LOS B	7.2	51.7	0.89	0.96	1.11	47.4
9	R2	45	3.0	47	3.0	0.661	15.2	LOS B	7.2	51.7	0.89	0.96	1.11	47.3
Approach		519	3.0	546	3.0	0.661	11.5	LOS B	7.2	51.7	0.89	0.96	1.11	47.2
West: Middleton Road														
10	L2	73	6.0	77	6.0	0.253	16.7	LOS B	1.6	11.9	0.94	0.97	0.94	43.2
11	T1	243	6.0	256	6.0	0.727	30.4	LOS C	9.6	70.5	1.00	1.28	1.72	37.8
12	R2	86	6.0	91	6.0	0.727	34.4	LOS C	9.6	70.5	1.00	1.28	1.72	37.7
Approach		402	6.0	423	6.0	0.727	28.7	LOS C	9.6	70.5	0.99	1.23	1.58	38.6
All Vehicles		2595	5.9	2732	5.9	1.534	247.3	LOS F	310.7	2305.6	0.93	5.15	9.07	11.6

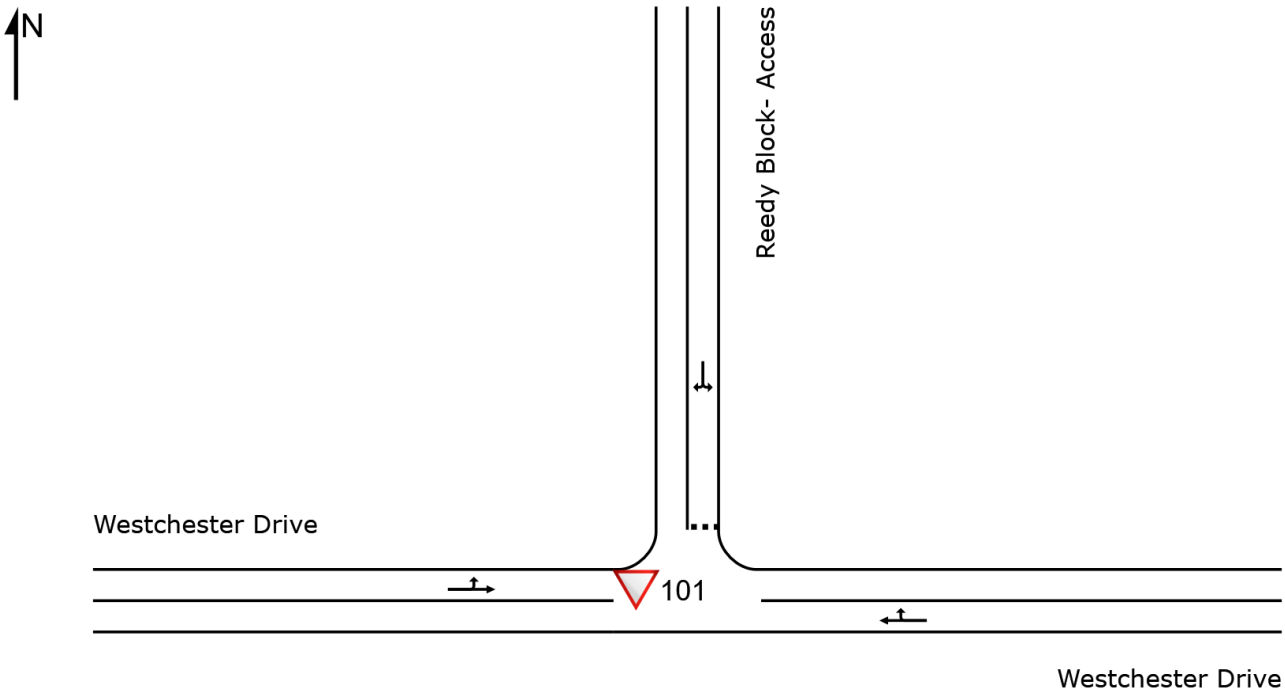
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Reedy Block-Base 2043-No Development-AM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Reedy Block-Base 2043-No Development-AM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Westchester Drive														
5	T1	540	0.0	568	0.0	0.344	0.8	LOS A	0.9	6.4	0.16	0.05	0.20	58.6
6	R2	40	0.0	42	0.0	0.344	10.6	LOS B	0.9	6.4	0.16	0.05	0.20	56.4
Approach		580	0.0	611	0.0	0.344	1.5	NA	0.9	6.4	0.16	0.05	0.20	58.4
North: Reedy Block- Access														
7	L2	94	0.0	99	0.0	0.281	9.6	LOS A	1.1	7.4	0.69	0.90	0.80	48.7
9	R2	40	0.0	42	0.0	0.281	19.0	LOS C	1.1	7.4	0.69	0.90	0.80	48.3
Approach		134	0.0	141	0.0	0.281	12.4	LOS B	1.1	7.4	0.69	0.90	0.80	48.6
West: Westchester Drive														
10	L2	17	0.0	18	0.0	0.358	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.0
11	T1	646	0.0	680	0.0	0.358	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
Approach		663	0.0	698	0.0	0.358	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1377	0.0	1449	0.0	0.358	1.9	NA	1.1	7.4	0.13	0.12	0.16	57.8

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Reedy Block-Base 2043-No Development-PM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Westchester Drive East														
5	T1	978	0.0	1029	0.0	0.598	0.7	LOS A	2.1	14.5	0.16	0.05	0.23	58.7
6	R2	75	0.0	79	0.0	0.598	9.7	LOS A	2.1	14.5	0.16	0.05	0.23	56.5
Approach		1053	0.0	1108	0.0	0.598	1.3	NA	2.1	14.5	0.16	0.05	0.23	58.6
North: Reedy Block/Upper Stebbings Access														
7	L2	32	0.0	34	0.0	0.137	7.0	LOS A	0.4	2.8	0.61	0.75	0.61	47.7
9	R2	14	0.0	15	0.0	0.137	29.8	LOS D	0.4	2.8	0.61	0.75	0.61	47.3
Approach		46	0.0	48	0.0	0.137	13.9	LOS B	0.4	2.8	0.61	0.75	0.61	47.6
West: Westchester Drive West														
10	L2	32	0.0	34	0.0	0.225	5.6	LOS A	0.0	0.0	0.00	0.05	0.00	57.9
11	T1	384	0.0	404	0.0	0.225	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	59.5
Approach		416	0.0	438	0.0	0.225	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.3
All Vehicles		1515	0.0	1595	0.0	0.598	1.5	NA	2.1	14.5	0.13	0.07	0.18	58.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Reedy Block-Base 2043-Low Development-AM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Westchester Drive East														
5	T1	641	0.0	675	0.0	0.426	1.8	LOS A	1.8	12.3	0.23	0.04	0.33	57.5
6	R2	40	0.0	42	0.0	0.426	16.1	LOS C	1.8	12.3	0.23	0.04	0.33	55.4
Approach		681	0.0	717	0.0	0.426	2.7	NA	1.8	12.3	0.23	0.04	0.33	57.4
North: Reedy Block/Upper Stebbings Access														
7	L2	94	0.0	99	0.0	0.519	17.0	LOS C	2.0	14.3	0.88	1.06	1.29	42.3
9	R2	40	0.0	42	0.0	0.519	39.4	LOS E	2.0	14.3	0.88	1.06	1.29	42.0
Approach		134	0.0	141	0.0	0.519	23.7	LOS C	2.0	14.3	0.88	1.06	1.29	42.2
West: Westchester Drive West														
10	L2	17	0.0	18	0.0	0.486	5.7	LOS A	0.0	0.0	0.00	0.01	0.00	57.9
11	T1	882	0.0	928	0.0	0.486	0.2	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach		899	0.0	946	0.0	0.486	0.3	NA	0.0	0.0	0.00	0.01	0.00	59.5
All Vehicles		1714	0.0	1804	0.0	0.519	3.1	NA	2.0	14.3	0.16	0.11	0.23	56.8

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Reedy Block-Base 2043-Low Development-PM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Westchester Drive East														
5	T1	1167	0.0	1228	0.0	0.707	1.0	LOS A	3.1	22.0	0.21	0.04	0.33	58.3
6	R2	75	0.0	79	0.0	0.707	12.6	LOS B	3.1	22.0	0.21	0.04	0.33	56.2
Approach		1242	0.0	1307	0.0	0.707	1.7	NA	3.1	22.0	0.21	0.04	0.33	58.2
North: Reedy Block/Upper Stebbings Access														
7	L2	32	0.0	34	0.0	0.276	10.1	LOS B	0.8	5.7	0.79	0.90	0.89	41.1
9	R2	14	0.0	15	0.0	0.276	63.5	LOS F	0.8	5.7	0.79	0.90	0.89	40.8
Approach		46	0.0	48	0.0	0.276	26.3	LOS D	0.8	5.7	0.79	0.90	0.89	41.0
West: Westchester Drive West														
10	L2	32	0.0	34	0.0	0.269	5.6	LOS A	0.0	0.0	0.00	0.04	0.00	57.9
11	T1	464	0.0	488	0.0	0.269	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	59.5
Approach		496	0.0	522	0.0	0.269	0.4	NA	0.0	0.0	0.00	0.04	0.00	59.4
All Vehicles		1784	0.0	1878	0.0	0.707	2.0	NA	3.1	22.0	0.16	0.07	0.25	57.9

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.
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Reedy Block-Base 2043-High Development-AM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Westchester Drive East														
5	T1	669	0.0	704	0.0	0.503	3.3	LOS A	3.3	23.1	0.38	0.08	0.58	55.8
6	R2	69	0.0	73	0.0	0.503	17.4	LOS C	3.3	23.1	0.38	0.08	0.58	53.8
Approach		738	0.0	777	0.0	0.503	4.6	NA	3.3	23.1	0.38	0.08	0.58	55.6
North: Reedy Block/Upper Stebbings Access														
7	L2	161	0.0	169	0.0	0.968	64.4	LOS F	10.2	71.1	0.96	1.87	4.34	26.9
9	R2	69	0.0	73	0.0	0.968	93.4	LOS F	10.2	71.1	0.96	1.87	4.34	26.8
Approach		230	0.0	242	0.0	0.968	73.1	LOS F	10.2	71.1	0.96	1.87	4.34	26.9
West: Westchester Drive West														
10	L2	30	0.0	32	0.0	0.493	5.7	LOS A	0.0	0.0	0.00	0.02	0.00	57.9
11	T1	882	0.0	928	0.0	0.493	0.2	LOS A	0.0	0.0	0.00	0.02	0.00	59.4
Approach		912	0.0	960	0.0	0.493	0.4	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehicles		1880	0.0	1979	0.0	0.968	10.9	NA	10.2	71.1	0.27	0.27	0.76	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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Reedy Block-Base 2043-High Development-PM (Site Folder: General)]

Reedy Block
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Westchester Drive East														
5	T1	1220	0.0	1284	0.0	0.794	2.3	LOS A	7.0	49.2	0.41	0.08	0.71	56.7
6	R2	128	0.0	135	0.0	0.794	15.2	LOS C	7.0	49.2	0.41	0.08	0.71	54.7
Approach		1348	0.0	1419	0.0	0.794	3.5	NA	7.0	49.2	0.41	0.08	0.71	56.5
North: Reedy Block/Upper Stebbings Access														
7	L2	55	0.0	58	0.0	0.736	54.1	LOS F	3.2	22.1	0.87	1.23	1.76	25.4
9	R2	24	0.0	25	0.0	0.736	144.1	LOS F	3.2	22.1	0.87	1.23	1.76	25.2
Approach		79	0.0	83	0.0	0.736	81.5	LOS F	3.2	22.1	0.87	1.23	1.76	25.3
West: Westchester Drive West														
10	L2	55	0.0	58	0.0	0.282	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	57.7
11	T1	464	0.0	488	0.0	0.282	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	59.3
Approach		519	0.0	546	0.0	0.282	0.7	NA	0.0	0.0	0.00	0.06	0.00	59.1
All Vehicles		1946	0.0	2048	0.0	0.794	5.9	NA	7.0	49.2	0.32	0.13	0.56	54.4

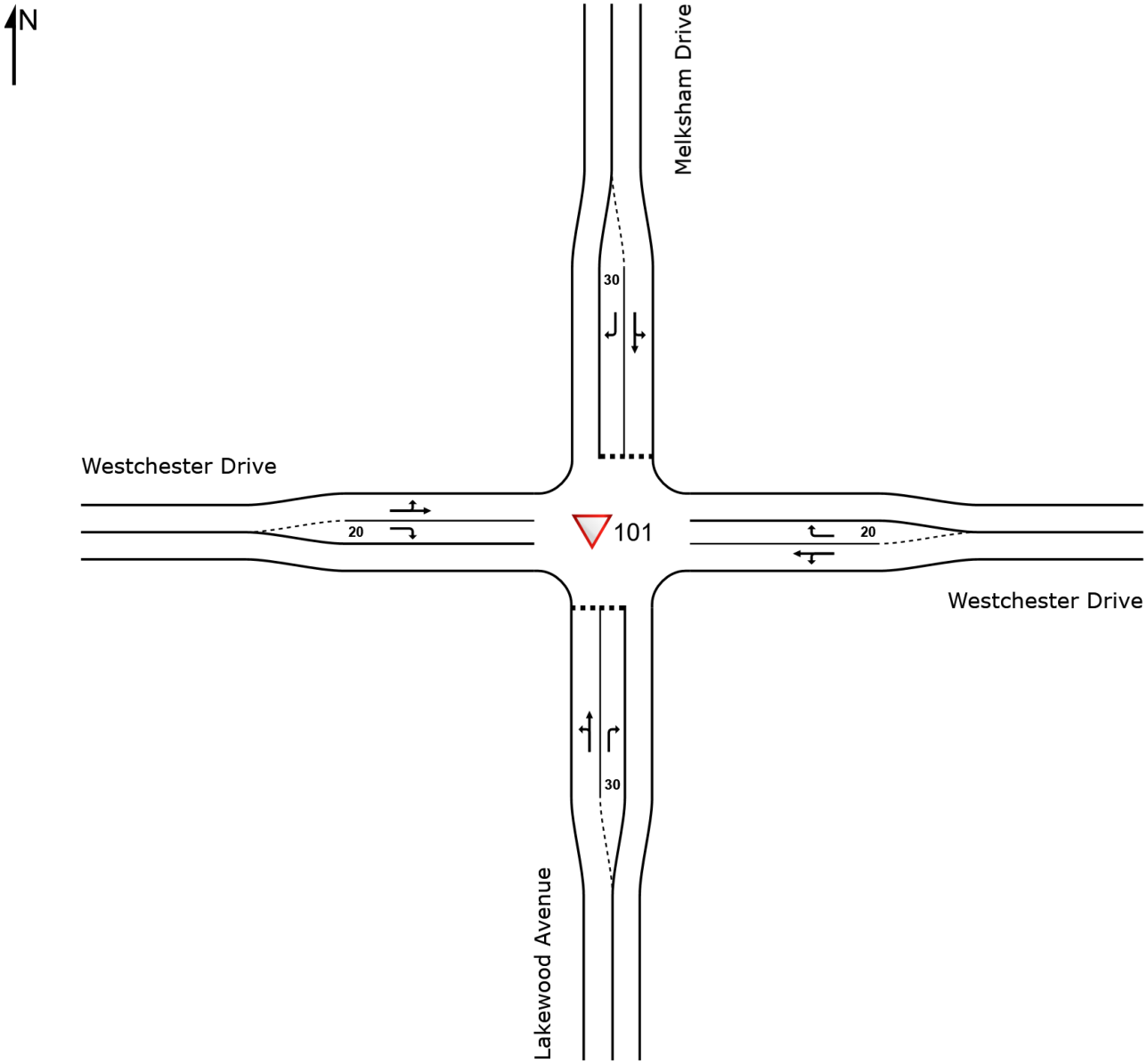
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Westchester-Melksham-2020 - Base Year_AM (Site Folder: General)]

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

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2020 - Base Year_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	42	4.0	44	4.0	0.094	6.2	LOS A	0.3	2.5	0.35	0.61	0.35	52.0
2	T1	29	4.0	31	4.0	0.094	8.9	LOS A	0.3	2.5	0.35	0.61	0.35	52.4
3	R2	53	4.0	56	4.0	0.128	11.7	LOS B	0.5	3.3	0.58	0.83	0.58	48.9
Approach		124	4.0	131	4.0	0.128	9.2	LOS A	0.5	3.3	0.45	0.70	0.45	50.7
East: Westchester Drive														
4	L2	21	3.0	22	3.0	0.102	5.6	LOS A	0.0	0.0	0.00	0.07	0.00	57.5
5	T1	158	3.0	166	3.0	0.102	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
6	R2	32	3.0	34	3.0	0.024	6.3	LOS A	0.1	0.7	0.34	0.57	0.34	52.2
Approach		211	3.0	222	3.0	0.102	1.5	NA	0.1	0.7	0.05	0.14	0.05	57.9
North: Melksham Drive														
7	L2	52	12.0	55	12.0	0.068	6.6	LOS A	0.2	1.6	0.30	0.60	0.30	52.6
8	T1	8	12.0	8	12.0	0.068	8.9	LOS A	0.2	1.6	0.30	0.60	0.30	52.5
9	R2	17	12.0	18	12.0	0.042	11.5	LOS B	0.1	1.1	0.55	0.77	0.55	48.6
Approach		77	12.0	81	12.0	0.068	7.9	LOS A	0.2	1.6	0.35	0.63	0.35	51.6
West: Westchester Drive														
10	L2	24	3.0	25	3.0	0.129	5.7	LOS A	0.0	0.0	0.00	0.06	0.00	57.6
11	T1	208	3.0	219	3.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.4
12	R2	39	3.0	41	3.0	0.028	6.2	LOS A	0.1	0.9	0.29	0.56	0.29	52.3
Approach		271	3.0	285	3.0	0.129	1.4	NA	0.1	0.9	0.04	0.13	0.04	58.1
All Vehicles		683	4.2	719	4.2	0.129	3.6	NA	0.5	3.3	0.15	0.30	0.15	55.8

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2020 - Base Year_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	23	4.0	24	4.0	0.053	6.7	LOS A	0.2	1.3	0.43	0.64	0.43	51.6
2	T1	13	4.0	14	4.0	0.053	10.1	LOS B	0.2	1.3	0.43	0.64	0.43	51.9
3	R2	47	4.0	49	4.0	0.139	14.0	LOS B	0.5	3.5	0.66	0.86	0.66	47.5
Approach		83	4.0	87	4.0	0.139	11.3	LOS B	0.5	3.5	0.56	0.77	0.56	49.2
East: Westchester Drive														
4	L2	103	3.0	108	3.0	0.214	5.6	LOS A	0.0	0.0	0.00	0.16	0.00	56.7
5	T1	271	3.0	285	3.0	0.214	0.1	LOS A	0.0	0.0	0.00	0.16	0.00	58.4
6	R2	57	3.0	60	3.0	0.039	6.0	LOS A	0.2	1.3	0.27	0.55	0.27	52.4
Approach		431	3.0	454	3.0	0.214	2.2	NA	0.2	1.3	0.04	0.21	0.04	57.1
North: Melksham Drive														
7	L2	51	12.0	54	12.0	0.074	6.3	LOS A	0.2	1.8	0.25	0.58	0.25	52.4
8	T1	11	12.0	12	12.0	0.074	11.1	LOS B	0.2	1.8	0.25	0.58	0.25	52.3
9	R2	15	12.0	16	12.0	0.039	11.9	LOS B	0.1	1.0	0.57	0.78	0.57	48.3
Approach		77	12.0	81	12.0	0.074	8.1	LOS A	0.2	1.8	0.31	0.62	0.31	51.5
West: Westchester Drive														
10	L2	12	3.0	13	3.0	0.083	5.7	LOS A	0.0	0.0	0.00	0.05	0.00	57.7
11	T1	137	3.0	144	3.0	0.083	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.5
12	R2	31	3.0	33	3.0	0.027	7.0	LOS A	0.1	0.8	0.44	0.61	0.44	51.9
Approach		180	3.0	189	3.0	0.083	1.6	NA	0.1	0.8	0.08	0.15	0.08	57.9
All Vehicles		771	4.0	812	4.0	0.214	3.6	NA	0.5	3.5	0.13	0.30	0.13	55.7

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.
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2043 - Base Year_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	58	4.0	61	4.0	0.319	8.7	LOS A	1.3	9.5	0.66	0.87	0.82	46.7
2	T1	57	4.0	60	4.0	0.319	22.1	LOS C	1.3	9.5	0.66	0.87	0.82	47.0
3	R2	72	4.0	76	4.0	0.757	79.1	LOS F	3.3	23.9	0.97	1.18	1.76	25.7
Approach		187	4.0	197	4.0	0.757	39.9	LOS E	3.3	23.9	0.78	0.99	1.18	35.6
East: Westchester Drive														
4	L2	60	3.0	63	3.0	0.239	5.6	LOS A	0.0	0.0	0.00	0.09	0.00	57.3
5	T1	358	3.0	377	3.0	0.239	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	59.1
6	R2	162	3.0	171	3.0	0.139	7.0	LOS A	0.6	4.5	0.46	0.66	0.46	51.9
Approach		580	3.0	611	3.0	0.239	2.6	NA	0.6	4.5	0.13	0.25	0.13	56.7
North: Melksham Drive														
7	L2	291	3.0	306	3.0	0.539	9.1	LOS A	3.5	24.9	0.55	0.89	0.91	49.1
8	T1	59	3.0	62	3.0	0.539	24.8	LOS C	3.5	24.9	0.55	0.89	0.91	49.3
9	R2	70	3.0	74	3.0	0.398	29.0	LOS D	1.5	10.4	0.87	1.01	1.12	39.6
Approach		420	3.0	442	3.0	0.539	14.6	LOS B	3.5	24.9	0.60	0.91	0.94	47.3
West: Westchester Drive														
10	L2	52	3.0	55	3.0	0.197	5.7	LOS A	0.0	0.0	0.00	0.09	0.00	57.3
11	T1	301	3.0	317	3.0	0.197	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	59.1
12	R2	61	3.0	64	3.0	0.057	7.3	LOS A	0.2	1.7	0.48	0.66	0.48	51.8
Approach		414	3.0	436	3.0	0.197	1.8	NA	0.2	1.7	0.07	0.17	0.07	57.7
All Vehicles		1601	3.1	1685	3.1	0.757	9.9	NA	3.5	24.9	0.31	0.49	0.45	50.7

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.
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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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2043 - Base Year_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	38	4.0	40	4.0	0.470	14.8	LOS B	1.9	14.0	0.86	1.03	1.21	39.6
2	T1	55	4.0	58	4.0	0.470	39.6	LOS E	1.9	14.0	0.86	1.03	1.21	39.8
3	R2	70	4.0	74	4.0	1.047	210.6	LOS F	8.0	57.8	1.00	1.54	3.36	13.2
Approach		163	4.0	172	4.0	1.047	107.3	LOS F	8.0	57.8	0.92	1.25	2.13	21.3
East: Westchester Drive														
4	L2	190	3.0	200	3.0	0.405	5.7	LOS A	0.0	0.0	0.00	0.16	0.00	56.6
5	T1	517	3.0	544	3.0	0.405	0.2	LOS A	0.0	0.0	0.00	0.16	0.00	58.3
6	R2	285	3.0	300	3.0	0.219	6.6	LOS A	1.1	7.8	0.41	0.63	0.41	52.0
Approach		992	3.0	1044	3.0	0.405	3.1	NA	1.1	7.8	0.12	0.29	0.12	56.0
North: Melksham Drive														
7	L2	142	12.0	149	12.0	0.431	9.5	LOS A	2.1	16.4	0.51	0.78	0.75	46.5
8	T1	32	12.0	34	12.0	0.431	44.5	LOS E	2.1	16.4	0.51	0.78	0.75	46.4
9	R2	35	12.0	37	12.0	0.323	41.6	LOS E	1.0	8.0	0.91	1.00	1.06	34.7
Approach		209	12.0	220	12.0	0.431	20.2	LOS C	2.1	16.4	0.58	0.82	0.80	44.0
West: Westchester Drive														
10	L2	54	3.0	57	3.0	0.144	5.7	LOS A	0.0	0.0	0.00	0.12	0.00	57.0
11	T1	204	3.0	215	3.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	58.8
12	R2	43	3.0	45	3.0	0.062	9.6	LOS A	0.2	1.7	0.61	0.79	0.61	50.3
Approach		301	3.0	317	3.0	0.144	2.4	NA	0.2	1.7	0.09	0.22	0.09	57.1
All Vehicles		1665	4.2	1753	4.2	1.047	15.3	NA	8.0	57.8	0.25	0.44	0.40	47.1

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2043 - Low Development_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	63	4.0	66	4.0	0.503	12.7	LOS B	2.4	17.5	0.77	1.02	1.20	42.4
2	T1	76	4.0	80	4.0	0.503	32.0	LOS D	2.4	17.5	0.77	1.02	1.20	42.6
3	R2	72	4.0	76	4.0	2.319	1297.6	LOS F	33.5	242.2	1.00	2.17	6.33	2.6
Approach		211	4.0	222	4.0	2.319	458.1	LOS F	33.5	242.2	0.85	1.41	2.95	6.7
East: Westchester Drive														
4	L2	60	3.0	63	3.0	0.245	5.6	LOS A	0.0	0.0	0.00	0.08	0.00	57.3
5	T1	369	3.0	388	3.0	0.245	0.1	LOS A	0.0	0.0	0.00	0.08	0.00	59.1
6	R2	252	3.0	265	3.0	0.224	7.3	LOS A	1.1	7.6	0.50	0.69	0.50	51.7
Approach		681	3.0	717	3.0	0.245	3.2	NA	1.1	7.6	0.19	0.31	0.19	56.0
North: Melksham Drive														
7	L2	500	3.0	526	3.0	1.053	83.4	LOS F	46.1	330.9	1.00	3.35	7.23	23.9
8	T1	103	3.0	108	3.0	1.053	121.4	LOS F	46.1	330.9	1.00	3.35	7.23	23.9
9	R2	115	3.0	121	3.0	0.883	78.0	LOS F	5.3	38.2	0.98	1.38	2.59	25.8
Approach		718	3.0	756	3.0	1.053	88.0	LOS F	46.1	330.9	1.00	3.04	6.48	24.2
West: Westchester Drive														
10	L2	52	3.0	55	3.0	0.211	5.7	LOS A	0.0	0.0	0.00	0.08	0.00	57.4
11	T1	327	3.0	344	3.0	0.211	0.1	LOS A	0.0	0.0	0.00	0.08	0.00	59.2
12	R2	72	3.0	76	3.0	0.068	7.4	LOS A	0.3	2.1	0.49	0.67	0.49	51.8
Approach		451	3.0	475	3.0	0.211	1.9	NA	0.3	2.1	0.08	0.18	0.08	57.6
All Vehicles		2061	3.1	2169	3.1	2.319	79.0	NA	46.1	330.9	0.51	1.34	2.64	25.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2043 - Low Development_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	47	4.0	49	4.0	1.206	248.3	LOS F	22.1	160.1	1.00	2.56	6.83	10.7
2	T1	91	4.0	96	4.0	1.206	286.8	LOS F	22.1	160.1	1.00	2.56	6.83	10.7
3	R2	70	4.0	74	4.0	2.079	1084.5	LOS F	29.9	216.3	1.00	2.16	6.26	3.0
Approach		208	4.0	219	4.0	2.079	546.6	LOS F	29.9	216.3	1.00	2.43	6.64	5.8
East: Westchester Drive														
4	L2	190	3.0	200	3.0	0.418	5.7	LOS A	0.0	0.0	0.00	0.15	0.00	56.6
5	T1	538	3.0	566	3.0	0.418	0.2	LOS A	0.0	0.0	0.00	0.15	0.00	58.3
6	R2	452	3.0	476	3.0	0.366	7.2	LOS A	2.1	15.0	0.50	0.68	0.52	51.7
Approach		1180	3.0	1242	3.0	0.418	3.7	NA	2.1	15.0	0.19	0.36	0.20	55.3
North: Melksham Drive														
7	L2	213	3.0	224	3.0	0.784	29.2	LOS D	8.6	62.1	0.61	1.28	2.03	36.0
8	T1	47	3.0	49	3.0	0.784	82.8	LOS F	8.6	62.1	0.61	1.28	2.03	36.1
9	R2	50	3.0	53	3.0	0.711	92.3	LOS F	2.6	18.5	0.98	1.12	1.53	23.5
Approach		310	3.0	326	3.0	0.784	47.5	LOS E	8.6	62.1	0.67	1.25	1.94	33.2
West: Westchester Drive														
10	L2	90	3.0	95	3.0	0.170	5.7	LOS A	0.0	0.0	0.00	0.18	0.00	56.6
11	T1	213	3.0	224	3.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	58.3
12	R2	47	3.0	49	3.0	0.070	9.8	LOS A	0.3	1.9	0.62	0.81	0.62	50.1
Approach		350	3.0	368	3.0	0.170	2.8	NA	0.3	1.9	0.08	0.26	0.08	56.6
All Vehicles		2048	3.1	2156	3.1	2.079	65.3	NA	29.9	216.3	0.33	0.69	1.10	28.1

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2043 - High Development_AM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	63	4.0	66	4.0	0.552	14.7	LOS B	2.7	19.7	0.80	1.06	1.32	40.8
2	T1	76	4.0	80	4.0	0.552	36.6	LOS E	2.7	19.7	0.80	1.06	1.32	41.0
3	R2	76	4.0	80	4.0	2.632	1575.0	LOS F	38.2	276.9	1.00	2.19	6.42	2.1
Approach		215	4.0	226	4.0	2.632	574.0	LOS F	38.2	276.9	0.87	1.46	3.12	5.5
East: Westchester Drive														
4	L2	71	3.0	75	3.0	0.261	5.6	LOS A	0.0	0.0	0.00	0.09	0.00	57.2
5	T1	386	3.0	406	3.0	0.261	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	59.0
6	R2	252	3.0	265	3.0	0.231	7.5	LOS A	1.1	7.8	0.52	0.71	0.52	51.7
Approach		709	3.0	746	3.0	0.261	3.3	NA	1.1	7.8	0.18	0.31	0.18	56.0
North: Melksham Drive														
7	L2	500	3.0	526	3.0	1.108	125.0	LOS F	59.9	430.0	1.00	4.10	9.25	18.7
8	T1	103	3.0	108	3.0	1.108	163.6	LOS F	59.9	430.0	1.00	4.10	9.25	18.7
9	R2	115	3.0	121	3.0	0.954	105.4	LOS F	7.0	50.5	0.99	1.53	3.22	21.7
Approach		718	3.0	756	3.0	1.108	127.4	LOS F	59.9	430.0	1.00	3.69	8.28	19.1
West: Westchester Drive														
10	L2	71	3.0	75	3.0	0.226	5.7	LOS A	0.0	0.0	0.00	0.10	0.00	57.2
11	T1	335	3.0	353	3.0	0.226	0.1	LOS A	0.0	0.0	0.00	0.10	0.00	58.9
12	R2	72	3.0	76	3.0	0.071	7.6	LOS A	0.3	2.1	0.50	0.68	0.50	51.7
Approach		478	3.0	503	3.0	0.226	2.0	NA	0.3	2.1	0.08	0.19	0.08	57.5
All Vehicles		2120	3.1	2232	3.1	2.632	102.9	NA	59.9	430.0	0.51	1.55	3.20	21.7

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Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Westchester-Melksham-2043 - High Development_PM (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lakewood Avenue														
1	L2	47	4.0	49	4.0	1.269	300.1	LOS F	25.6	185.2	1.00	2.73	7.51	9.2
2	T1	91	4.0	96	4.0	1.269	338.4	LOS F	25.6	185.2	1.00	2.73	7.51	9.2
3	R2	78	4.0	82	4.0	2.504	1456.2	LOS F	37.8	273.6	1.00	2.24	6.63	2.3
Approach		216	4.0	227	4.0	2.504	733.7	LOS F	37.8	273.6	1.00	2.55	7.19	4.4
East: Westchester Drive														
4	L2	194	3.0	204	3.0	0.426	5.7	LOS A	0.0	0.0	0.00	0.16	0.00	56.6
5	T1	544	3.0	573	3.0	0.426	0.2	LOS A	0.0	0.0	0.00	0.16	0.00	58.3
6	R2	452	3.0	476	3.0	0.373	7.3	LOS A	2.2	15.9	0.51	0.70	0.55	51.7
Approach		1190	3.0	1253	3.0	0.426	3.8	NA	2.2	15.9	0.20	0.36	0.21	55.3
North: Melksham Drive														
7	L2	213	3.0	224	3.0	0.823	35.0	LOS E	9.8	70.6	0.64	1.43	2.38	33.9
8	T1	47	3.0	49	3.0	0.823	91.9	LOS F	9.8	70.6	0.64	1.43	2.38	33.9
9	R2	50	3.0	53	3.0	0.746	102.1	LOS F	2.8	19.8	0.98	1.13	1.60	22.1
Approach		310	3.0	326	3.0	0.823	54.5	LOS F	9.8	70.6	0.70	1.38	2.25	31.2
West: Westchester Drive														
10	L2	90	3.0	95	3.0	0.180	5.7	LOS A	0.0	0.0	0.00	0.17	0.00	56.7
11	T1	229	3.0	241	3.0	0.180	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	58.4
12	R2	47	3.0	49	3.0	0.072	9.9	LOS A	0.3	2.0	0.63	0.82	0.63	50.0
Approach		366	3.0	385	3.0	0.180	2.7	NA	0.3	2.0	0.08	0.25	0.08	56.8
All Vehicles		2082	3.1	2192	3.1	2.504	86.9	NA	37.8	273.6	0.33	0.72	1.21	24.0

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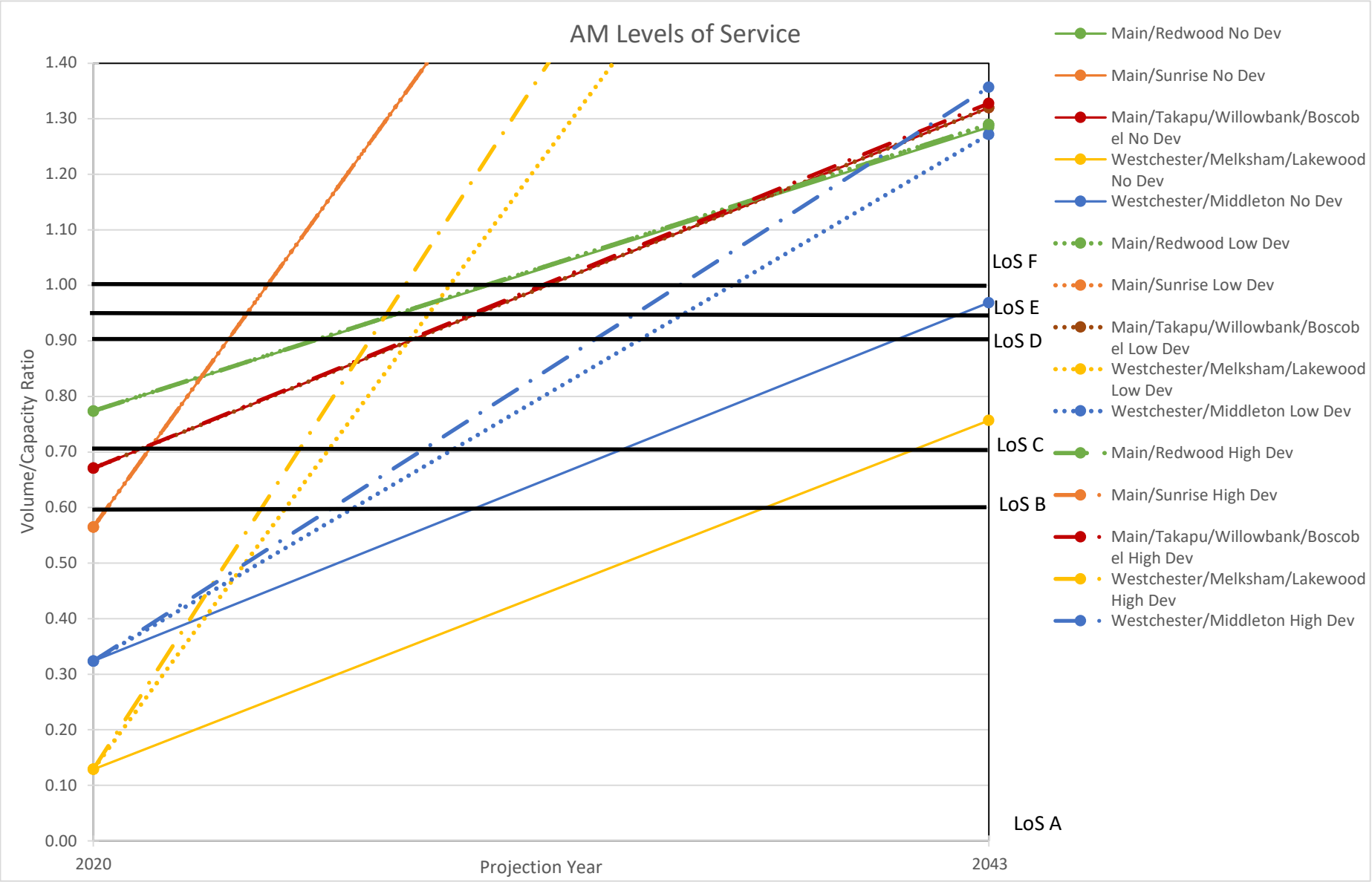
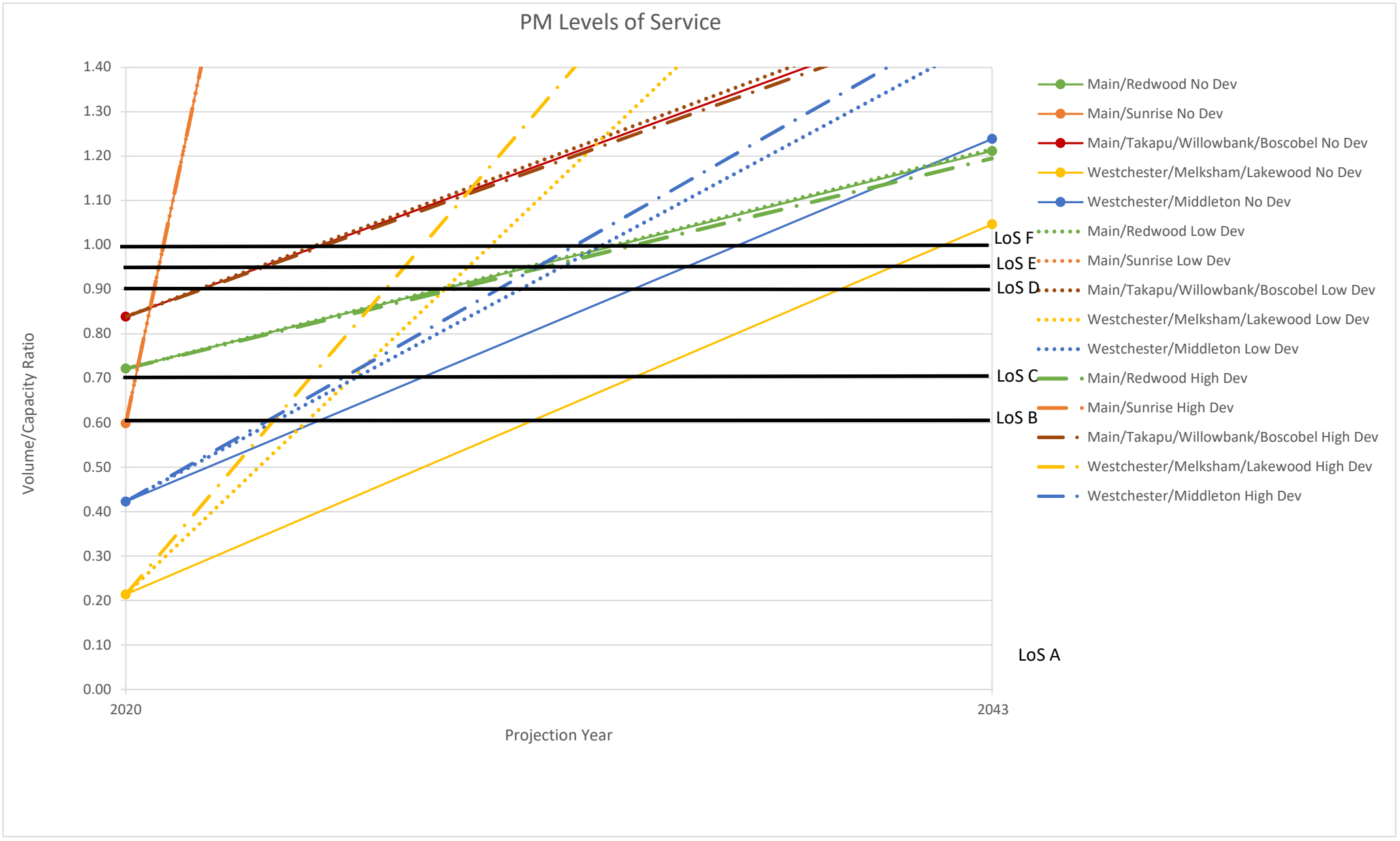
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.


AM Levels of Service
Volume/Capacity Ratio
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2020
Projection Year
2043
LoS F
LoS E
LoS D
LoS C
LoS B
LoS A
Main/Redwood No Dev
Main/Sunrise No Dev
Main/Takapu/Willowbank/Boscobel No Dev
Westchester/Melksham/Lakewood No Dev
Westchester/Middleton No Dev
Main/Redwood Low Dev
Main/Sunrise Low Dev
Main/Takapu/Willowbank/Boscobel Low Dev
Westchester/Melksham/Lakewood Low Dev
Westchester/Middleton Low Dev
Main/Redwood High Dev
Main/Sunrise High Dev
Main/Takapu/Willowbank/Boscobel High Dev
Westchester/Melksham/Lakewood High Dev
Westchester/Middleton High Dev


PM Levels of Service
Volume/Capacity Ratio
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2020
2043
Projection Year
LoS F
LoS E
LoS D
LoS C
LoS B
LoS A
Main/Redwood No Dev
Main/Sunrise No Dev
Main/Takapu/Willowbank/Boscobel No Dev
Westchester/Melksham/Lakewood No Dev
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Westchester/Middleton High Dev

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