Appendix H

Multi-Criteria Analysis

	Criteria for Cyclists 45%									Community/Stakeholder Interests 30%								Project Costs and Programme Risks 25%					Score	Differentiators				
Criteria	**Safety and Comfort**		**Directness and Coherance**		**Connectivity to Amenity within the corridor**		**Social Safety and Attractiveness (based on worst feature)**		**Score**	**Local Business Impact**		**Local Resident Impact**		**Operational and Network Impacts**		**Score**	**Ease of Construction and costs**		**Land Requirements /Easements /Other Agreements**		**Score**	**SCORE**	**Comments**	**Sensitivity**			
Route /Criteria Description	* Safety over route for cyclists GO/NO GO CRITERIA * Safety along route for other users * Relative conflict with other road users ***pedestrians; residents; traffic ***business access * Comfort of users exerience ***perceptions of risk; noise; CO_2		* Time and distance to travel * Match to desire lines. * Easy to recognise route * Limited changing of facility types * Few complicated manoeuvres * Few turns.		* Good match to: ***local schools ***shops ***parks ***other public spaces/buildings		* Greenspace routes need open aspect * Consider CPTED for routes off-street * Pleasantness of cycling experience * Lighting where off-road			* Impact on local business interests? * Loading Zone loss * Effects on access * Parking spaces lost - is offset possible * Estimated effect on patronage		* Impact on local residents? * Access to properties * Impact on on-street parkings * Impact on journey time if route changes network.		* Effect of changes to the network (signals, cul-de-sacs) * Public transport routes affected? * Operation costs for street cleaning, rubbish collection? * Effect on maintenance operations?			* Increased costs due to: ***Property purchase ***Complicated facilities ***Requires supporting asset replacement (Budget Risk)		* Programme delays due to: ***Land/property acquisition ***Legal processes - consents ***Legal processes - access (Timing Risk)					No weighting	Doubling weight of context impacts	Doubling weight of cycle benefits	Doubling weight of cost, property risk
Weighting		15%		10%		10%		10%			10%		10%		10%			10%		15%		**TOTAL**		**Total Score for Weighting**			
Blue Route 1: Calendonian, Edgeware, Abberley, Browns, Bretts, Mays, Rutland.	**Safety - go** Edgeware has high traffic volumes, commercial crossing, high peds. Highest number of side street crossings. Browns has narrow bdy to bdy	1	9 turns (corners negotiated), 3110m, shorter than orange and green. Big departure from desire line.	0	Connects to Edgeware well, but Will need links to amenities to the Rutland Street and Rutland reserve and Schools	-0.5	Mainly on street , Edgeware Road, St Albans busy, with extra traffic signal requirements; balanced by low volume roads with wide verges generally on rest of route.	0	**1**	Affects south-end Colombo parking, on-street Colombo, minor impact in Edgeware area and Abberley/ Springfield shop. Generally on a par with most other routing.	-0.5	Route will have major impact on residential on street parking.	-2	Adds five signalised intersections, and will impact on bus routes on Edgeware road. Likely one-way facilities will have rubbish bin location problems.	-1.5	**-4**	Long route, most signal sets, likely issues on Edgeware Road, longest kerb length to change. May also need both kerb changes on Caledonian	-1	No land acquistion required, or easements	0	**-1**	**-4**	Route's key negative impact is the number of signal sets required and deviation.	**-4.5**	**-8.5**	**-4**	**-5.5**
Blue Route 1A/1B: Caledonian, Ranfurly, Abberley Park, Kinseys Lane, Browns, Bretts, Mays, Rutland.	**Safety - go** Off Edgeware, so improvement on 1. Ranfurley and Kinleys quieter, less commercial impact. Narrow Browns issue still.	1.5	10 turns, 3180m, shorter than orange and green. Also big departure from desire line.	0	Similar to 1	-0.5	Ranfurly more pleasant than Edgeware but have CPTED concerns for Abberley Park and Kinleys Lane c	-0.5	**1.25**	Generally same as above.	-0.5	Route will have major impact on residential on street parking.	-2	Will add four signalised intersections, avoids bus routes, lengths of greenway have fewer rubbish bin matters	-1	**-3.5**	May be Issues of construction through Abberley Park - restricted area to accommodate cycleway	-1	No Land required. Abberley Park and Kinley Lane owned by CCC, no easement issues.	-0.5	**-1.75**	**-4**	Key negative impacts are signals and deviation	**-4.5**	**-8**	**-4**	**-6**
Orange Route 2/2B: Bealey, Springfield, Edgeware, Somme, property link,Chapter, Rutland.	**Safety - go** Close to limit on safety - go. Bealey Ave very high volume - cycle facility and crossing key issue. Springfield has highest volume of north-south roads. Other streets quiet.	0	Starts off with major departure from desire line. Uncertain about configuration of facility on this length of Bealey Ave. Has fewest turns of all routes though.	-0.5	Will need connection to Edgeware and Rutland shops and St Abans School	-1	Bealey and Springfield are busy streets - while better perception of security not partcularly attratcive to cyclists	0	**-1.5**	Hits all Springfield Road businesses and Bealey Ave impact, and shops on St Albans St. Consider Bealey matters to be an issue.	-1	Route will have major impact on residential on street parking.	-2	Will add three or four new signalised intersections - one for cyclists/peds only. Uncertain how to configure Bealey Ave crossing	-2	**-5**	Cost of multiple properties +$8m (most properties and full construction requirements) and work on Springfield Road	-2	Too higher risk,, with 8 x properties, and in a line - availability ever is an issue.	-2	**-5**	**-11.5**	Not viable due to property requirements	**-10.5**	**-15.5**	**-12**	**-14.5**
Orange Route 2/2A: Caledonian, Holly, Springfield, Edgeware, Somme, Hawkesbury, Browns, Bretts, Chapter, Rutland	**Safety - go** More friendly env than 2 above, however still on high volume, narrow length of Springfield. of on road environments due to length on Springfield road north end and number of conflict points	0.5	12 turns, 3270m, one of longest routes. Big departure from desire line at north end.	-0.5	Connects to nothing, connectivity as bad as 2 and will need more links than other options	-1	All on street, most of length quieter than above, but Springfield and additional signal set required to negotiate.	0	**-0.75**	Avoids all but Colombo area and impacts Springfied businesses and St Albans on north end of street. Pretty much average.	0	Route will have major impact on residential on street parking.	-2	Will also add four new signal sets but all at intersections. Greenways lesser rubbish impact.	-1	**-3**	Longest route likely to cost more with issues likely on Springfield Road, kerbing on Caledonian road, and signals required.	-1	No land agreements, easements required.	0	**-1**	**-4.75**	Key negative for route is busyness and narrowness of Springfield Road, and its deviation.	**-5**	**-8**	**-6**	**-6**
Yellow Route 3: Colombo, Edgeware, Trafalgar, St Albans, Rutland	**Safety - go** Only consider one-way facility on Rutland (constraint) due to high traffic volume. Facility types already understood, low number side street crossings cf 1 & 2 routes	1	Shortest route most direct 3 turns, 2780m. This route **IS** the desire line.	2	Connects directly to everything	2	All on street on Colombo, St Albans and Rutland - all busy streets, Trafalgar low volume and improved with cul de sac	0	**5.5**	Considered to be worst impact as route travels through most business areas (Colombo, Edgeware and Rutland)	-2	Route will have major impact on residential on street parking.	-2	Adds signals at Edgeware (which will serve peds well also) Adds signals at Rutland/St Albans (little different to roundabout). Bus route on Colombo. Rubbish collection issues standard throughout.	-0.5	**-4.5**	Shortest length, fewest signal sets, utilise existing kerb to kerb width as much as possible. Overall, cheapest version.	0	No land agreements, easements required.	0	**0**	**1**	Second most preferred route - is most direct.	**0.5**	**-4**	**5.5**	**0.5**
Yellow Route 3A/3B/3: Caledonian, Dover, property link, Massey, St Albans, Rutland	**Safety - go** Avoids busy Colombo, but length on Edgeware, very quiet Dover and off road length. Marginally better overall than 3.	1.5	Marginally longer than 3 (2870m 7 turns. With corridor length is 2870m. Closest alternative route to desire line.	1	Good connection to almost everything as per route 3. Will need some connection to St Albans School and English Park, and misses Edtgeware village by a small distance	1.5	Quieter streets and greenways and property lanes more attractive than 3, but balanced CPTED matters	0	**4.75**	Only Business impact at south end of Colombo Street, and Rutland; avoids Edgeware	0	Same impact as other routes that travel on street. But less streets used	-1.5	Bypass most of bus route and mainly on lower traffic roads and some off road and greenways used. Same signals impact as 3, fewer rubbish issues on greenway treatments.	0	**-1.5**	Cost of multiple properties + $3m, plus kerb and channel on Caledonian.	-1	2 x properties in a line +$3m bwetween Dover and Massey Crescent	-1.5	**-3.25**	**0**	Not viable due to property requirements	**0**	**-1.5**	**4**	**-2.5**
Yellow Route 3A/3C: Calendonian, Dover, Trafalgar, St Albans, Rutland, Westminster, Carrington, Rugby Park, right-of-way, Weston, Rutland	**Safety - go** Quietest route choice barring 4 below. Fewer access crossings due to park and right-of-way lengths.	1.5	Approx 14 turns, making it the "twistiest" of routes , 3380m. Longest of routes overall. Close to, but not on desire line.	0	Slight miss on Edgeware shops as per 3A/3B/3, but reaches St Albans School and English Park. Miss on Rutland St shops and St Albans Catholic school.	1.5	More quiet streets and green environments used than route 3, but balanced by CPTED matters on Rugby Park and right-of-way.	0	**3.75**	Only Business impact at south end of Colombo Street; avoids Edgeware and Rutland.	0	Same impact as other routes that travel on street	-1.5	Bypass most of bus route and mainly on lower traffic roads and some off road and greenways used. Additionals signal crossing set on Innes. Fewer rubbish issues on greenway treatments.	-0.5	**-2**	2nd Shortest route predominantly on local roads, which may be greenways, but will require deep dish k&c on Caledonian replacement.	-0.5	No property issues.	0	**-0.5**	**1.25**	Identified as preferred route through this analysis.	**0.5**	**-1.5**	**3.5**	**0**
Green Route 4: Colombo, Trafalgar, Dover, property link, English Park, St Albans school, Roosevelt, Rugby Park, right-of-way, Weston, Rutland	**Safety - go** Most off-road sections, therefore most cycle friendly re vehicle conflicts, fewest busy road crossings.	1.5	12 turns 3220m - one of the longer route. Biggest depature from desire line to the east.	-0.5	Good to Edgeware shops and parks and schools, needs connection to Rutland	1	Lengths avoid busier roads and are green environments, but consider significant CPTED issues for lengths through parks, out of sight of roads.	-2	**0.75**	High impact at Colombo end, Edgeware, avoids Rutland	-1	Impact on Colombo Street main issue, but good where green space used.	-0.5	Separated facilities have higher ops impact, bus route on Colombo, three set of signals to install, but least rubbish collection impact due off road lengths.	-0.5	**-2**	Need Dover Street property $0.5m, construction cost lower in parks than on street	-0.5	Need Dover Street property, and easement/agreement to use St Abans School and English Park	-1	**-2**	**-3.25**	Not viable due to property requirements	**-3.5**	**-5.5**	**-3.5**	**-5**
Green Route 4/4B Colombo, Trafalgar, Dover, property link, English Park, St Albans school, Roosevelt, Rugby Park, right-of-way, Weston, property link, Ketton, Kenwyn	**Safety - go** Assessed as safest with amount of off-road travel and least number of conflict points and major roads	2	Approx 12 turns, similar to option 4 - but has departure from desire line at north end - ie misses main tie in to Rutland Reserve	-0.5	Needs links to Rutland St amentiy. But good for English Park, St Albans School	1	Lengths avoid busier roads and are green environments, but consider significant CPTED issues for lengths through parks, out of sight of roads.	-2	**1.5**	Same as 4 - high impact at Colombo end, Edgeware, avoids Rutland	-1	Least impact due to less parking removed overall	-1	Separated facilities have higher ops impact, bus route on Colombo, four set of signals to install, but least rubbish collection impact.	-1	**-3**	Need Dover Street property $0.5m, plus Weston and Ketton properties $1M, construction cost lower in parks and greenways than on street	-1	Need Dover Street property and properties Ketton and Weston. Easement/agreement to use St Abans School and English Park	-1.5	**-3.25**	**-4.75**	Not viable due to property requirements	**-5**	**-8**	**-4.5**	**-7.5**
Green Route 4/4A: Colombo, Trafalgar, property link, Westminster, Carrington, Rugby Park, right-of-way, Weston, Rutland	**Safety - go** Also a good option by using local roads and parks. Off Road sections are comfortable, Not as good as 4b with additional on-road.	1.5	Very similar to Yellow 3A/3c	0	Minor miss to St Albans School and Rutland St Shops	1.5	Avoids high vol mostly, has plenty of greenspace. Has areas where isolation may be a CPTED issue, but avoids bulk of route 4 issues.	0	**3.75**	Same as 4 - high impact at Colombo end, Edgeware, avoids Rutland	-1	Majority on-street so parking impacts are almost as per others - have some lengths off-road so considered same as 3A/3C.	-1.5	Does affect Colombo bus route. Uses lower traffic roads and some off road and greenways used. Additionals signal crossing on Innes and St Albans. Fewer rubbish issues on greenway treatments.	-0.5	**-3**	Need St Albans - Westminster properties Dover Street property $1.53m, construction cost lower in parks than on street	-1	Land purchase required. Possible Staged option to acquire 2 properties between St Albans and Westminster	-1.5	**-3.25**	**-2.5**	Not viable due to property requirements	**-2.5**	**-5.5**	**0.5**	**-5**
Bealey/ Papanui Road/Mays	**Safety - No Go** Arterial (Bealey Ave and Papanui Rd) incompatable to MCR, crossing concerns.	-2	Significant deviation from desire line	-2	Worst connectivity to corridor would need conectors to be constructed to all local amenities	-2	High traffic routes not desirable to cyclists	-2	**-9**	Likely to impact businesss are more business on route	-2	Will impact on all residential on street parking	-2	Will impact operation of Bealey /Papanui intersection	-2	**-6**	Significant cost impacts for property and facilities and multitude of crossings on major arterials.	-2	Land required to accommodate 1W facilities assumed along whole of Papanui Road	-2	**-5**	**-20**	No go on route safety. Not viable due to property requirements	**-18**	**-24**	**-26**	**-22**
Bealey/ Sherbourne - Cranford/ McFaddens	**Safety - No Go** Arterial roads (large traffic volumes) incompatable to MCR without landtake	-2	Significant deviation from desire line, but better than Papanui	-1	Poor connectivity to amenities as per above.	-2	High traffic routes not desirable to cyclists	-2	**-8**	Likely to impact businesss are more business on route	-2	Land take is big impact on residents	-2	Cranford St north of Innes is part of another scheme for 4 laning and does not have space for MCR without landtake	-2	**-6**	Significant cost impacts for property and facilities and multitude of crossings on major arterials.	-2	Land would be required on Cranford/Sherbourne to fit 1W cycleway facilities	-2	**-5**	**-19**	No go on route safety. Not viable due to property requirements	**-17**	**-23**	**-24**	**-21**

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Description	* Safety for cyclists GO/NO GO CRITERIA * Safety along route for other users * Relative conflict with other road users ***pedestrians; residents; traffic ***business access * Comfort of users exerience ***perceptions of risk; noise; CO_2		* Time and distance to travel * Match to desire lines. * Easy to recognise route * Limited changing of facility types * Few complicated manoeuvres * Few turns.		* Good match to: ***local schools ***shops ***parks ***other public spaces/buildings		* Greenspace routes need open aspect * Consider CPTED for routes off-street * Pleasantness of cycling experience * Lighting where off-road			* Impact on local business interests? * Loading Zone loss * Effects on access * Parking spaces lost - is offset possible * Estimated effect on patronage		* Impact on local residents? * Access to properties * Impact on on-street parkings * Impact on journey time if route changes network.		* Effect of changes to the network (signals, cul-de-sacs) * Public transport routes affected? * Operation costs for street cleaning, rubbish collection? * Effect on maintenance operations?		* Increased costs due to: ***Property purchase ***Complicated facilities ***Requires supporting asset replacement (Budget Risk)		* Programme delays due to: ***Land/property acquisition ***Legal processes - consents ***Legal processes - access (Timing Risk)			**Normal weighting**	**Cost & Prog weighted**	**Context Weighted**	**Cycle Weighted**	**Unweighted**
Weighting		**15%**		**10%**		**10%**		**10%**			**10%**		**10%**		**10%**		**10%**		**15%**		**TOTAL**				
Bealey Ave to Trafalgar St - Dover St Intersection																									
Option 1A - One Stage Crossing with Retention of all movements at Colombo Street and Bealey Ave	1) Traffic volume increases by approximately 450 vehicles/day on Colombo Street 2)Vehicle speeds are likely to be the same for all options. 3&4) Good separation provided on all approaches. 5) Signal phasing provides cyclists full protection from conflicting traffic.	1	1) Matches desire lines well. 2) Minimal delays as priority route. 3) Cycle facilities to be provided at destinations (shops) subject to DD phase approval.	2	Good conenction to all amenities, maintained for cyclists	2.0	No CPTED issues. Colombo Route with higher traffic may be percieved less attractive	1.0	**6.5**	The footpath widths will be reduced outside of retail stores on the Colombo Street approaches, however, this is required to obtain desirable cycleway widths. This option retains all movements on Colombo Street making Colombo Street traffic able to easily access on-street parking on Bealey Avenue.	-1.0	Removes parking near the intersection in order to maintain traffic turn lanes and cycleway. Similar impact to on street parking as other options.	0.0	This option does not significantly impact the performance of Bealey Avenue which results in an increase in delay of 3 seconds for westbound traffic between Madras Street and Durham Street for the AM & PM Peak and a reduction in delay for eastbound traffic.	0	**-1**	Bealey Ave impact during construction higher than other options, also extent of work for Option 1A larger than other options - potential utility and services relocation cost higher also.	-1	Assume No Land required for scheme. Altyough footpath width will need to be reduced so agreement with affected parties likely to be more protracted.	0	**-1**	**4.5**	**3.0**	**3.0**	**10.0**	**4.0**
Option 1B - One Stage Crossing with Left-turn Bans on Colombo Street, all movement on Bealey Ave retained	1) Traffic volume increases by approximately 2000 vehicles/day on Colombo Street 2)Vehicle speeds are likely to be the same for all options. 3&4) Good separation provided on all approaches. 5) Signal phasing provides cyclists full protection from conflicting traffic. 7) Lighting design required for all options - Same as other options.	1.5	1) Matches desire lines well. 2) Minimal delays as priority route. 3) Cycle facilities to be provided at destinations (shops) subject to DD phase approval.	2	Makes Connection to local business and shops more difficult than Option 1A - for motorists	2.0	No CPTED issues. Colombo Route with higher traffic may be percieved less attractive	1.0	**7.3**	The footpath widths will be reduced outside of retail stores on the Colombo Street approaches, to obtain cycleway widths. Banned left-turning movements on Colombo Street making it more difficult for Colombo Street traffic access on-street parking on Bealey Avenue.	-1.5	Removes parking near the intersection in order to maintain traffic turn lanes and cycleway. Similar impact to on street parking as other options.	0.0	This option does not significantly impact the performance of Bealey Avenue which results in an increase in delay of 6 seconds for westbound traffic between Madras Street and Durham Street for the AM & PM Peak and a reduction in delay for eastbound traffic.	-1	**-2.5**	Bealey Ave impact during construction higher than other options, also extent of work for Option 1B similar to Opt1A more than Option 1C - potential utility and services relocation cost higher also.	-1	Assume No Land required for scheme. Altyough footpath width will need to be reduced so agreement with affected parties likely to be more protracted.	-0.5	**-2**	**3.0**	**1.0**	**0.0**	**9.0**	**2.5**
Option Cc - One Stage Crossing with Left-turn and Right-turn Bans on Colombo Street, all movement on Bealey Ave retained	1) Traffic volume increase by 250 vehicles/day on Colombo Street 2)Vehicle speeds are likely to be the same for all options. 3&4) Good separation provided on all approaches. 5) Signal phasing provides cyclists full protection from conflicting traffic. 7) Lighting design required for all options - Same as other options	2	1) Matches desire lines well. 2) Minimal delays as priority route. 3) Cycle facilities to be provided at destinations (shops) subject to DD phase approval.	2	Makes Connection to local business and shops more difficult than Option 1A - for motorists	2.0	No CPTED issues. Colombo Route with higher traffic may be percieved less attractive	1.0	**8**	This option bans left-turns and right-turns from Colombo Street. The reduction in movements means Colombo Street vehicles cannot access on-street parking facilities on Bealey Avenue. However footpath width is maintained as is except on north west corner	-2.0	Removes parking near the intersection in order to maintain exisitng kerb layouts. Similar impact to on street parking as other options.	0.0	This option does not significantly impact the performance of Bealey Avenue which results in an increase in delay of 2 seconds and 4 seconds for westbound traffic between Madras Street and Durham Street for the AM & PM Peak respectively. A reduction in delay for eastbound traffic is experienced during the PM peak. Colombo St is affected with all turns banned	-2	**-4**	Likely less impact due to smaller extent of work largely within exisitng kerblines, less likely any utility relocations, no land required.	0	No Land required for scheme.	0	**0**	**4.0**	**3.0**	**-1.0**	**10.0**	**3.0**
Section 1: Bealey Ave to Trafalgar St - Dover St Intersection																									
Sect 1 - ver 1: Colombo (1W), Edgeware, Trafalgar (GW)	Route intersections 3 Crossing conflict 5 Bus Rt - Colombo, Edgeware, Business access = high Traffic vol high on Colombo. Generally: Less conflict with turns but more conflict at shops	1.5	Best route, most direct and intuitive as type changes occur at intersections - with obvious transitions	2	Good conenction to all amenities	2.0	No CPTED issues. Colombo Route with higher traffic may be percieved less attractive	1.0	**7.3**	At Bealey, and Edgeware (most Loading Zones removed. Other areas all LZ's kept albeit on the opposite side in some cases(on Colombo Street- see plans).	-2.0	Colombo 1W removes most parking (betn 22 to 35 spaces left depends on setback) - approx 25% remain)	-2.0	Bus route Colombo/ Edgeware. Lights at Edgeware may be more beneficial than lights opposite Dover on Edgeware. 1W facility will increase ops $ due rubbish collection	0	**-4**	Colombo impact during construction higher than other options, costs for 1W less than Caledonian 2W options. All options require signal crossing of Edgeware.	0	No Land required for scheme.	0	**0**	**3.25**	**2.5**	**-1.5**	**9**	**2.5**
Sect 1 - ver 2: Colombo (1W) Purchas (2W), Caledonian (1W), Edgeware(2W), Dover (GW)	Route intersections 5 Crossing conflict 5 Bus Rt - Colombo, Edgeware Business access = high (incl Purchas) Traffic vol med (high at Colombo south) Generally: lower vol traffic env overall, but balance with more turns and crossings to get there.	1.5	Least Direct and not intuitive with 2 westbound directional changes	-2	Connection to Canon St shops required. Close enough to Edgeware shops but not as good as Colombo St option	0.5	Better than full Colombo but still has Colombo element and sharp turns less comfortable.	1.5	**2.3**	Business parking loss at Bealey and Purchase, but less overall due to use of Caledonian. Less impact than ver 1.	-1.0	Caledonian 1W also removes most of residentsn parking (similar numbers left - approx 25%)	-2.0	Less impact on Bus Routes than 1, but need to consider cul-de-sac of Canon, and will require ights on Edgeware/Dover and on Colombo/ Purchas. 1W on Edgware also have rubbish operational impacts.	-1	**-4**	Likely less impact on traffic due work on lower volume roads. Cost for Caledonian one-ways almost same as two way due kerb costs, more expensive than Colombo one-ways.	-1	No Land required for scheme.	0	**-1**	**-2.75**	**-4.5**	**-7.5**	**-2**	**-3.5**
Sect 1 - ver 3: Colombo (1W) Purchas (2W), Caledonian (2W), Edgeware(2W), Dover (GW)	Route intersections 5 Crossing conflict 1 Bus Rt - Colombo, Edgeware Business access = high (inc Purchas) Traffic vol med (high at Colombo south) Generally: Caledonian is excellent env for two way, few crossings.	2	Least Direct and not intuitive with 2 westbound directional changes	-2	Connection to Canon St shops required. Close enough to Edgeware shops but not as good as Colombo St option	0.5	Better than full Colombo but still has Colombo element and sharp turns less comfortable.	1.5	**3**	Same business parking loss at Bealey and Purchase as ver 2. Less impact than ver 1 -	-1.0	Better with 2W on Caledonian as 101/128 OSP are maintained, has bigger impact on Edgeware OSP, and more impact on Dover (than Trafalgar option) due to narrow road.	-1.0	Less impapct on Bus Routes than 1. Consider cul-de-sac of canon. Will require lights on Edgeware/ Dover, land on Colombo/ Purchas. Bin collection easier to build into 2 way	-0.5	**-2.5**	Likely less impact on traffic with work on lower vol roads - Caledonian 2W more expensive than Colombo 1W k&c.	-1	No Land required for scheme.	0	**-1**	**-0.5**	**-2.5**	**-4**	**0.5**	**-1.5**

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Description	* Safety for cyclists GO/NO GO CRITERIA * Safety along route for other users * Relative conflict with other road users ***pedestrians; residents; traffic ***business access * Comfort of users exerience ***perceptions of risk; noise; CO_2		* Time and distance to travel * Match to desire lines. * Easy to recognise route * Limited changing of facility types * Few complicated manoeuvres * Few turns.		* Good match to: ***local schools ***shops ***parks ***other public spaces/buildings		* Greenspace routes need open aspect * Consider CPTED for routes off-street * Pleasantness of cycling experience * Lighting where off-road			* Impact on local business interests? * Loading Zone loss * Effects on access * Parking spaces lost - is offset possible * Estimated effect on patronage		* Impact on local residents? * Access to properties * Impact on on-street parkings * Impact on journey time if route changes network.		* Effect of changes to the network (signals, cul-de-sacs) * Public transport routes affected? * Operation costs for street cleaning, rubbish collection? * Effect on maintenance operations?		* Increased costs due to: ***Property purchase ***Complicated facilities ***Requires supporting asset replacement (Budget Risk)		* Programme delays due to: ***Land/property acquisition ***Legal processes - consents ***Legal processes - access (Timing Risk)			**Normal weighting**	**Cost & Prog weighted**	**Context Weighted**	**Cycle Weighted**	**Unweighted**
Weighting		**15%**		**10%**		**10%**		**10%**			**10%**		**10%**		**10%**		**10%**		**15%**		**TOTAL**				
Sect 1 - ver 4: Colombo (1W) Purchas (2W), Caledonian (2W), Edgeware(2W), Trafalgar (GW)	Route intersections 5 Crossing conflict 1 Bus Rt - Colombo, Edgeware Business Access = high (inc Purchas) Traffic vol med (high at Colombo Sth Generally: Marginally better than Dover as shorter length on Edgeware, easier crossing Caledonian to Trafalgar	2	less direct than 1, more direct than Dover St options	0	Connection to Canon St shops required. Close enough to Edgeware shops, bwetter than Dover street options but not as good as Colombo St option	1.0	Better than full Colombo but still has Colombo element and sharp turns less comfortable.	1.5	**5.5**	Same business parking loss at Bealey and Purchase as ver 2. Less impact than ver 1 -	-0.5	91% of parking retained between Purchas - St Albans. Generally best option for possible Colombo or Caledonian routes.	-0.5	Less impapct on Bus Routes than 1. Consider cul-de-sac of canon. Will require lights on Edgeware/ Dover, land on Colombo/ Purchas. Bin collection easier to build into 2 way	-0.5	**-1.5**	Likely less impact on traffic with work on lower vol roads - $ to construct 2W replacing dish more exp than 1W btn ex kerbs on Colombo	-1	No Land required for scheme.	0	**-1**	**3.0**	**1.0**	**0.5**	**6.5**	**2.0**
Sect 1 - ver 5: Colombo/ Caledonian 1W split (both back to Trafalgar)	Route intersections 6 Crossing conflict 8 No further safety evaluation - could be made safte for each path, but would face potential conflicts with cyclists travelling in wrong direction.	1	Difficult to navigate not intuitive and needs more connectors, complicated crossing etc	-2	Would require additional connections between directions. Better than Dover split option	-1.0	Better than full Colombo, as length on Caledonian. Difficutly reversing direction and worries about conflicting direction cyclists.	1.0	**-0.5**	Best - can maintain parkingon both sides on both Colombo and Caledonian	0.0	Best - can maintain parkingon both sides on both Colombo and caledonian	0.0	2 x crossing point at Edgeware simialr to colombo Option	-1.5	**-1.5**	One of cheapest options with kerb lines on one-side of Caledonian only	0	No Land required for scheme.	0	**0**	**-2.0**	**-2.5**	**-4.0**	**-3.5**	**-2.5**
Sect 1 - ver 6: Colombo/ Caledonian 1W split (outside of block, Dover/Trafalgar split)	Route intersections 6 Crossing conflict 8 No further safety evaluation - could be made safte for each path, but would face potential conflicts with cyclists travelling in wrong direction.	1	Least Direct and not intuitive	-2	Would require additional connections between directions and to Edgeware Shops	-2.0	Better than full Colombo, as length on Caledonian. Difficutly reversing direction and worries about conflicting direction cyclists.	1.0	**-1.5**	Best - can maintain parkingon both sides on both Colombo and Caledonian	0.0	Best - can maintain parkingon both sides on both Colombo and caledonian	0.0	2 x crossing point at Edgeware simialr to colombo Option	-1.5	**-1.5**	One of cheapest options with kerb lines on one-side of Caledonian only	0	No Land required for scheme.	0	**0**	**-3.0**	**-3.5**	**-5.0**	**-5.5**	**-3.5**
Sect 1 - ver 7: Bealey, Caledonian 2W (then either Trafalgar or Devon)	Route intersections 4 Crossing conflict 2 Generally: Could be good route however fit of 2W on Bealey Ave extremely problematic, and access to and from major complictions	1	As good as ver 4 above if using Trafalgar.	0	Good connectivity but not as good as Colombo St route - equivalent to ver 4.	1.0	Better than Colombo but not 2/2	1.5	**4**	Will still have loss of parking on one side of Caledonian, & affect medical areas parking	-0.5	Good as minimal loss of OSP	-1.0	2 x crossing point at Edgeware simialr to colombo Option	-0.5	**-2**	Same score as other options where Caledonian 2W more expensive than Colombo 1W	-1	No Land required for scheme.	0	**-1**	**1.0**	**-0.5**	**-1.5**	**4.0**	**0.5**
Sect 1 - ver 8: Colombo 2W, Edgeware 2w, Trafalgar GW	Traffic volumes too high for 2W in accordance with Best Practice Design Guide	-2	Slightly less direct than Colombo 1W option but still very good	1.5	Good connection to all amenities	2.0	Colombo Route with higher traffic may be percieved less attractive	1.0	**1.5**	50% of parking loss better than Colombo 1W	-1.0	50% of parking loss better than Colombo 1W	-1.0	Traffic volumes too high for 2W	-2	**-4**	Chepaer than 1W on Colombo but may be some issues with utility / services	0	No Land required for scheme.	0	**0**	**-2.5**	**-1.5**	**-5.5**	**1.0**	**-1.5**

	Criteria for Cyclists 45%									Community/Stakeholder Interests 30%						Project Costs and Programme Risks 25%					Sensitivity				
Criteria	**Safety and Comfort**		**Directness and Coherance**		**Connectivity to Amenity within the corridor**		**Social Safety and Attractiveness (based on worst feature)**			**Local Business Impact**		**Local Resident Impact**		**Operational and Network Impacts**		**Ease of Construction and costs**		**Land Requirements /Easements /Other Agreements**			Weightings				
Description	* Safety for cyclists GO/NO GO CRITERIA * Safety along route for other users * Relative conflict with other road users ***pedestrians; residents; traffic ***business access * Comfort of users exerience ***perceptions of risk; noise; CO_2		* Time and distance to travel * Match to desire lines. * Easy to recognise route * Limited changing of facility types * Few complicated manoeuvres * Few turns.		* Good match to: ***local schools ***shops ***parks ***other public spaces/buildings		* Greenspace routes need open aspect * Consider CPTED for routes off-street * Pleasantness of cycling experience * Lighting where off-road			* Impact on local business interests? * Loading Zone loss * Effects on access * Parking spaces lost - is offset possible * Estimated effect on patronage		* Impact on local residents? * Access to properties * Impact on on-street parkings * Impact on journey time if route changes network.		* Effect of changes to the network (signals, cul-de-sacs) * Public transport routes affected? * Operation costs for street cleaning, rubbish collection? * Effect on maintenance operations?		* Increased costs due to: ***Property purchase ***Complicated facilities ***Requires supporting asset replacement (Budget Risk)		* Programme delays due to: ***Land/property acquisition ***Legal processes - consents ***Legal processes - access (Timing Risk)			Normal weighting	Cost & Prog weighted	Context Weighted	Cycle Weighted	Unweighted
Weighting		15%		10%		10%		10%			10%		10%		10%		10%		15%		TOTAL				
Section 2: Dover St Intersection to Rutland St/St Albans St Intersection																									
Sect 2 Opt 1 Trafalgar Greenway to Sheppard Pl then 2W to St Albans continuing as 2W on south side	Has more exposure to higher traffic St Albans Street and St Albans School traffic than ver 1 route, marked slightly lower	1.5	Most direct route and only affected by one set of signals - good connectivity afforded by signals at Rutland/St Albans.	2	same connectivity as opther options	0	Better than Massey Greenway	1	5.3	No Businesses affected	0	Will require removal of parking on one side of St Albans. More impact than GW	-1	1 x signals crossing at Rutland/St Albans. Marginally more impact on ops than Massey St	-0.5	-1.5	More exp than GW, south side option similar to north option cost	-1	No Land required or agreements etc	0	-1	2.8	1.0	0.5	6.5	2.0
Sect 2 Opt 2 Trafalgar GW to Sheppard Pl then St Albans 2W - north side (+ future property purchase option)	Has similar exposure as ver 2 to St Albans Road traffic & St Albans School traffic. Will use a second set of crossing signals	1	Does follow the most direct overall alignment, but score reduced due to two signal sets required.	1.5	same connectivity as opther options	0	Same and ver 2	1	4	No Businesses affected	0	Will require removal of parking on one side of St Albans. More impact than GW	-1	1 x signals at Trafalgar with second set at Rutland / St Albans	-1	-2	More exp than GW, south side option similar to north option cost, but additional signal set involved.	-1.5	No Land required or agreements etc	0	-2	0.5	-1.5	-2.0	3.5	0.0
Sect 2 Opt 3 Trafalgar greenway to Sheppard Pl then St Albans 1W on both sides,	Has similar exposure as ver 2 to St Albans Road traffic & St Albans School traffic. Will use a second set of crossing signals	1	Does follow the most direct overall alignment, but score reduced due to two signal sets required.	1.5	same connectivity as opther options	0	Same and ver 2	1	4	No Businesses affected	0	Will require the removal of parking on both sides of St Albans Street	-2	1 x signals at Trafalgar with second set at Rutland / St Albans	-1	-3	Most Exp 1W more than GW/2W options with additional signal set involved	-1.5	No Land required or agreements etc	0	-2	-0.5	-2.5	-4.0	2.5	-1.0
Sect 2 Opt 4 Trafalgar/Massey greenway	Use of Massey - avoids St Albans for longer than other routes. Better safety as avoids conflicts with school traffic. Uses signalised crossing at Rutland / St Albans	2	Not as direct as St Albans option generally. Good connectivity afforded by signals at Rutland/St Albans.	0	Main amenity connection is St albans School - not much to chose between options as all options go directly past the school	0	Greenway is quiet, dark at night with large trees and further to go so scores lower than the alternative routes. More attractive than alternatives	-1	2	No Businesses affected	0	Greenways best as only posted speed and cul de sac impacts - no removal of On Street Parking	-0.5	1 x Signals to cross St Albans at Rutland St, Least impact on ops	-0.5	-1	GW relatively cheap and easy to implement compared to other options.	-0.5	No Land required or agreements etc	0	-1	0.5	-1.0	-1.5	0.5	-0.5
Sect 2 ver 5 Trafalgar 1W	Doesn't fit in road reserve, and not necessary for traffic volumes.								0							0					0					
Sect 2 ver 6 Trafalgar shared path	In sufficient offset from boundaries which is reqd to be 3m from cycleway								0							0					0					
Sect 2 ver 7 Massey 1W or 2W	Cannot be made to fit with trees, but would otherwise by functioning facility types								0							0					0					
Section 3: Rutland St / St Albans St to Rutland Reserve																									
Sect 3 Opt 2 Rutland St 1W both sides	1W facilty safe but traffic vol on Rutland and areas around school and shops and Innes Road create more conflict points	1	Most direct, connects best with local shops and school.	2	Shops and schools direct connection, parks etc	2	Greater passive security at all hours	2	7.5	Parking loss in front of shops	-1	1w has greatest impact on OSP	-2	Minor efficiency/ capacity loss on Rutland/Innes	-0.5	-3.5	More issues likely along Rutland and 1W more expensive than alternatives	-2	No agreements required	0	-2	2.0	-0.5	-1.5	8.5	1.5
Sect 3 Opt 3 Rutland 2W	Traffic volumes, side roads do not allow 2W facility without restricting traffic	0.5	Most direct, connects best with local shops and school.	2	Shops and schools direct connection, parks etc	2	Greater passive security at all hours	2	6.8	Better than 1W should be able to accommodate LZ	-1	Better than Rutland 1W but still lose 50%	-2	To reduced traffic volumes, major network impacts.	-2	-5	2W cheaper than 1 way but complicated at Intersections	-1	No Land required or agreements etc	0	-1	0.8	-0.5	-2.5	7.0	0.5
Sect 3 Opt 4a Rutland 2W, Westminster 2W, Gosset GW, Rugby Park, right-of-way, Weston 2W, Rutland 2W	Fewest property access crossings of overall route; signal crossing of Innes better than at Rutland. Traffic volume too high for 2W on north end Rutland, but only for one block, and crossing with and crossing of Mcfaddens.	1	Will feel slightly more direct than Carrington, especially if connecting to St Albans St option.	-1	Misses schools and shops so may need additional connectors	1	Parks are attractive, but quiet streets and parks at night not so much, also alley from Innes to Weston	1	2.5	No business affected along the route. No LZ loss.	0	Some parking loss on Westminster, Weston, Rutland, else GW or off road is better than Rutland 1W	-0.5	Possible cul-de-sac of Mays, & Gossett. Possible signalise McFaddens/ Rutland if traffic volume increase. Signals on Innes	-1	-1.5	Greenways cheaper than Rutland 1W but route is longer. 2W in park should be easier than Rutland so overall slightly eassier overall than Rutland	-0.5	Agreements required for route through Parks only, no real difference to Rutland	0	-1	0.5	-0.5	-0.5	2.0	0.0
Sect 3 Opt 4b Rutland 2W, Westminster 2W, Carrington GW, Rugby Park, right-of-way, Weston 2W, Rutland 2W	Fewest property access crossings of overall route; signal crossing of Innes better than at Rutland. Traffic volume too high for 2W on north end Rutland, but only for one block, and crossing with and crossing of Mcfaddens. Minor improvement over ver 1, as don't deal with parking on Malvern	1.5	More straight-forward and direct crossing of Malvern Street.	-1	Misses schools and shops so may need additional connectors	1	Parks are attractive, but quiet streets and parks at night not so much, also alley from Innes to Weston	1	3.3	No parking loss	0	Some parking loss on Westminster, Weston, Rutland, else GW or off road is better than Rutland 1W	-0.5	Possible cul-de-sac of Mays, & Gossett. Possible signalise McFaddens/ Rutland if traffic volume increase. Signals on Innes	-1	-1.5	as above	-0.5	Agreements required for route through Parks only, no real difference to Rutland	0	-1	1.3	0.0	0.0	3.0	0.5
Rutland St / Innes Road Traffic Signal Sequencing																									
Rutland/Innes Opt 1 Existing signal phasing	Facility operates as normal intersection signals. While road code governs behaviour rules, intersections are not attractive and some cyclists avoid due to safety concerns.	0	No influence on directness or coherence	0	No influence on Amenity within the corridor	2	Has no greater attractiveness than current situation	0	2	No change to business effect.	0	No change to business effect.	0	No change to network impact	0	0	No additional costs	0	No agreements required	0	0	2.0	2.0	2.0	4.0	2.0
Rutland/Innes Opt 2 Separate cycle phase.	Facility operates with additionsl phase for cyclists (and pedestrians). Lowest risk signalised intersection option. s.	2	No influence on directness or coherence	0	No influence on Amenity within the corridor	2	May make cycle route more attractive, with some additional cycle focused measures.	2	7	No change to business effect.	0	Consider impact on businesses due to queuing time	-1	Will impact on network efficiency due to additional phase in signal cycle.	-2	-3	Minor additional costs due extra signal head	-1	No agreements required	0	-1	3.0	1.0	1.0	8.0	2.0

Appendix I

Cost estimate

	Bealey Option 1C	Colombo Option 2B	Edgeware Option 2	Trafalgar Option 3	St Albans - Trafalgar	Rutland	Sawyers - Grassmere	**Total**
CARRIAGEWAY	$ 18,865	$ 152,810	$ 14,430	$ 78,080	$ 551,054	$ 1,146,341	$ 13,028	**$ 1,974,607**
KERB & CHANNEL and TRAFFIC ISLANDS	$ 46,518	$ 273,780	$ 93,836	$ 11,903	$ 181,840	$ 884,966	$ 300,544	**$ 1,793,386**
FOOTPATH / CYCLEWAY	$ 30,350	$ 40,000	$ 5,334	$ 27,430	$ 135,165	$ 259,635	$ 57,344	**$ 555,258**
STORMWATER	$ 8,050	$ 12,650	$ 38,150	$ 11,500	$ 94,000	$ 519,900	$ 24,980	**$ 709,230**
LANDSCAPING and BERM	$ -	$ 52,300	$ 16,550	$ 10,500	$ 95,257	$ 151,562	$ 1,618	**$ 327,787**
ROAD MARKING	$ 28,000	$ 33,900	$ 22,450	$ 3,700	$ 33,810	$ 128,025	$ 111,436	**$ 361,321**
SIGNS	$ 20,000	$ 10,000	$ 6,500	$ 10,000	$ 3,800	$ 3,600	$ 28,004	**$ 81,904**
STREET FURNITURE and PEDESTRIAN FEATURES	$ -	$ 44,000	$ 7,500	$ 1,400	$ 1,000	$ 5,500	$ 6,767	**$ 66,167**
STREET LIGHTING	$ 6,000	$ 25,000	$ 15,000	$ 50,000	$ 60,000	$ 140,000	$ 3,000	**$ 299,000**
SERVICES and UTILITIES	$ 25,000	$ 45,000	$ 100,000	$ 20,000	$ 70,000	$ 265,000	$ 30,929	**$ 555,929**
SIGNALS	$ 300,000	$ -	$ 175,000	$ -	$ 150,000	$ 25,000	$ 203,000	**$ 853,000**
Sub total Construction Costs	$ 482,783	$ 689,440	$ 494,750	$ 224,513	$ 1,375,925	$ 3,529,529	$ 780,649	**$ 7,577,589**
TM 6% (16% on Bealey)	$ 77,245	$ 41,366	$ 29,685	$ 13,471	$ 82,556	$ 211,772	$ 46,839	**$ 502,934**
P&G 10%	$ 48,278	$ 68,944	$ 49,475	$ 22,451	$ 137,593	$ 352,953	$ 78,065	**$ 757,759**
	$ 608,307	$ 799,750	$ 573,910	$ 260,435	$ 1,596,073	$ 4,094,253	$ 905,553	**$ 8,838,282**
Contingency 30%	$ 182,492	$ 239,925	$ 172,173	$ 78,130	$ 478,822	$ 1,228,276	$ 271,666	**$ 2,651,485**
Total Construction Costs	$ 790,799	$ 1,039,676	$ 746,084	$ 338,565	$ 2,074,895	$ 5,322,529	$ 1,177,219	**$ 11,489,766**
Design (5.5%)	$ 43,494	$ 57,182	$ 41,035	$ 18,621	$ 114,119	$ 292,739	$ 64,747	**$ 631,937**
Supervision (5%)	$ 39,540	$ 51,984	$ 37,304	$ 16,928	$ 103,745	$ 266,126	$ 58,861	**$ 574,488**
Contingency (10%)	$ 79,080	$ 103,968	$ 74,608	$ 33,856	$ 207,490	$ 532,253	$ 117,722	**$ 1,148,977**
Total	**$ 952,912**	**$ 1,252,809**	**$ 899,031**	**$ 407,971**	**$ 2,500,249**	**$ 6,413,648**	**$ 1,418,549**	**$ 13,845,168**

Appendix J

Consent requirements

Summary of CCC rules/consent requirements

Zoning

Colombo Street: Moorhouse Ave – Edgeware Road = zoned as a collector road 1,000 to 6,000 total daily traffic flow

Courtenay Street: Trafalgar Street – Westminster Street = zones as a collector road 1,000 to 6,000 total daily traffic flow

Cycle facilities are allowed for in the standards for road design and construction for collector roads.

Summary of the Zone as per the Plan

Section 4.3 – Extent of the Zone

a. *The Special Purpose (Road) Zone shall be deemed to apply to all land that is legal road, within the meaning of the Local Government Act 1974, excluding that land shown on the planning maps as Special Purpose (Pedestrian Precincts) Zone,* ***Conservation 5 Zone,*** *and land comprising the carparking associated with the Bishopdale Shopping Centre.*

b. Where subsequent to notification of the Plan (24 June 1995), land is vested in the Council as road then it shall be deemed to be included in the Special Purpose (Road) zone.

c. Where a road has been stopped, the site that was formerly within the Special Purpose (Road) Zone will revert to the zoning as shown on the planning maps

The proposed cycleway appears to be within the extent of the road reserve therefore the Special Purpose (Road) Zone section of the plan will apply to the proposal.

Permitted activity

4.4.1 All activities

Updated 31 July 2012

(a) Any activity which complies with:

- all of the development standards under Clause 4.5; and
- the critical standard under Clause 4.6

shall be a **permitted activity.**

(b) Any activity which complies with the critical standard, but does not comply with any one or more of the development standards under Clause 4.5, shall be a **discretionary activity** with the exercise of the Council's discretion limited to the matter(s) subject to that standard.

(c) Any activity which does not comply with the critical standard under Clause 4.6, shall be a **non-complying activity.**

(d) Clauses 4.5.1-4.5.5 (Special Purpose (Road) Zone) do not apply within the Central City.

For section 4, development standards and the critical standard must be met in order for the activity to be a permitted activity.

The development standards are set out and a brief summary is provided in the table below.

Development or Critical Standard	Does the standard apply?	Explanation
4.5.1 Roadway widths Construction/reconstruction of a roadway not to exceed maximum road widths or be less than minimum road widths.	Standard will apply.	The construction of cycle ways must not reduce or increase the lane sizes on the roads.
4.5.2 Medians Solid medians shall be constructed in accordance with the roading hierarchy standards in Appendix 2.	Standard will not apply.	Under the type of zoning for the road, medians are not required.
4.5.3 Activities on Road Zone adjoining waterways No widening of roads or construction of buildings is allowed to encroach into any area between the edge of any carriageway, footpath or parking are or the bank of a waterway	Standard will not apply.	Proposed area is not located near a waterway.
4.5.4 Removal or major pruning of any tree in Road Zone In addition to any relevant rules applicable to listed protected trees in Appendix 4, Part 10 of the Plan, within any of the streets listed in the SP (Road) Zone listed below: a. No tree shall be removed. b. Pruning of any tree shall only be permitted above a height which is two-thirds of the total height of the tree measured from ground level. c. Below the height specified in (b), only those branches less than 50mm in diameter may be pruned.	Standard will not apply.	No protected trees are located within the proposed area.

4.5.5 Esplanade reserves/strips when road stops Where a legal road adjoining the coastal marine area, or a river or stream is stopped and the planning map for the locality shows a requirement to make provision for esplanade purposes, an esplanade reserve or strip shall be vested in the Council or an instrument be entered into with the Council, as if the stopping were a subdivision, in accordance with Part 14, Clauses 6.2 and 6.3.	Standard will not apply.	Site is not adjoining coastal marine area or stream and there is no associated proposal to stop either Colombo Street or Trafalgar Street.
Critical Standard 4.6.1 Roads to be stopped No roadway shall be constructed or reconstructed within a road shown on the planning maps and in Appendix 1 as road to be stopped.	Standard will not apply.	Colombo Street and Trafalgar Street are not listed in Appendix 1 and are not shown on the planning maps as roads that are proposed to be stopped.

Summary

In conclusion, the proposal meets all development and critical standards in section 4 of Chapter 8 of the Christchurch City Plan.

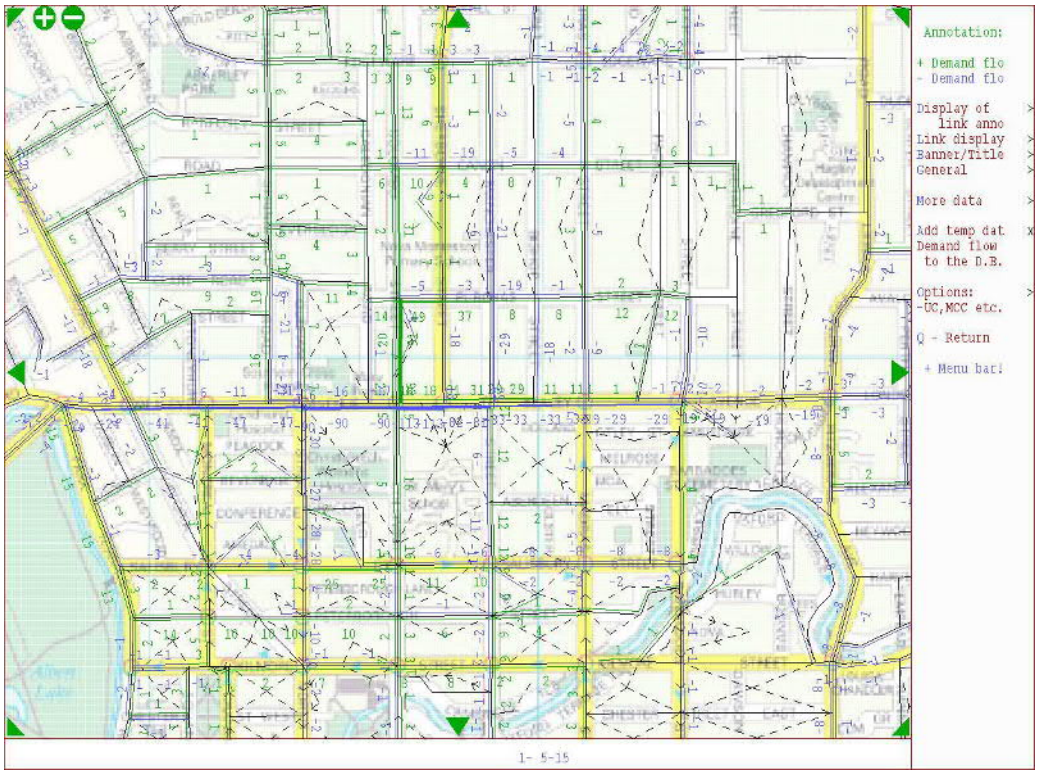
As all relevant standards can be met, the activity is considered to be permitted and there are no requirements for resource consent.

Appendix K

Modelling diagrams

Colombo Street / Bealey Avenue – 2021 Option 1a Volume Change

AM Peak



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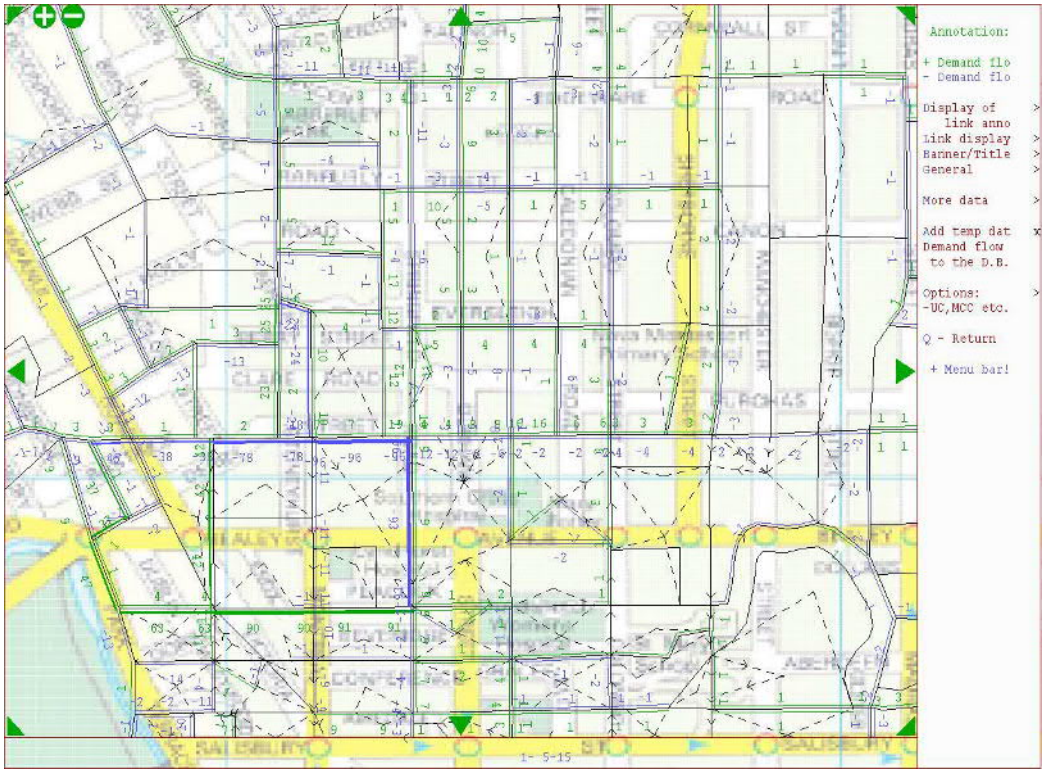
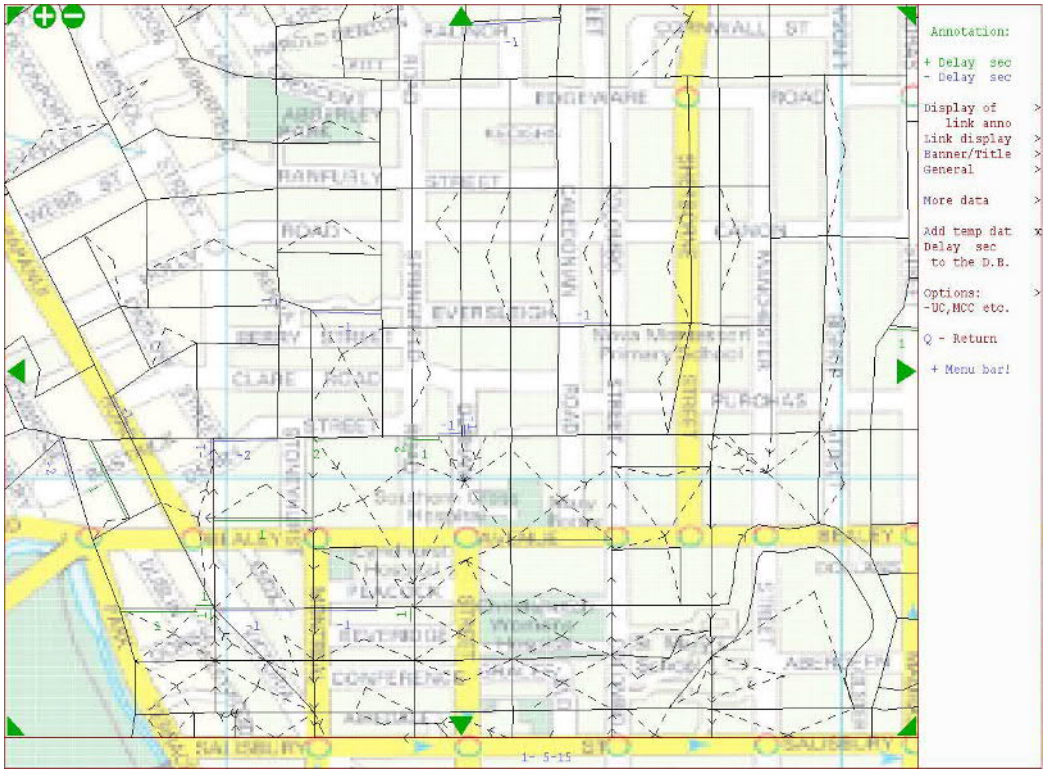


Colombo Street / Bealey Avenue – 2021 Option 1a Delay Change

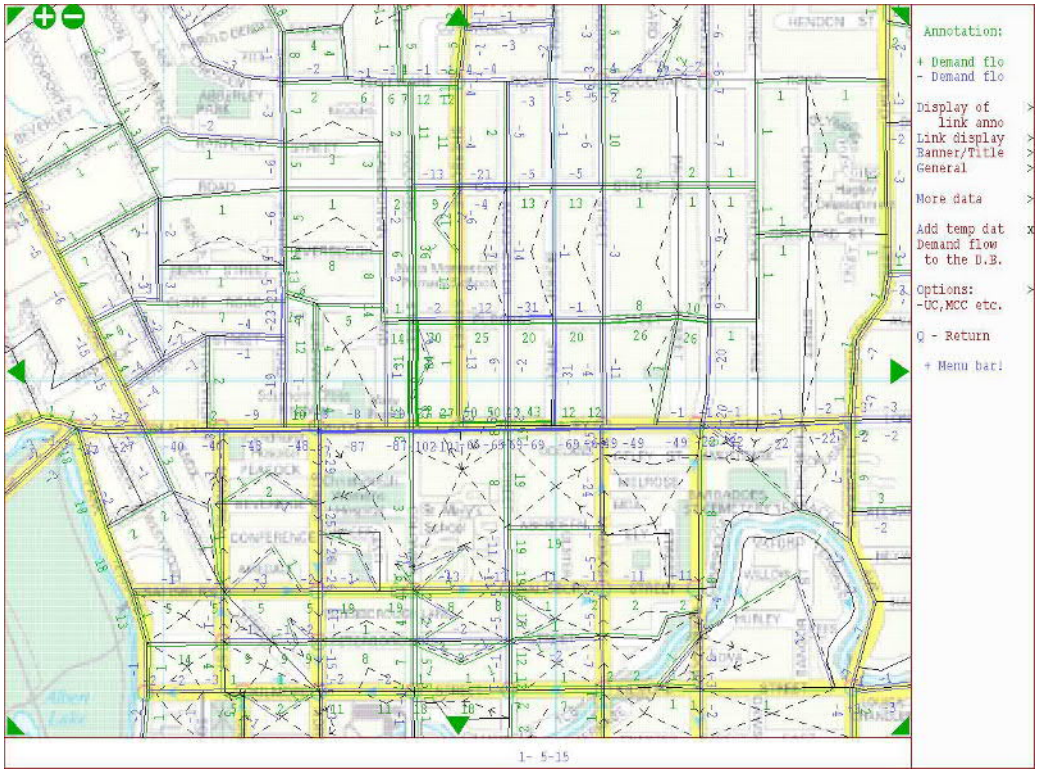
AM Peak

PM Peak



Colombo Street / Bealey Avenue – 2021 Option 1b Volume Change

AM Peak



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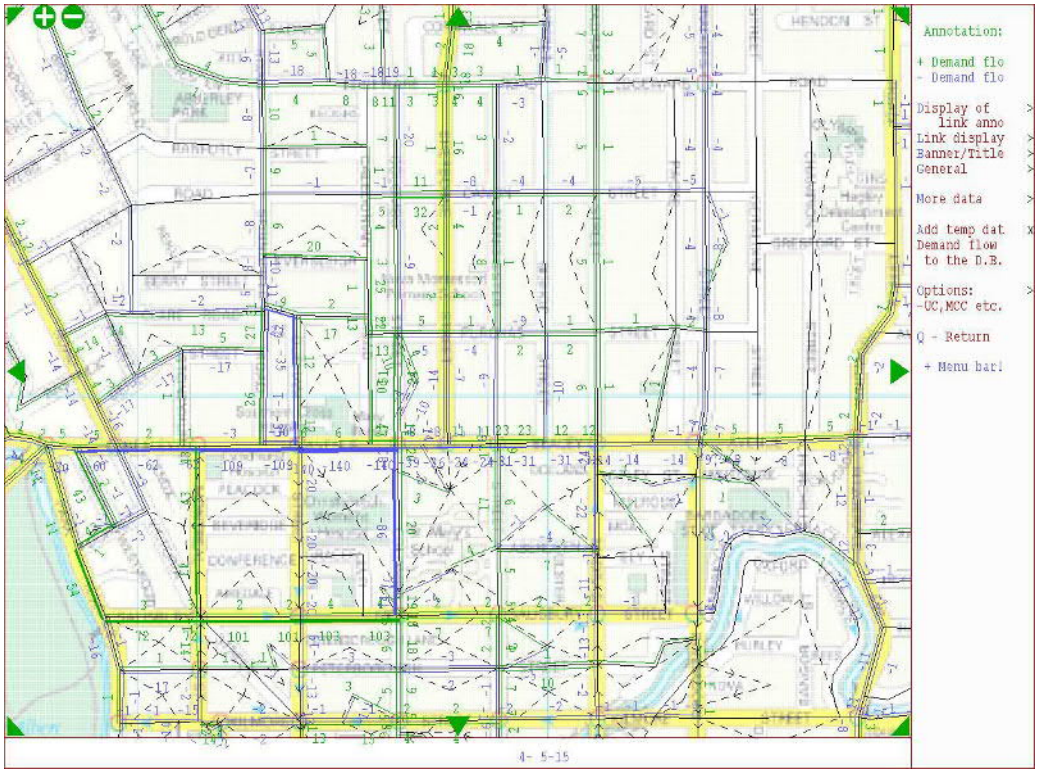

Colombo Street / Bealey Avenue – 2021 Option 1b Delay Change

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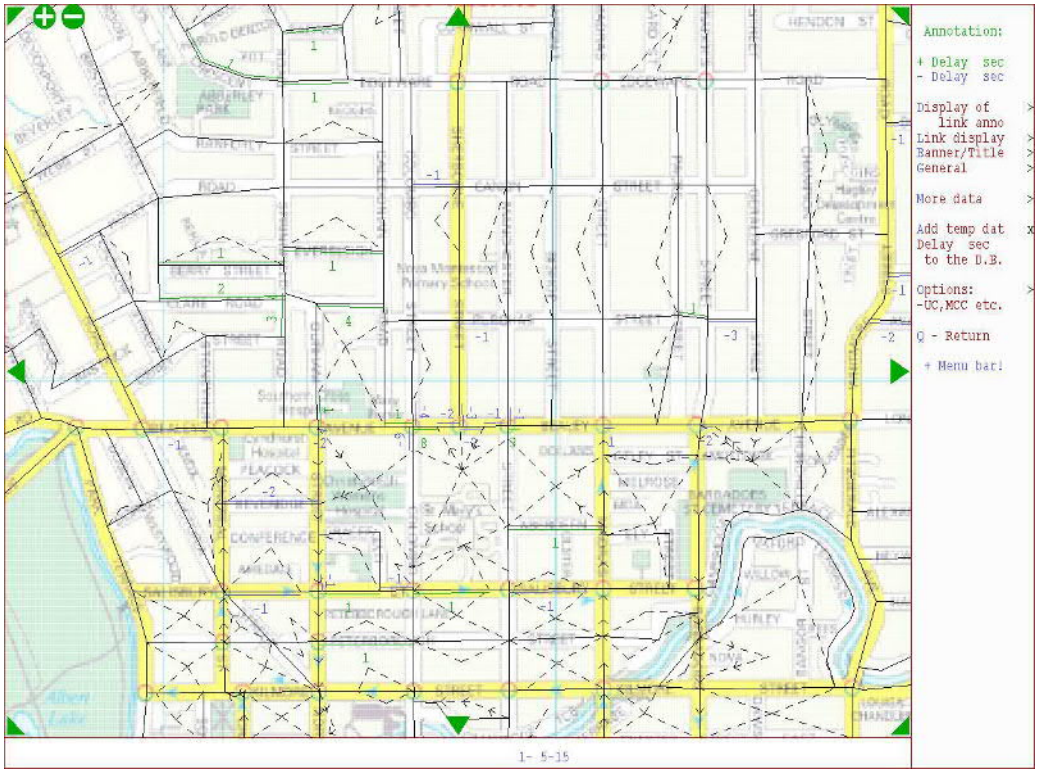
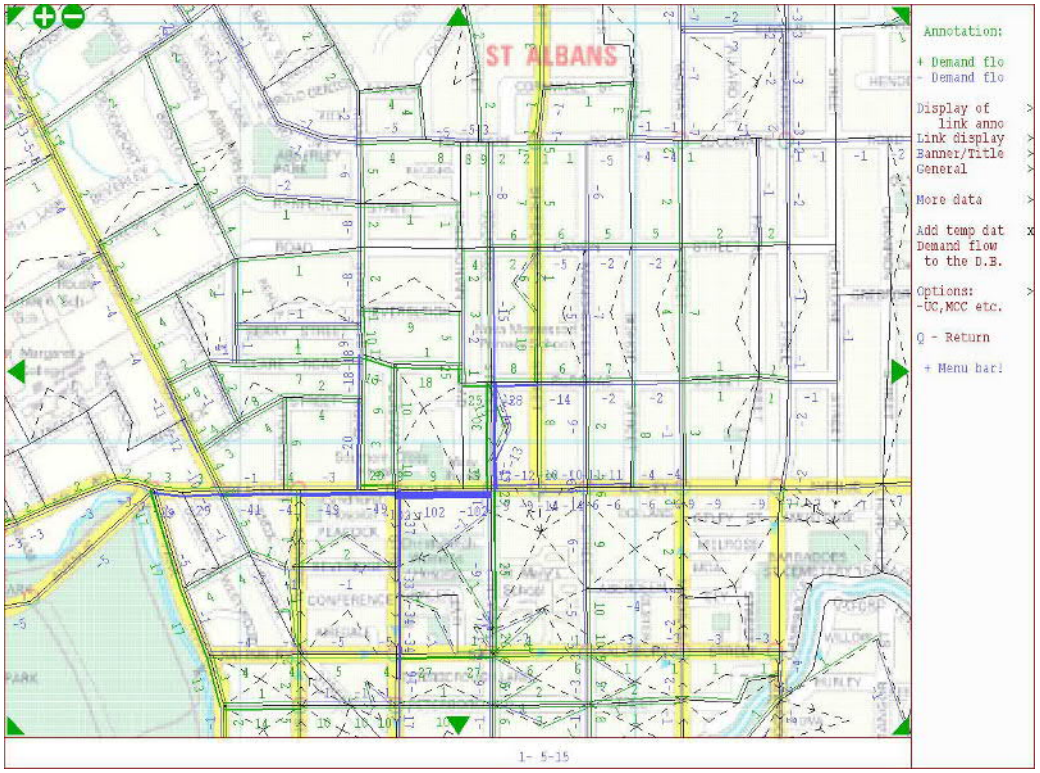


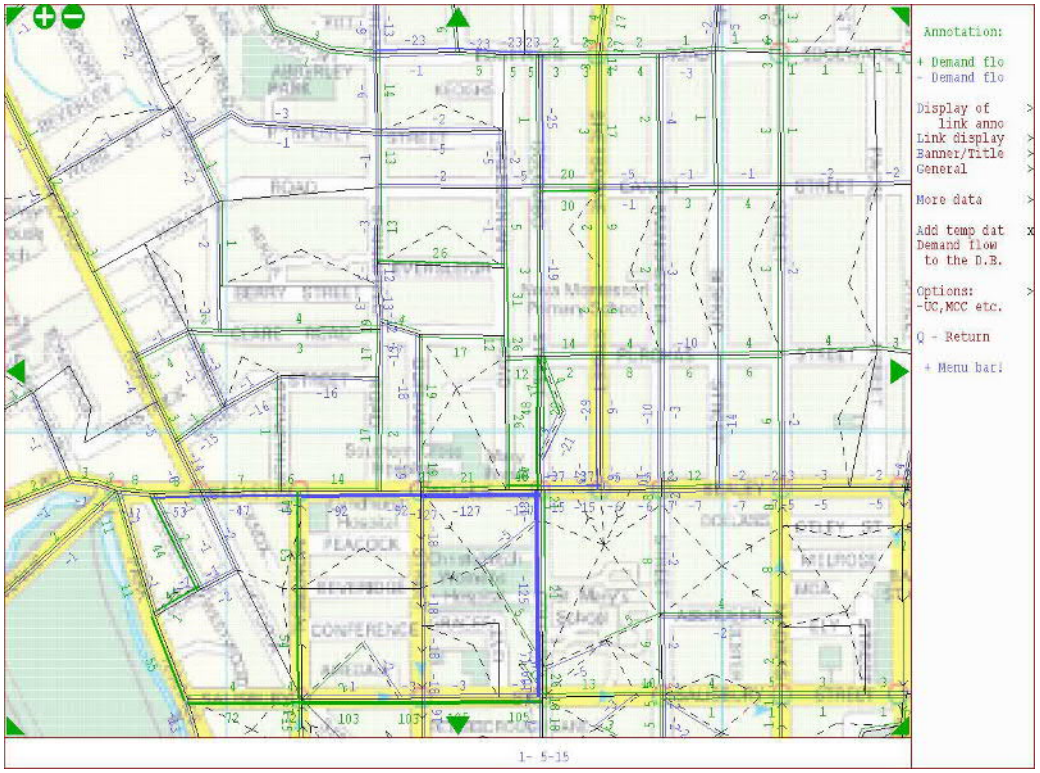
PM Peak

Colombo Street / Bealey Avenue – 2021 Option 1c Volume Change

AM Peak

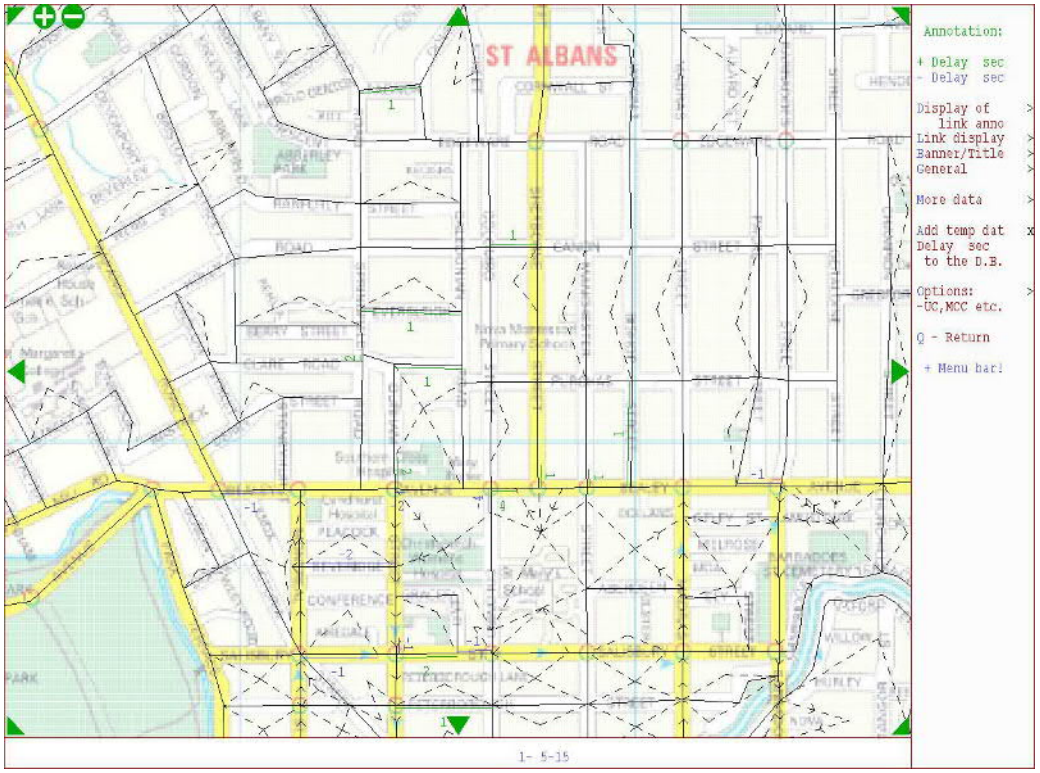


PM Peak



Colombo Street / Bealey Avenue – 2021 Option 1c Delay Change

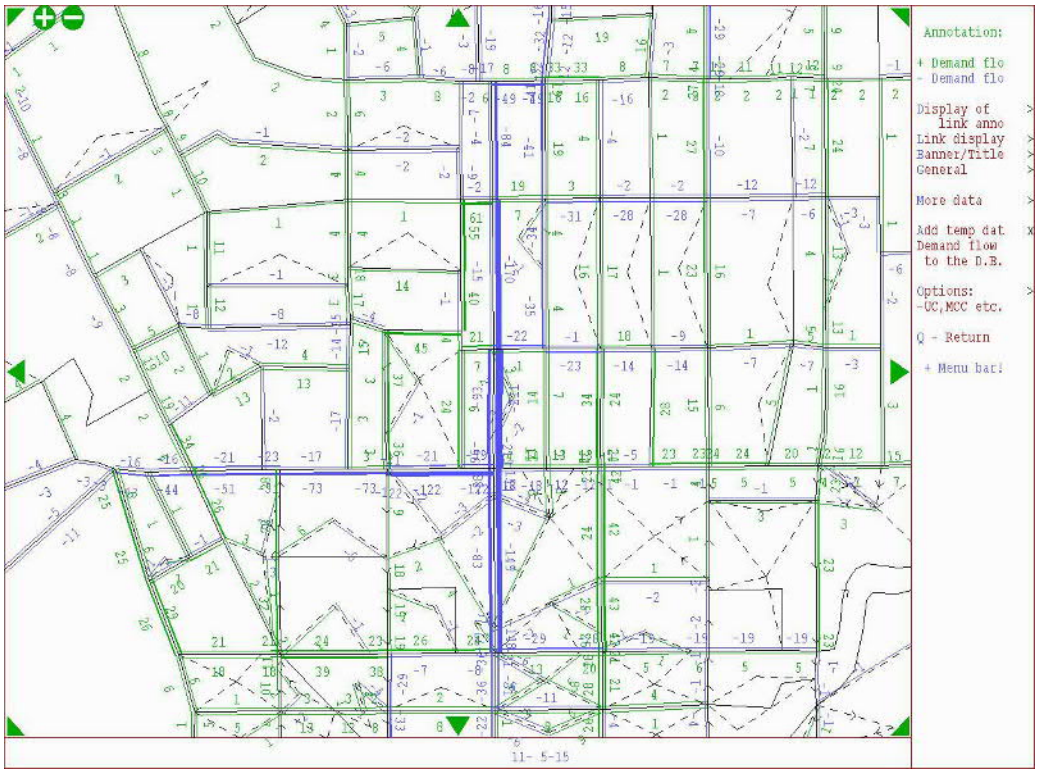
AM Peak



PM Peak

Colombo Street / Bealey Avenue – 2031 Option 1a Sensitivity Test Volume Change

AM Peak



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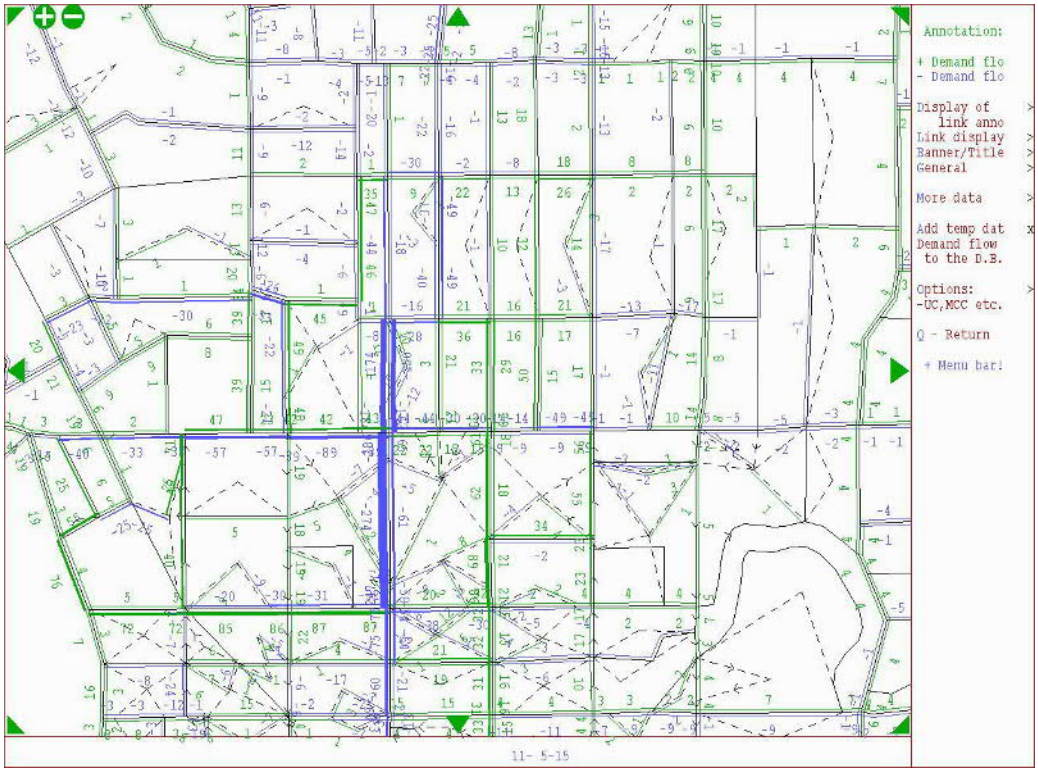
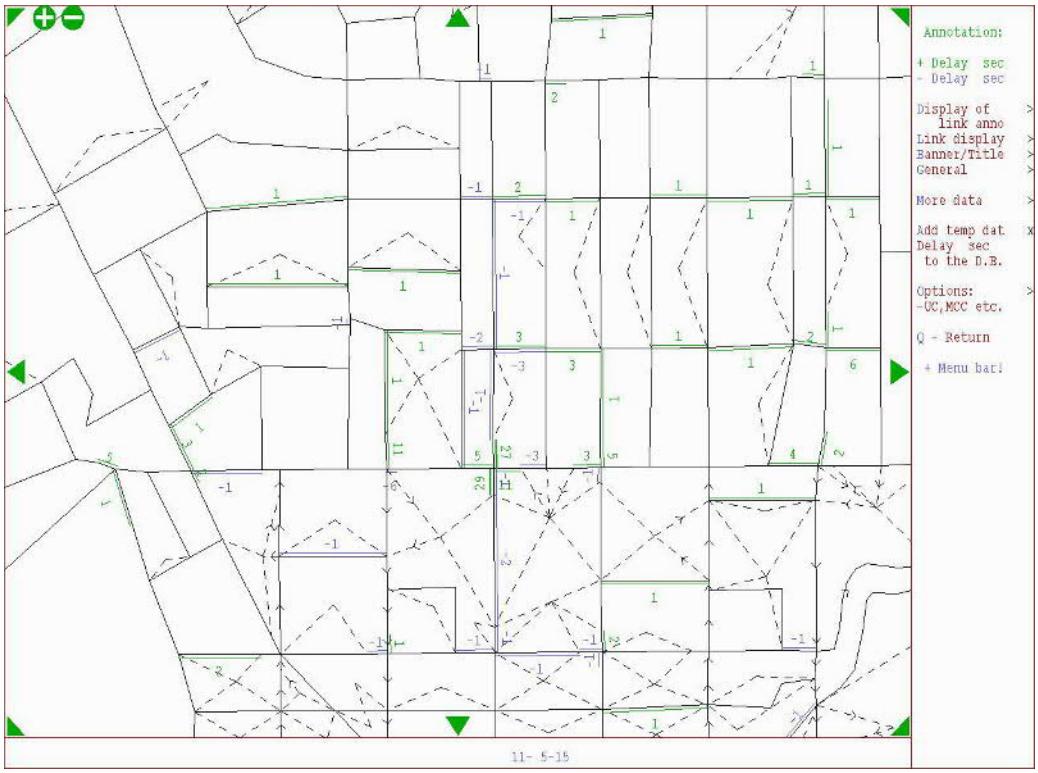
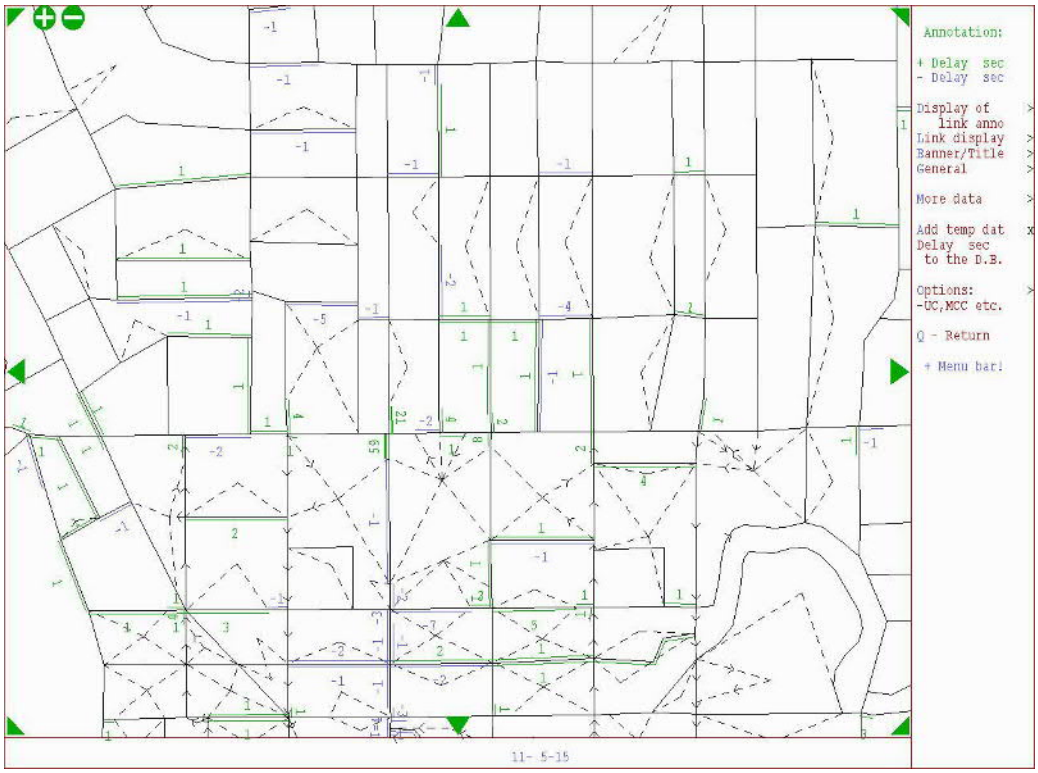


Colombo Street / Bealey Avenue – 2031 Option 1a Sensitivity Test Delay Change

AM Peak

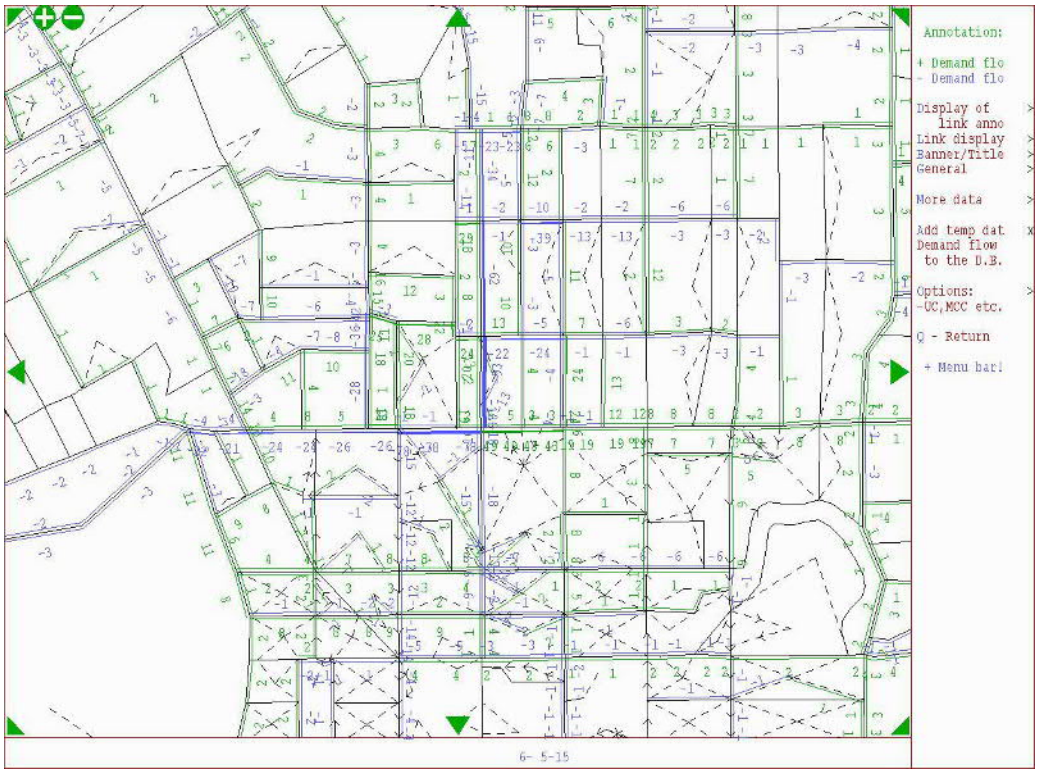


PM Peak

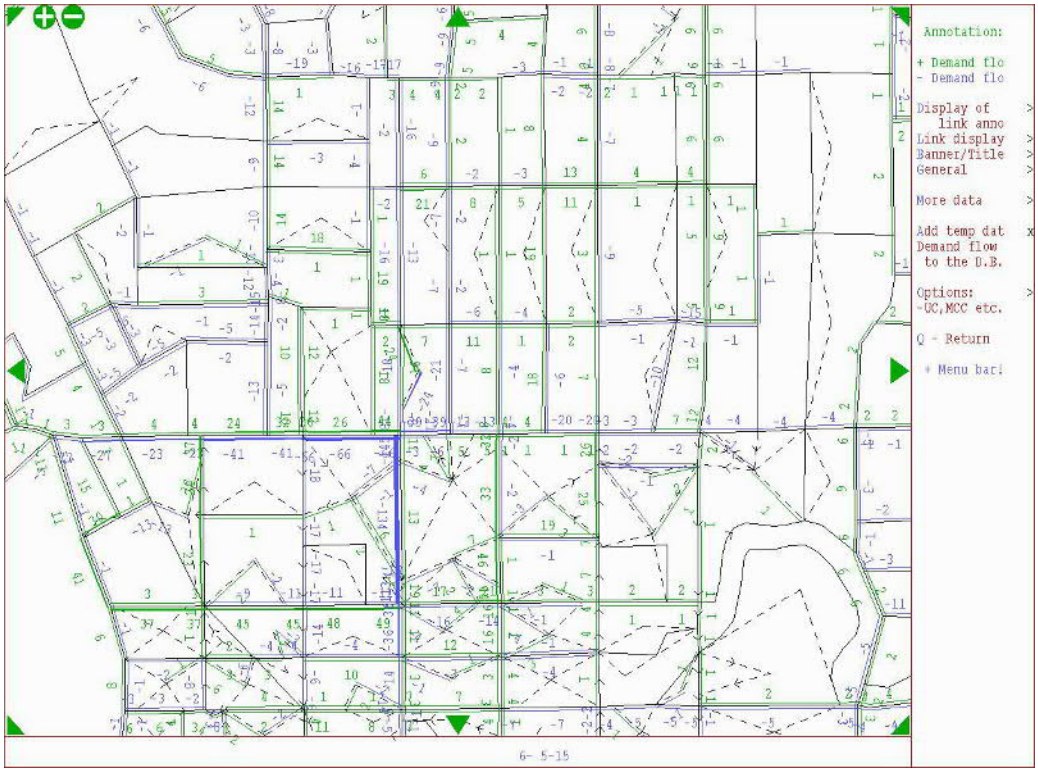


Colombo Street / Bealey Avenue – 2031 Option 1c Sensitivity Test Volume Change

AM Peak



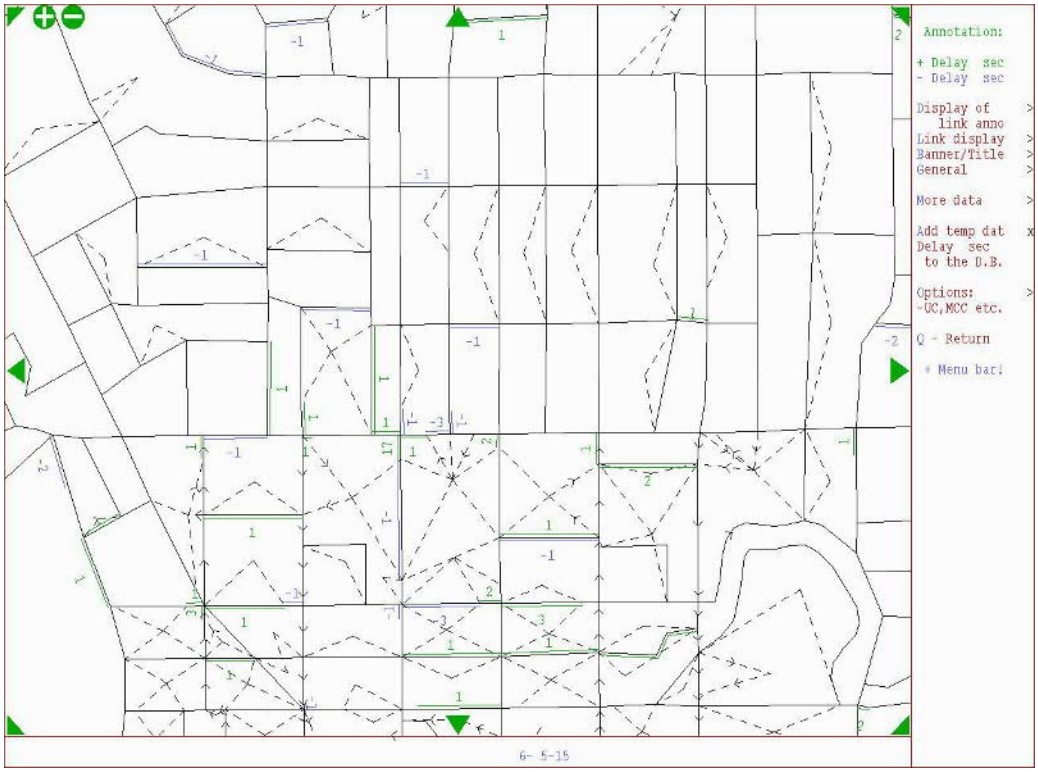
PM Peak



Colombo Street / Bealey Avenue – 2031 Option 1c Sensitivity Test Delay Change

AM Peak

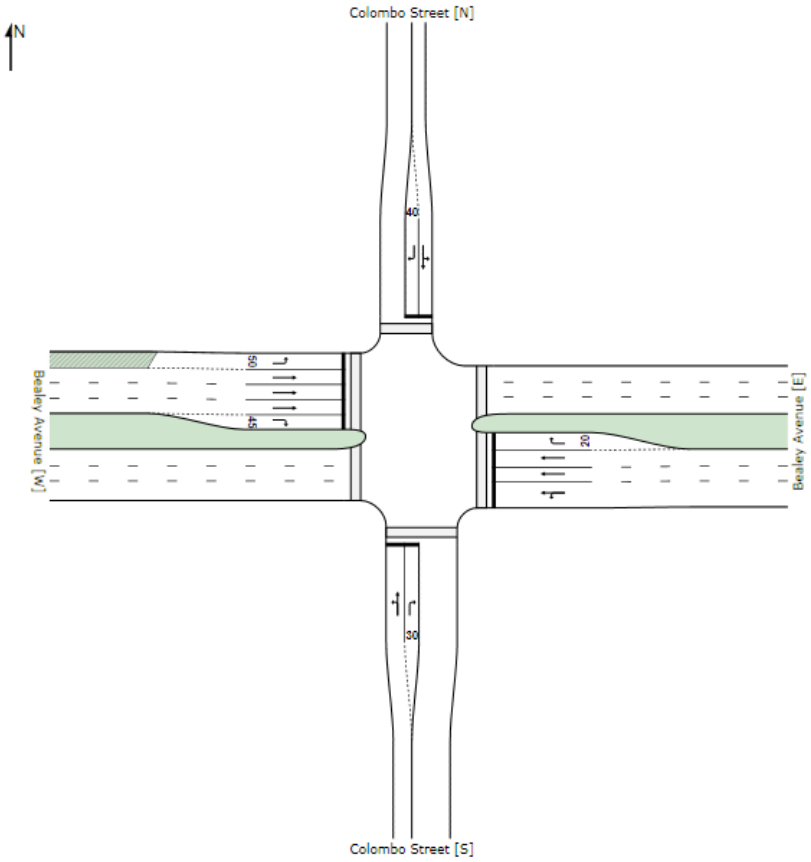
PM Peak



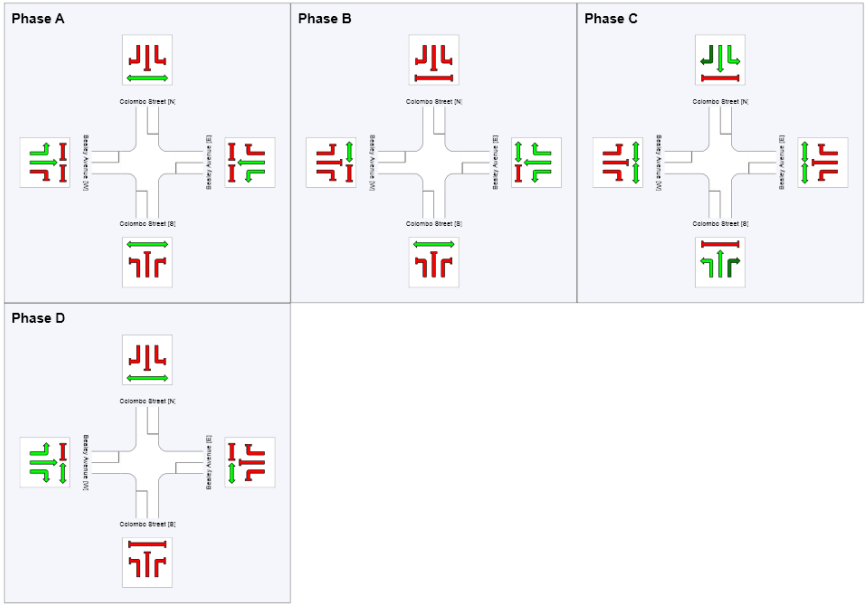
Colombo Street / Bealey Avenue – 2021 Operational Traffic Modelling Base Case

SIDRA Layout & Signal Phasing

SIDRA Layout



Signal Phasing



Movement Summaries

Site: Bealey Avenue / Colombo Street AAC Changes 2021 AM Peak

Bealey Avenue / Colombo Street
Existing Situation
Signals - Fixed Time Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street [S]											
1	L2	42	0.0	0.459	41.4	LOS D	5.1	35.4	0.96	0.77	25.8
2	T1	96	1.6	0.459	34.7	LOS C	5.1	35.4	0.96	0.77	25.8
3	R2	1	0.0	0.012	47.8	LOS D	0.0	0.3	0.93	0.57	23.4
Approach		139	1.1	0.459	36.8	LOS D	5.1	35.4	0.96	0.77	25.8
East: Bealey Avenue [E]											
4	L2	229	0.7	0.810	33.8	LOS C	24.7	174.5	0.96	0.93	28.5
5	T1	1629	1.5	0.810	27.5	LOS C	24.7	174.5	0.96	0.93	28.7
6	R2	1	0.0	0.007	44.1	LOS D	0.0	0.3	0.94	0.59	24.3
Approach		1859	1.4	0.810	28.3	LOS C	24.7	174.5	0.96	0.93	28.6
North: Colombo Street [N]											
7	L2	1	0.0	0.835	48.8	LOS D	11.0	72.7	1.00	0.99	23.9
8	T1	254	0.6	0.835	42.1	LOS D	11.0	72.7	1.00	0.99	23.9
9	R2	98	1.1	0.616	47.4	LOS D	4.0	28.3	1.00	0.81	23.6
Approach		353	0.7	0.835	43.6	LOS D	11.0	72.7	1.00	0.94	23.8
West: Bealey Avenue [W]											
10	L2	163	3.6	0.156	15.1	LOS B	2.9	21.2	0.49	0.70	36.8
11	T1	849	2.6	0.260	5.7	LOS A	3.2	22.9	0.31	0.27	43.0
12	R2	371	0.4	0.837	43.0	LOS D	15.6	109.6	0.99	0.98	24.8
Approach		1383	2.1	0.837	16.8	LOS B	15.6	109.6	0.51	0.51	35.3
All Vehicles		3735	1.6	0.837	25.8	LOS C	24.7	174.5	0.80	0.77	30.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	22.5	LOS C	0.1	0.1	0.75	0.75
P21	East Stage 1	53	16.9	LOS B	0.1	0.1	0.65	0.65
P22	East Stage 2	53	25.7	LOS C	0.1	0.1	0.80	0.80
P3	North Full Crossing	53	11.0	LOS B	0.1	0.1	0.53	0.53
P41	West Stage 1	53	29.8	LOS C	0.1	0.1	0.86	0.86
P42	West Stage 2	53	14.4	LOS B	0.1	0.1	0.60	0.60
All Pedestrians		316	20.1	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Site: Bealey Avenue / Colombo Street AAC Changes 2021 PM Peak

Bealey Avenue / Colombo Street
Existing Situation
Signals - Fixed Time Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street [S]											
1	L2	114	0.5	0.959	66.2	LOS E	19.0	127.2	0.98	1.26	19.8
2	T1	241	0.2	0.959	59.5	LOS E	19.0	127.2	0.98	1.26	19.8
3	R2	198	0.5	0.761	44.7	LOS D	8.2	57.8	1.00	0.93	24.4
Approach		553	0.4	0.959	55.6	LOS E	19.0	127.2	0.99	1.14	21.2
East: Bealey Avenue [E]											
4	L2	6	0.0	0.583	21.4	LOS C	13.3	94.0	0.66	0.59	35.5
5	T1	1552	1.5	0.583	14.8	LOS B	13.3	94.0	0.66	0.58	35.5
6	R2	5	0.0	0.037	44.9	LOS D	0.2	1.4	0.95	0.64	24.1
Approach		1564	1.4	0.583	14.9	LOS B	13.3	94.0	0.66	0.58	35.4
North: Colombo Street [N]											
7	L2	12	0.0	0.332	34.4	LOS C	5.0	34.6	0.87	0.71	28.7
8	T1	140	1.5	0.332	27.7	LOS C	5.0	34.6	0.87	0.71	28.7
9	R2	12	0.0	0.062	44.1	LOS D	0.4	3.1	0.95	0.68	24.3
Approach		163	1.3	0.332	29.3	LOS C	5.0	34.6	0.88	0.71	28.3
West: Bealey Avenue [W]											
10	L2	165	1.6	0.194	20.3	LOS C	3.8	26.8	0.62	0.74	33.7
11	T1	2396	1.1	0.961	52.7	LOS D	48.6	343.6	0.98	1.27	21.3
12	R2	101	0.5	0.631	47.6	LOS D	4.1	29.0	1.00	0.82	23.5
Approach		2661	1.1	0.961	50.5	LOS D	48.6	343.6	0.96	1.22	21.9
All Vehicles		4941	1.1	0.961	39.1	LOS D	48.6	343.6	0.87	0.99	25.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

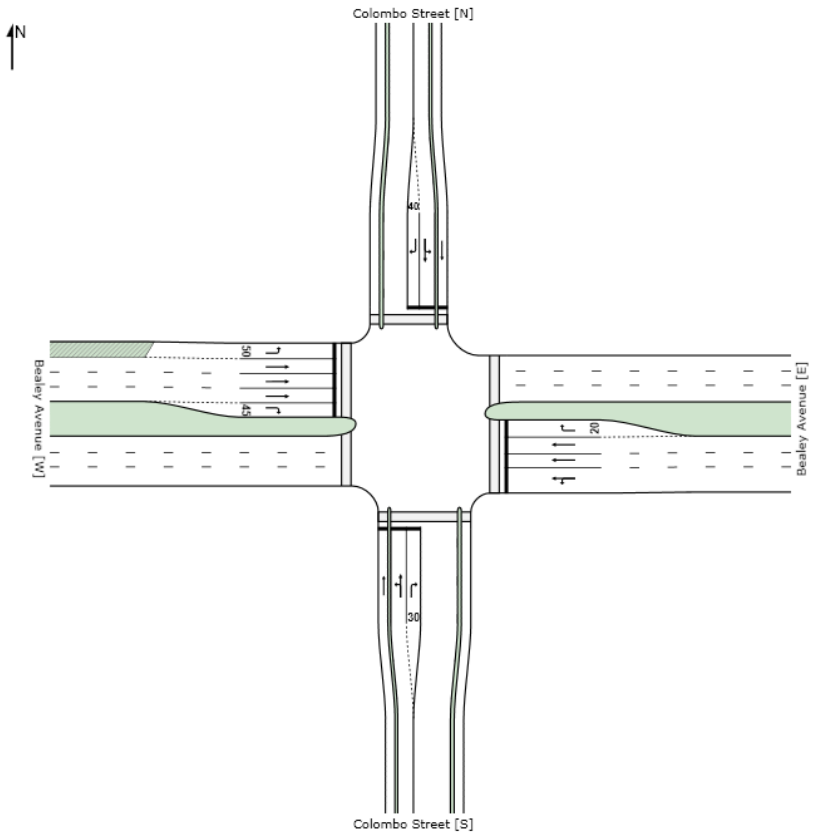
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	18.9	LOS B	0.1	0.1	0.69	0.69
P21	East Stage 1	53	21.8	LOS C	0.1	0.1	0.74	0.74
P22	East Stage 2	53	18.9	LOS B	0.1	0.1	0.69	0.69
P3	North Full Crossing	53	16.3	LOS B	0.1	0.1	0.64	0.64
P41	West Stage 1	53	22.5	LOS C	0.1	0.1	0.75	0.75
P42	West Stage 2	53	18.9	LOS B	0.1	0.1	0.69	0.69
All Pedestrians		316	19.6	LOS B			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

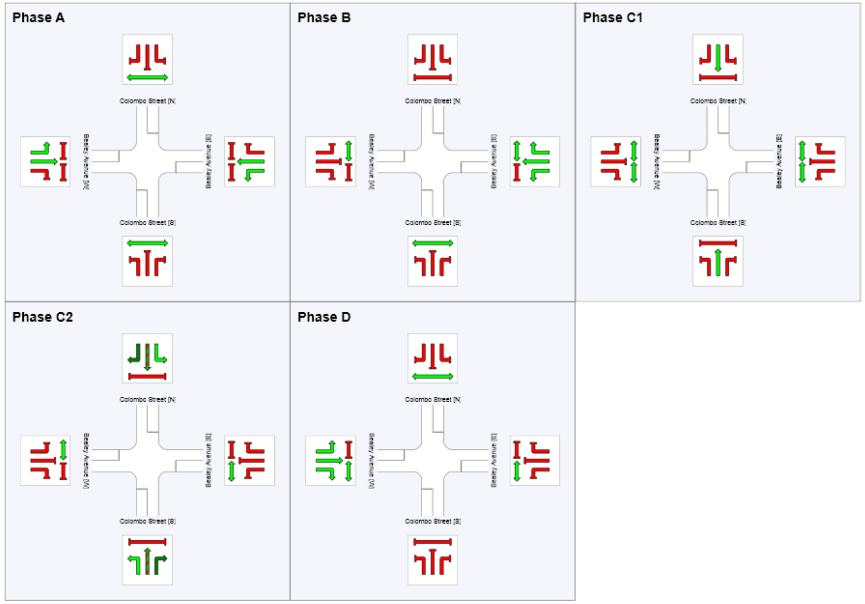
Colombo Street / Bealey Avenue – 2021 Option 1a Operational Traffic Modelling

SIDRA Layout & Signal Phasing

SIDRA Layout



Signal Phasing



*Colombo Street cycle movements stopped during Phase C2

Movement Summaries

Site: Bealey Avenue / Colombo Street Option 1a AM Peak

Bealey Avenue / Colombo Street
Option 1a
Signals - Fixed Time Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street [S]											
1	L2	15	0.0	0.344	36.2	LOS D	4.7	33.3	0.89	0.73	27.9
2	T1	129	1.2	0.344	29.5	LOS C	4.7	33.3	0.89	0.72	27.1
3	R2	1	0.0	0.011	47.6	LOS D	0.0	0.3	0.88	0.57	23.4
Approach		145	1.1	0.344	30.3	LOS C	4.7	33.3	0.89	0.72	27.1
East: Bealey Avenue [E]											
4	L2	144	0.7	1.020	94.1	LOS F	42.1	298.2	1.00	1.52	15.6
5	T1	1595	1.5	1.020	88.3	LOS F	42.1	298.2	1.00	1.56	15.6
6	R2	1	0.0	0.007	44.1	LOS D	0.0	0.3	0.94	0.59	24.3
Approach		1741	1.4	1.020	88.8	LOS F	42.1	298.2	1.00	1.56	15.6
North: Colombo Street [N]											
7	L2	1	0.0	0.608	32.0	LOS C	11.9	84.0	0.90	0.77	29.7
8	T1	382	0.6	0.608	25.7	LOS C	11.9	84.0	0.90	0.76	28.0
9	R2	66	0.8	0.666	51.8	LOS D	2.8	19.9	1.00	0.80	22.5
Approach		449	0.6	0.666	29.5	LOS C	11.9	84.0	0.91	0.76	27.0
West: Bealey Avenue [W]											
10	L2	156	3.4	0.208	22.9	LOS C	3.9	28.2	0.68	0.74	32.4
11	T1	867	2.5	0.369	15.5	LOS B	6.4	45.7	0.60	0.51	35.2
12	R2	344	0.5	0.997	83.8	LOS F	21.4	150.7	1.00	1.30	16.8
Approach		1367	2.1	0.997	33.5	LOS C	21.4	150.7	0.71	0.74	27.3
All Vehicles		3701	1.6	1.020	58.9	LOS E	42.1	298.2	0.88	1.12	20.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	32.4	LOS D	0.0	0.0	0.90	0.90
P21	East Stage 1	21	12.1	LOS B	0.0	0.0	0.55	0.55
P22	East Stage 2	21	24.8	LOS C	0.0	0.0	0.79	0.79
P3	North Full Crossing	21	22.5	LOS C	0.0	0.0	0.75	0.75
P41	West Stage 1	21	19.6	LOS B	0.0	0.0	0.70	0.70
P42	West Stage 2	21	13.9	LOS B	0.0	0.0	0.61	0.61
All Pedestrians		126	20.9	LOS C			0.75	0.75

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Site: Bealey Avenue / Colombo Street Option 1a PM Peak

Bealey Avenue / Colombo Street
Option 1a
Signals - Fixed Time Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street [S]											
1	L2	19	0.0	0.756	38.5	LOS D	13.1	92.4	0.96	0.90	27.1
2	T1	330	0.5	0.756	31.8	LOS C	13.1	92.4	0.96	0.89	26.8
3	R2	85	0.6	0.858	54.8	LOS D	3.8	26.7	1.00	0.94	21.8
Approach		434	0.5	0.858	36.6	LOS D	13.1	92.4	0.97	0.90	26.6
East: Bealey Avenue [E]											
4	L2	8	0.0	0.804	36.8	LOS D	21.3	151.3	0.98	0.94	27.7
5	T1	1546	1.5	0.804	30.5	LOS C	21.3	151.3	0.98	0.95	27.6
6	R2	1	0.0	0.007	44.1	LOS D	0.0	0.3	0.94	0.59	24.3
Approach		1555	1.5	0.804	30.6	LOS C	21.3	151.3	0.98	0.95	27.6
North: Colombo Street [N]											
7	L2	12	0.0	0.348	34.5	LOS C	5.2	36.8	0.88	0.72	28.6
8	T1	172	1.2	0.348	28.1	LOS C	5.2	36.8	0.87	0.70	25.4
9	R2	12	0.0	0.117	49.0	LOS D	0.5	3.3	0.99	0.66	23.0
Approach		195	1.1	0.348	29.7	LOS C	5.2	36.8	0.88	0.70	25.4
West: Bealey Avenue [W]											
10	L2	69	1.5	0.092	22.0	LOS C	1.6	11.7	0.64	0.72	32.8
11	T1	2513	1.1	1.103	138.8	LOS F	78.9	557.8	1.00	1.96	11.3
12	R2	99	0.5	0.936	99.5	LOS D	3.6	25.1	0.93	0.77	25.8
Approach		2682	1.1	1.103	132.1	LOS F	78.9	557.8	0.99	1.89	11.8
All Vehicles		4865	1.2	1.103	87.0	LOS F	78.9	557.8	0.98	1.45	15.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

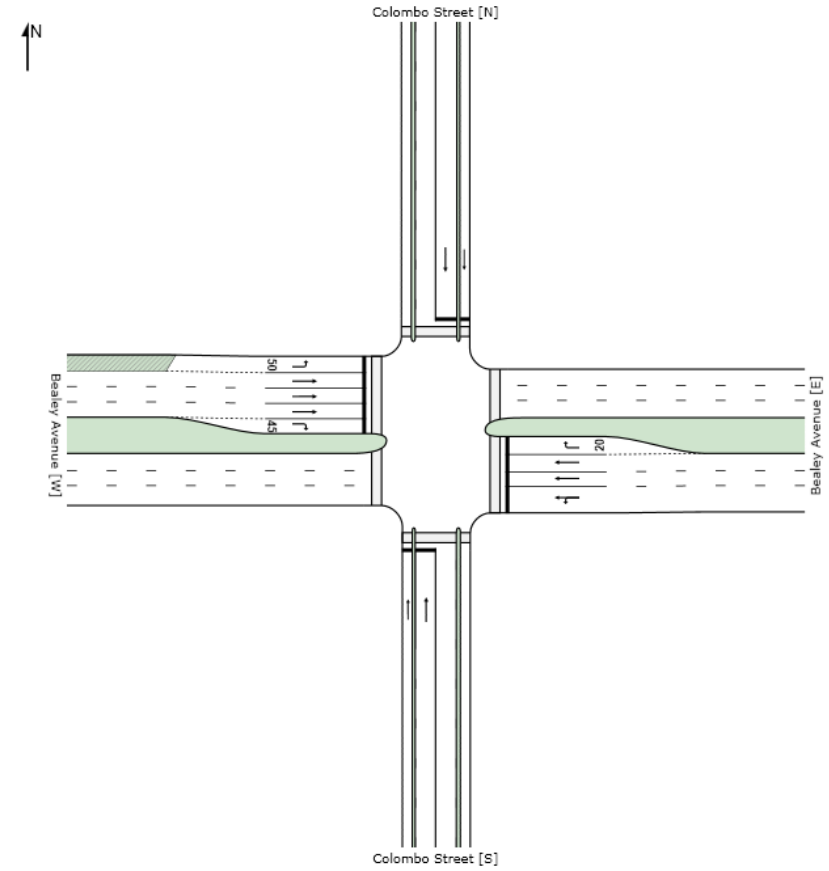
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	29.8	LOS C	0.0	0.0	0.86	0.86
P21	East Stage 1	21	13.8	LOS B	0.0	0.0	0.59	0.59
P22	East Stage 2	21	24.8	LOS C	0.0	0.0	0.79	0.79
P3	North Full Crossing	21	22.5	LOS C	0.0	0.0	0.75	0.75
P41	West Stage 1	21	19.6	LOS B	0.0	0.0	0.70	0.70
P42	West Stage 2	21	15.5	LOS B	0.0	0.0	0.85	0.85
All Pedestrians		126	21.0	LOS C			0.76	0.76

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

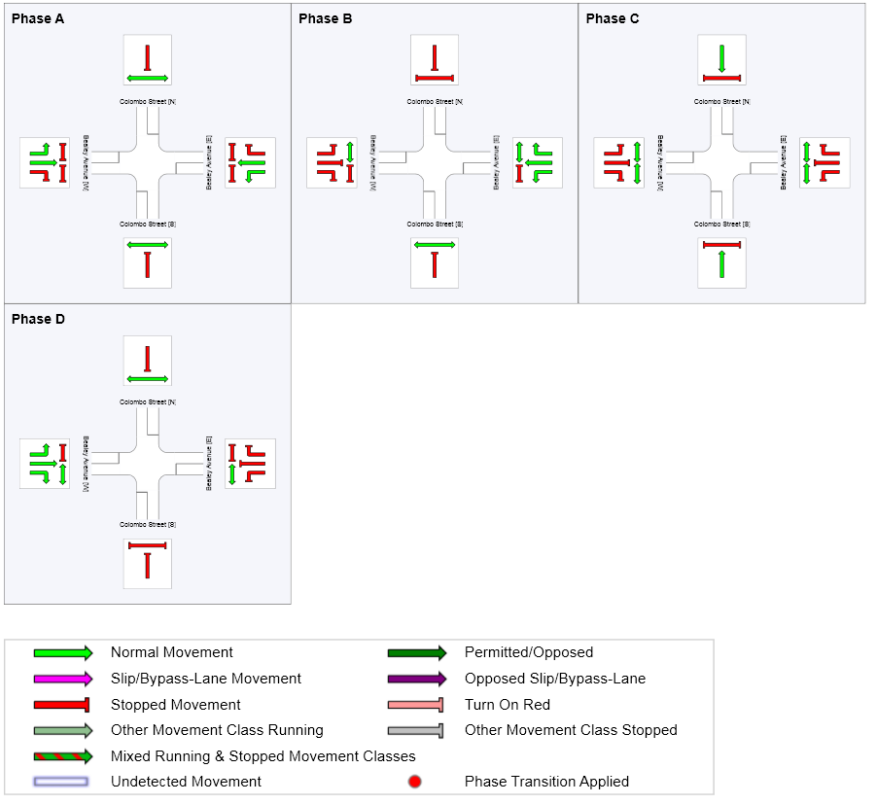
Colombo Street / Bealey Avenue – 2021 Option 1c Operational Traffic Modelling

SIDRA Layout & Signal Phasing

SIDRA Layout



Signal Phasing



Movement Summaries

Site: Bealey Avenue / Colombo Street Option 1c AM Peak

Bealey Avenue / Colombo Street
Option 1c
Signals - Fixed Time Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street [S]											
2	T1	129	1.2	0.378	33.1	LOS C	4.5	31.5	0.93	0.73	26.0
Approach		129	1.2	0.378	33.1	LOS C	4.5	31.5	0.93	0.73	26.0
East: Bealey Avenue [E]											
4	L2	186	0.8	0.861	39.6	LOS D	27.3	193.5	0.99	1.01	26.4
5	T1	1663	1.5	0.861	33.5	LOS C	27.3	193.5	0.99	1.03	26.5
6	R2	1	0.0	0.007	44.2	LOS D	0.0	0.3	0.94	0.59	24.2
Approach		1850	1.4	0.861	34.1	LOS C	27.3	193.5	0.99	1.03	26.5
North: Colombo Street [N]											
8	T1	303	0.7	0.835	40.4	LOS D	11.9	83.9	0.99	0.96	23.0
Approach		303	0.7	0.835	40.4	LOS D	11.9	83.9	0.99	0.96	23.0
West: Bealey Avenue [W]											
10	L2	163	3.9	0.160	15.6	LOS B	3.0	21.9	0.51	0.70	36.5
11	T1	838	2.6	0.262	6.3	LOS A	3.4	24.1	0.33	0.28	42.5
12	R2	391	0.4	0.873	46.3	LOS D	17.3	121.5	0.98	1.01	23.8
Approach		1392	2.2	0.873	18.6	LOS B	17.3	121.5	0.54	0.54	34.2
All Vehicles		3674	1.6	0.873	28.7	LOS C	27.3	193.5	0.82	0.83	28.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	24.0	LOS C	0.0	0.0	0.78	0.78
P21	East Stage 1	21	15.6	LOS B	0.0	0.0	0.63	0.63
P22	East Stage 2	21	24.8	LOS C	0.0	0.0	0.79	0.79
P3	North Full Crossing	21	13.2	LOS B	0.0	0.0	0.58	0.58
P41	West Stage 1	21	28.9	LOS C	0.0	0.0	0.85	0.85
P42	West Stage 2	21	13.2	LOS B	0.0	0.0	0.58	0.58
All Pedestrians		126	20.0	LOS B			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Site: Bealey Avenue / Colombo Street Option 1c PM Peak

Bealey Avenue / Colombo Street
Option 1c
Signals - Fixed Time Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street [S]											
2	T1	416	0.5	0.906	45.1	LOS D	18.5	130.2	0.99	1.10	22.2
Approach		416	0.5	0.906	45.1	LOS D	18.5	130.2	0.99	1.10	22.2
East: Bealey Avenue [E]											
4	L2	6	0.0	0.535	21.9	LOS C	14.8	104.7	0.74	0.66	35.0
5	T1	1545	1.5	0.535	15.3	LOS B	14.8	104.7	0.74	0.66	35.0
6	R2	1	0.0	0.007	44.2	LOS D	0.0	0.3	0.94	0.59	24.2
Approach		1552	1.5	0.535	15.3	LOS B	14.8	104.7	0.74	0.66	35.0
North: Colombo Street [N]											
8	T1	163	1.6	0.365	29.5	LOS C	5.4	38.1	0.90	0.72	27.4
Approach		163	1.6	0.365	29.5	LOS C	5.4	38.1	0.90	0.72	27.4
West: Bealey Avenue [W]											
10	L2	43	1.2	0.045	17.0	LOS B	0.8	5.8	0.52	0.69	35.6
11	T1	2558	1.0	0.895	23.4	LOS C	34.3	242.3	0.84	0.90	30.7
12	R2	102	0.5	0.558	46.0	LOS D	4.0	28.4	1.00	0.79	23.9
Approach		2703	1.0	0.895	24.2	LOS C	34.3	242.3	0.84	0.89	30.4
All Vehicles		4833	1.1	0.906	23.3	LOS C	34.3	242.3	0.83	0.83	30.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

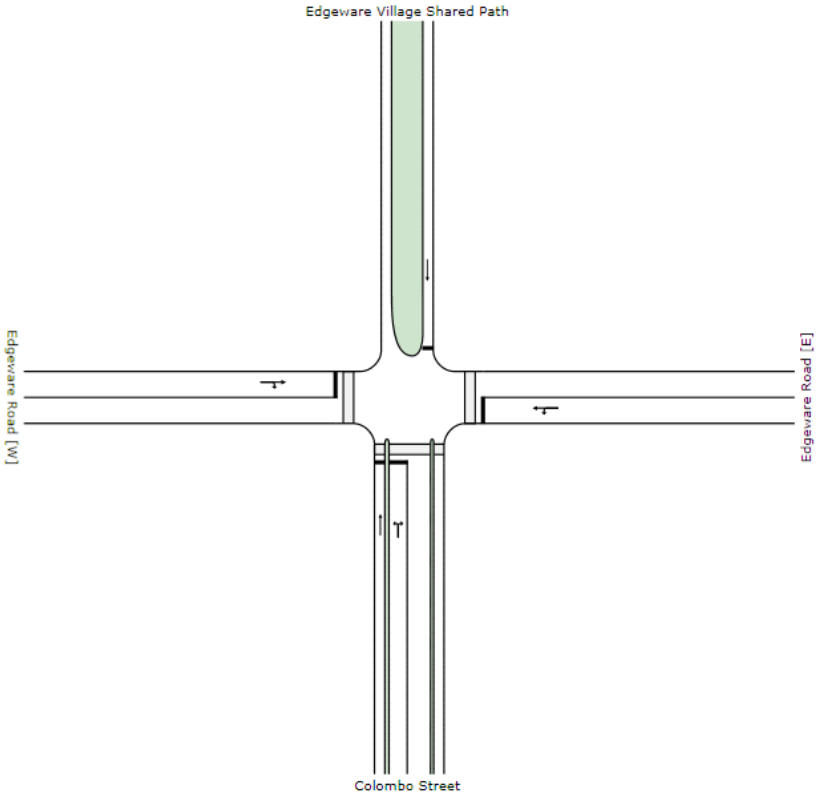
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	16.9	LOS B	0.0	0.0	0.65	0.65
P21	East Stage 1	21	22.5	LOS C	0.0	0.0	0.75	0.75
P22	East Stage 2	21	21.8	LOS C	0.0	0.0	0.74	0.74
P3	North Full Crossing	21	15.6	LOS B	0.0	0.0	0.63	0.63
P41	West Stage 1	21	25.6	LOS C	0.0	0.0	0.80	0.80
P42	West Stage 2	21	19.8	LOS B	0.0	0.0	0.70	0.70
All Pedestrians		126	20.3	LOS C			0.71	0.71

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

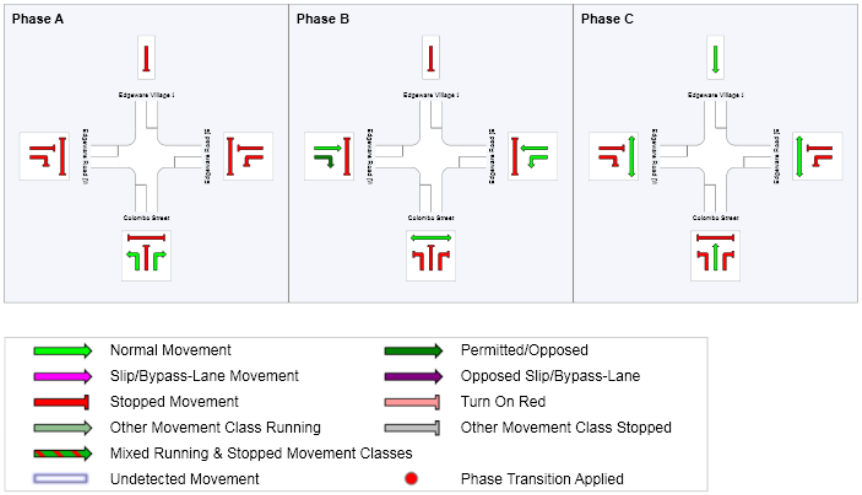
Colombo Street / Edgeware Street – 2021 Operational Traffic Modelling

SIDRA Layout & Signal Phasing

SIDRA Layout



Signal Phasing



Movement Summaries

MOVEMENT SUMMARY

Site: Edgeware Road / Colombo Street 2021 AM

Edgeware Road / Colombo Street
2021 AM Peak
Preferred Papanui Parallel Option
Signals - Fixed Time Cycle Time = 95 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street											
1	L2	21	0.0	0.355	55.7	LOS E	2.0	14.0	0.99	0.73	21.3
2	T1	53	0.0	0.062	37.6	LOS D	2.1	5.6	0.90	0.65	18.5
3	R2	21	0.0	0.355	55.7	LOS E	2.0	14.0	0.99	0.73	21.3
Approach		95	0.0	0.355	45.6	LOS D	2.1	14.0	0.94	0.69	19.7
East: Edgeware Road [E]											
4	L2	246	0.0	0.443	7.8	LOS A	2.2	15.5	0.09	0.38	45.3
5	T1	316	0.0	0.443	1.3	LOS A	2.2	15.5	0.09	0.38	45.3
Approach		562	0.0	0.443	4.2	LOS A	2.2	15.5	0.09	0.38	45.3
North: Edgeware Village Shared Path											
8	T1	53	0.0	0.062	37.6	LOS D	2.1	5.6	0.90	0.65	18.5
Approach		53	0.0	0.062	37.6	LOS D	2.1	5.6	0.90	0.65	18.5
West: Edgeware Road [W]											
11	T1	67	0.0	0.392	10.8	LOS B	5.9	41.4	0.56	0.71	36.1
12	R2	175	0.0	0.392	17.3	LOS B	5.9	41.4	0.56	0.71	36.1
Approach		242	0.0	0.392	15.5	LOS B	5.9	41.4	0.56	0.71	36.1
All Vehicles		952	0.0	0.443	13.0	LOS B	5.9	41.4	0.34	0.51	35.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	11.7	LOS B	0.1	0.1	0.50	0.50
P2	East Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		158	31.7	LOS D			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Edgeware Road / Colombo Street 2021 PM

Edgeware Road / Colombo Street
2021 PM Peak
Preferred Papanui Parallel Option
Signals - Fixed Time Cycle Time = 95 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colombo Street											
1	L2	21	0.0	0.355	55.7	LOS E	2.0	14.0	0.99	0.73	21.3
2	T1	53	0.0	0.062	37.6	LOS D	2.1	5.6	0.90	0.65	18.5
3	R2	21	0.0	0.355	55.7	LOS E	2.0	14.0	0.99	0.73	21.3
Approach		95	0.0	0.355	45.6	LOS D	2.1	14.0	0.94	0.69	19.7
East: Edgeware Road [E]											
4	L2	21	0.0	0.205	7.5	LOS A	0.7	5.2	0.07	0.12	47.9
5	T1	243	0.0	0.205	1.1	LOS A	0.7	5.2	0.07	0.12	47.9
Approach		264	0.0	0.205	1.6	LOS A	0.7	5.2	0.07	0.12	47.9
North: Edgeware Village Shared Path											
8	T1	53	0.0	0.062	37.6	LOS D	2.1	5.6	0.90	0.65	18.5
Approach		53	0.0	0.062	37.6	LOS D	2.1	5.6	0.90	0.65	18.5
West: Edgeware Road [W]											
11	T1	229	0.0	0.448	10.6	LOS B	10.3	71.8	0.58	0.66	37.0
12	R2	185	0.0	0.448	17.1	LOS B	10.3	71.8	0.58	0.66	37.0
Approach		415	0.0	0.448	13.5	LOS B	10.3	71.8	0.58	0.66	37.0
All Vehicles		826	0.0	0.448	14.9	LOS B	10.3	71.8	0.48	0.49	34.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	11.7	LOS B	0.1	0.1	0.50	0.50
P2	East Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		158	31.7	LOS D			0.79	0.79

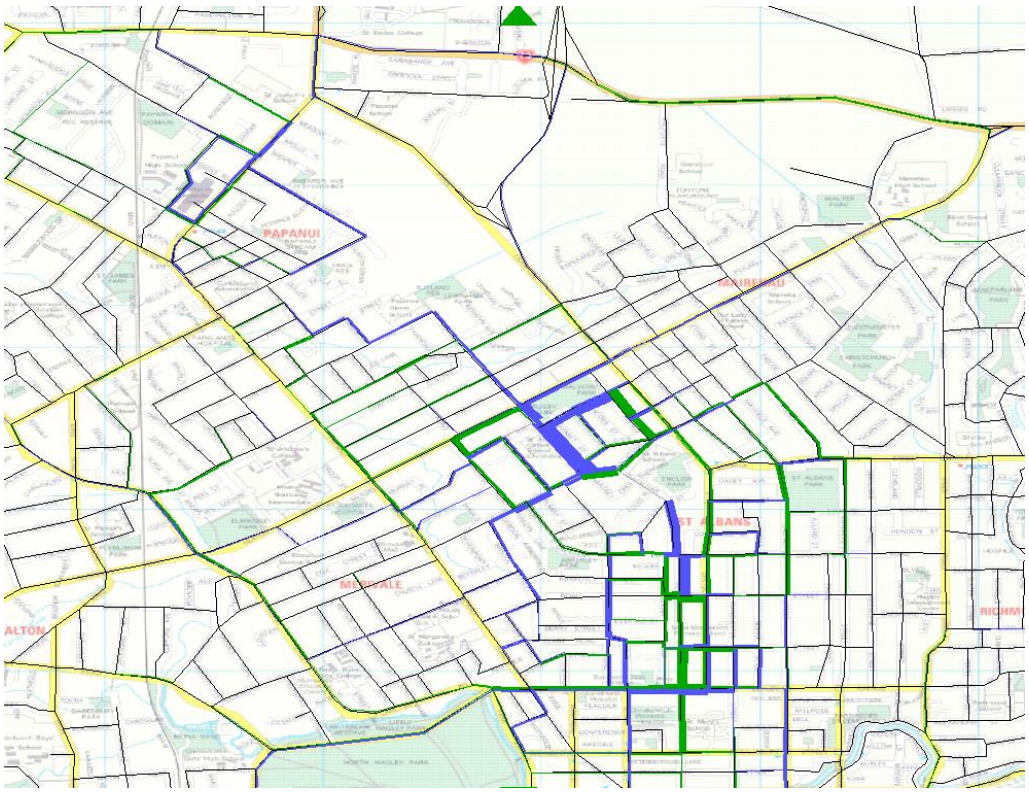
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CAST v6A 2031 Modelling – Preferred Option

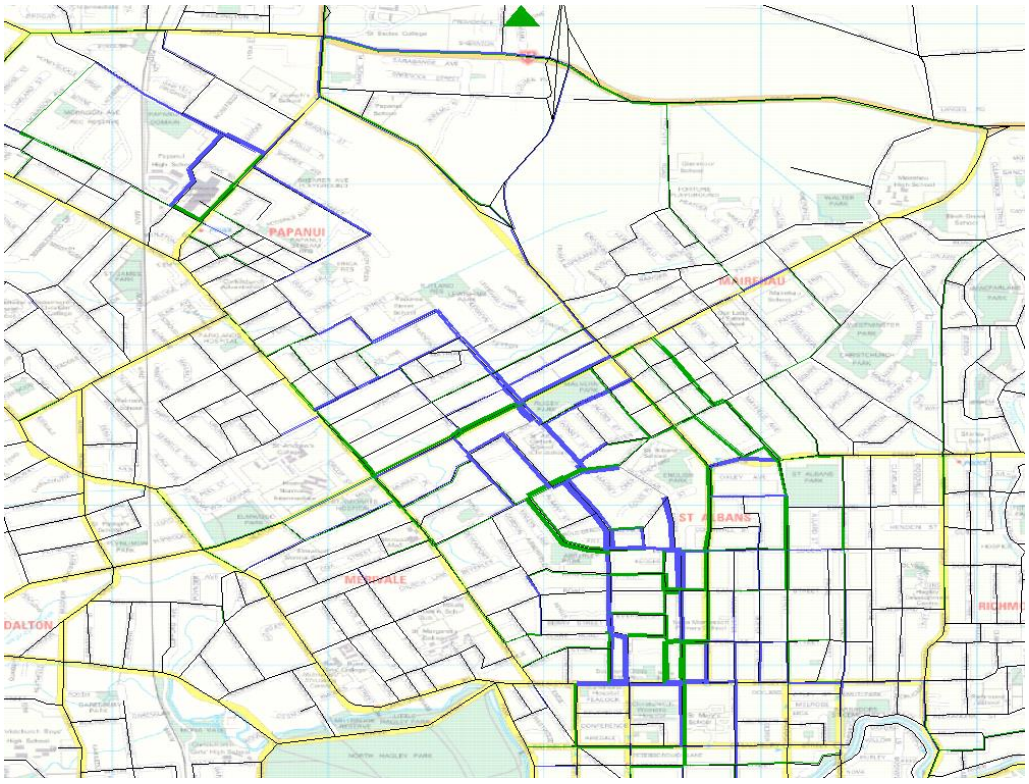
Traffic Volume Changes [2031]

Blue is decrease in traffic with preferred option, and green is increase

AM Peak Hour



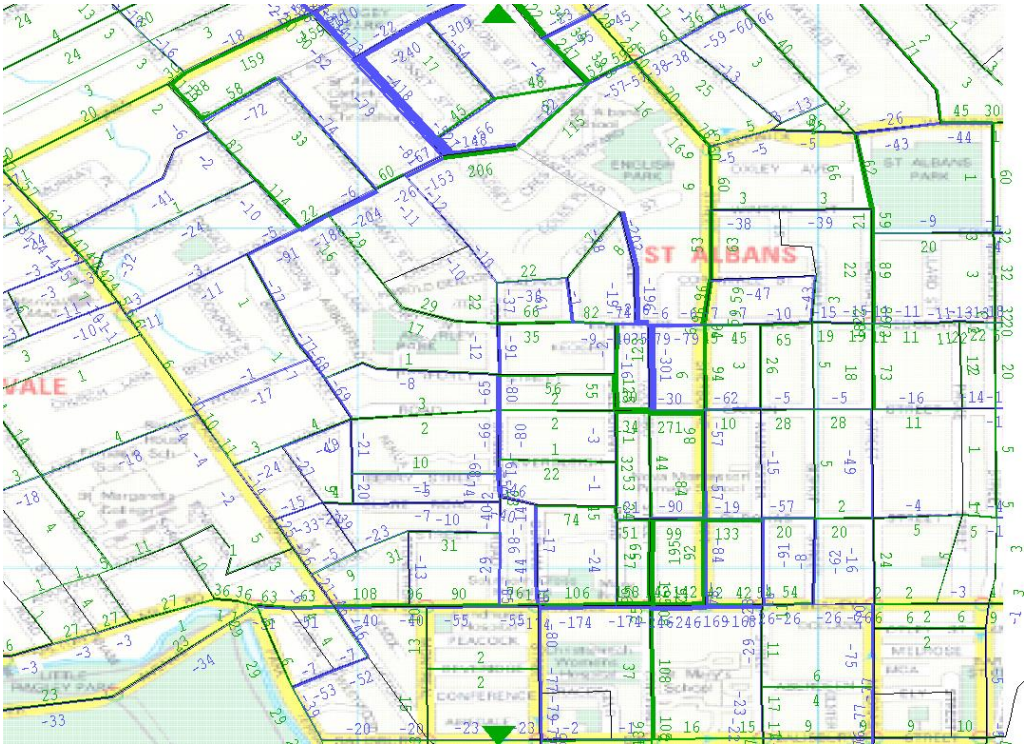
PM Peak Hour



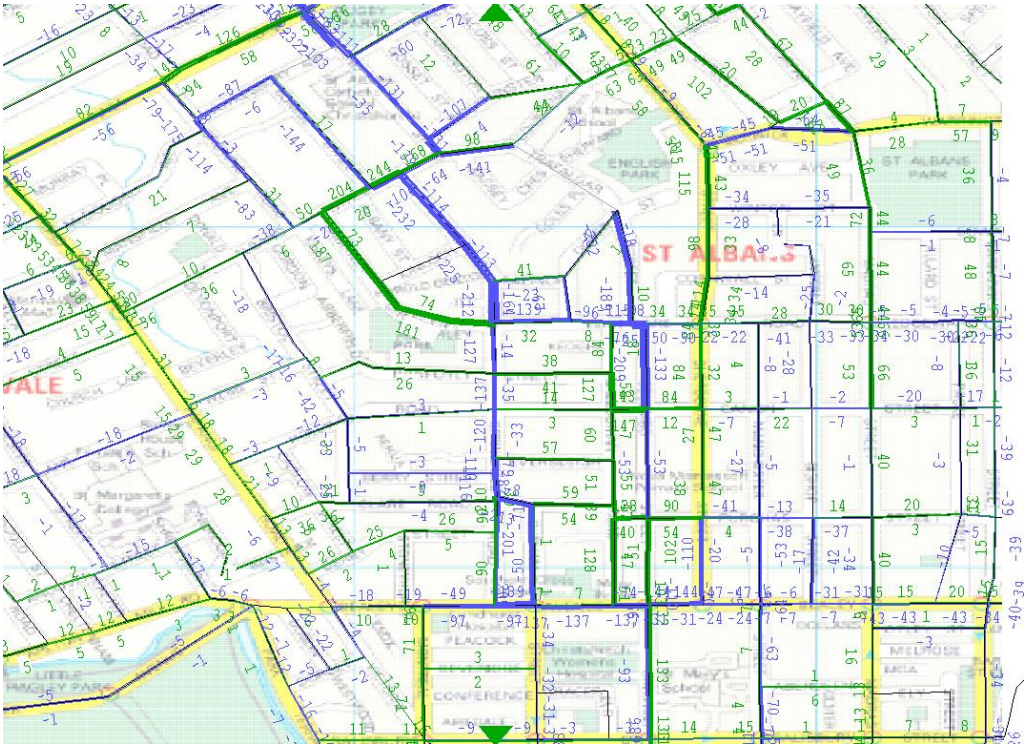
Traffic Volume Changes [2031] –Southern

Blue is decrease in traffic with preferred option, and green is increase

AM Peak Hour



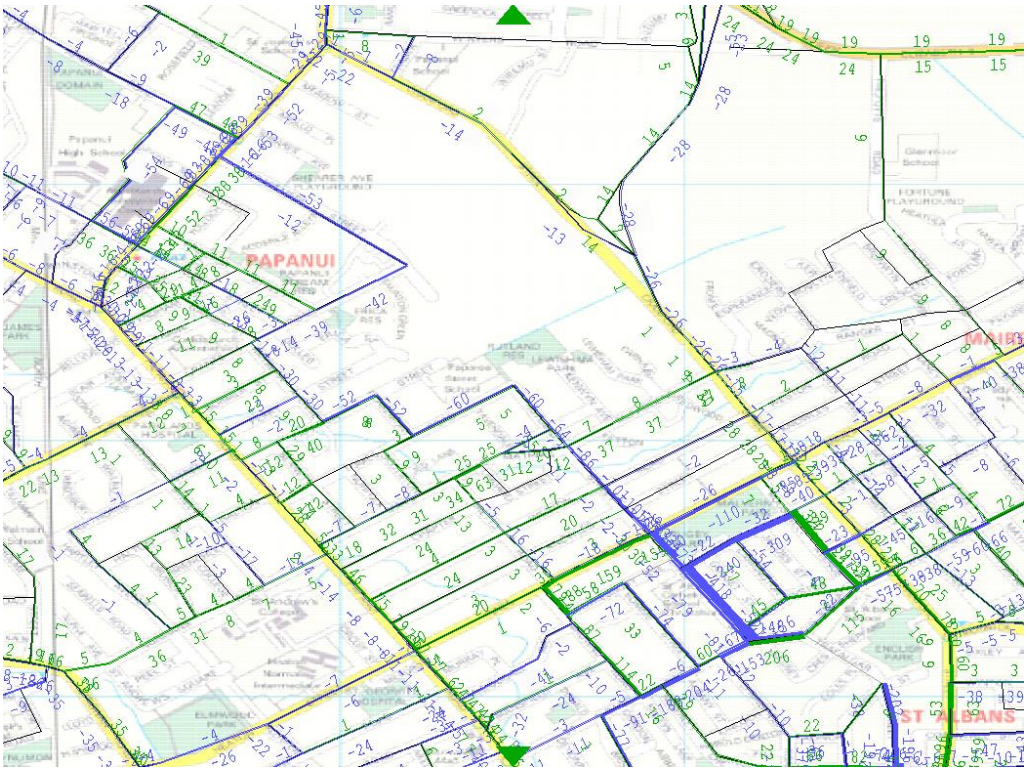
PM Peak Hour



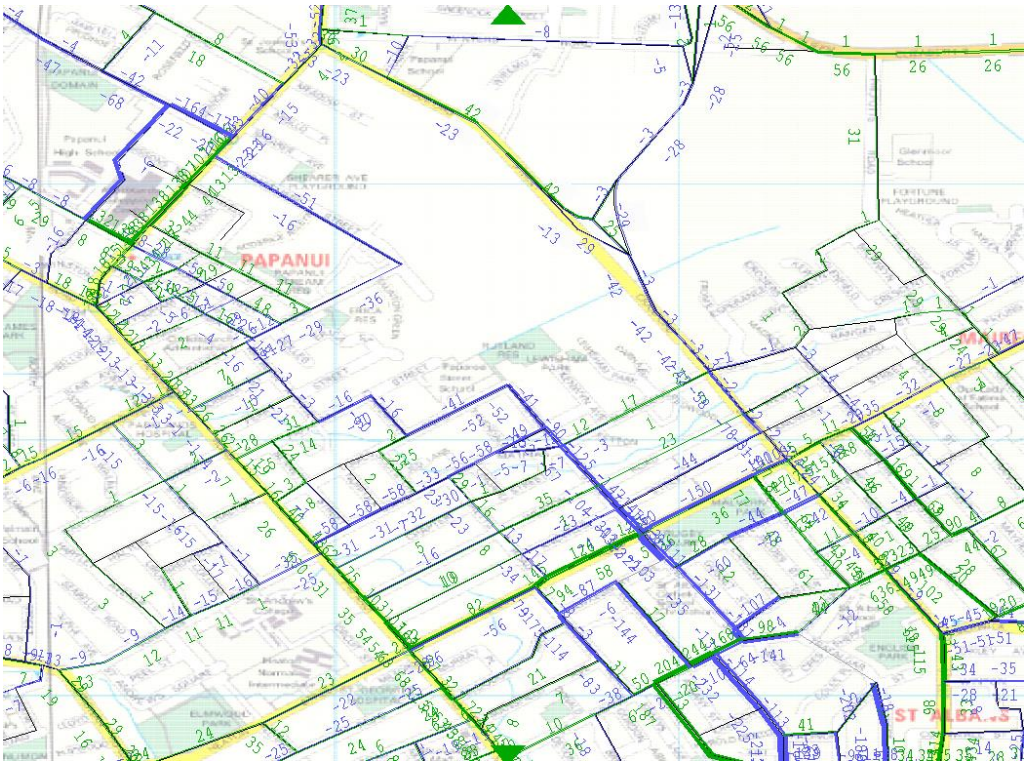
Traffic Volume Changes [2031] – Middle and Northern

Blue is decrease in traffic with preferred option, and green is increase

AM Peak Hour



PM Peak Hour

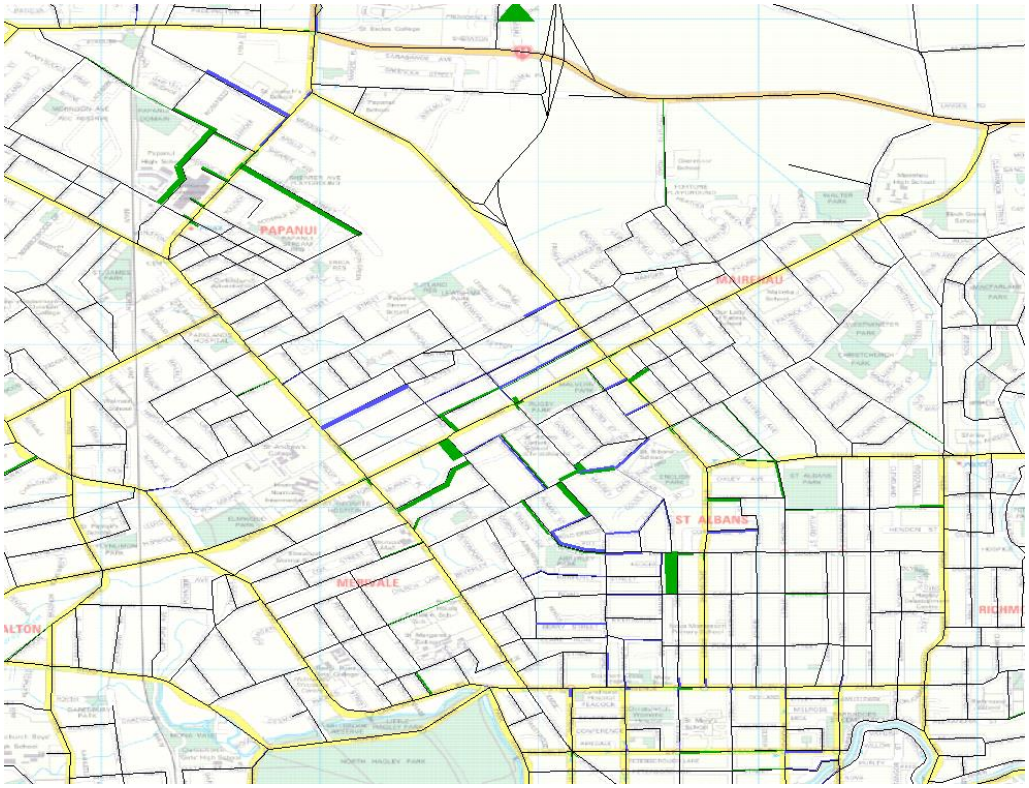


Traffic Delay Changes [2031]

Blue is decrease in delay with preferred option, and green is increase

AM Peak Hour

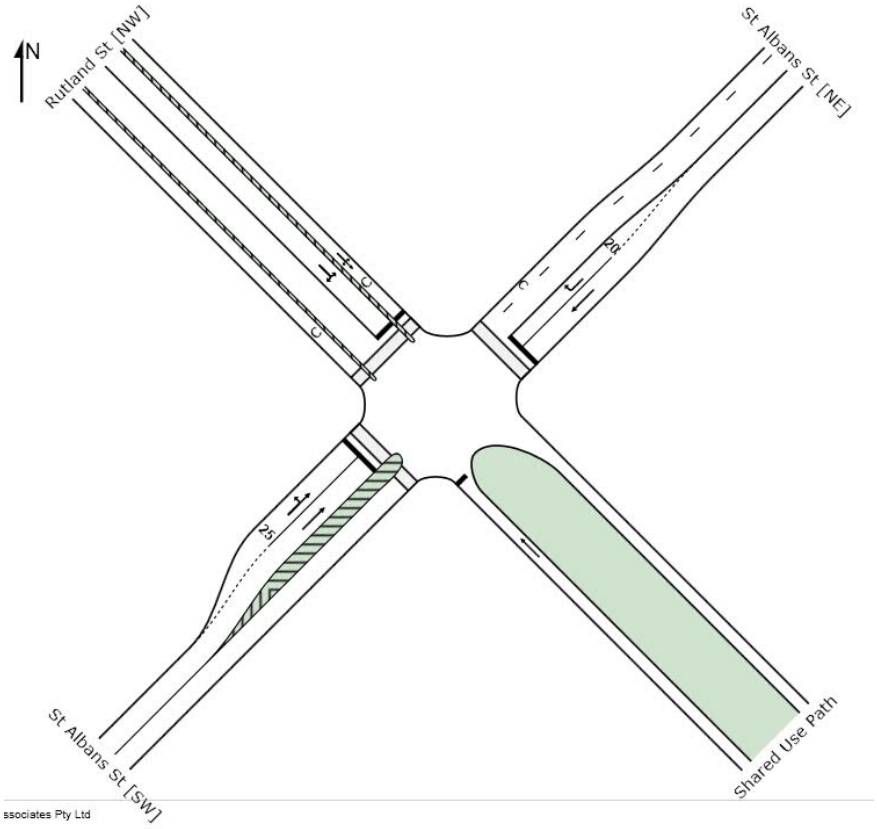
PM Peak Hour



St Albans Street/Rutland Street – SIDRA Operational Modelling – 2031 Peak Hours

SIDRA Layout & Signal Phasing

SIDRA Layout



Signal Phasing

Movement Summaries

MOVEMENT SUMMARY

Site: Rutland/St Albans 2031 AM

Rutland/St Albans signalised
2031 AM (CASTv6A PP)

Signals - Fixed Time Cycle Time = 85 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Shared Use Path											
22	T1	21	0.0	0.018	29.3	LOS C	0.7	1.9	0.64	0.57	2.0
Approach		21	0.0	0.018	29.3	LOS C	0.7	1.9	0.64	0.57	2.0
NorthEast: St Albans St [NE]											
8	T1	632	1.7	0.906	41.9	LOS D	31.4	222.6	1.00	1.12	24.0
9	R2	21	0.0	0.226	53.1	LOS D	0.9	6.4	1.00	0.68	21.9
Approach		653	1.6	0.906	42.3	LOS D	31.4	222.6	1.00	1.10	23.9
NorthWest: Rutland St [NW]											
18	L2	26	0.0	0.863	46.8	LOS D	17.7	124.5	0.97	0.91	21.0
28	T1	42	0.0	0.061	29.9	LOS C	1.8	4.8	0.55	0.62	15.0
12	R2	361	0.9	0.863	49.1	LOS D	17.7	124.5	1.00	0.96	22.8
Approach		429	0.7	0.863	46.9	LOS D	17.7	124.5	0.96	0.94	21.7
SouthWest: St Albans St [SW]											
1	L2	133	9.5	0.209	26.6	LOS C	3.9	29.1	0.73	0.74	30.3
2	T1	120	0.9	0.209	19.6	LOS B	3.9	29.1	0.71	0.58	32.6
Approach		253	5.4	0.209	23.4	LOS C	3.9	29.1	0.72	0.66	31.3
All Vehicles		1356	2.0	0.906	40.1	LOS D	31.4	222.6	0.94	0.96	24.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	NorthEast Full Crossing	53	35.0	LOS D	0.1	0.1	0.91	0.91
P4	NorthWest Full Crossing	53	36.6	LOS D	0.1	0.1	0.93	0.93
P1	SouthWest Full Crossing	53	36.6	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		158	36.2	LOS D			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Rutland/St Albans 2031 PM

Rutland/St Albans signalised
2031 AM (CASTv6A PP)

Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Shared Use Path											
22	T1	42	0.0	0.034	27.0	LOS C	1.3	3.5	0.63	0.59	2.1
Approach		42	0.0	0.034	27.0	LOS C	1.3	3.5	0.63	0.59	2.1
NorthEast: St Albans St [NE]											
8	T1	288	1.8	0.308	13.2	LOS B	6.7	48.0	0.64	0.55	36.5
9	R2	21	0.0	0.213	50.2	LOS D	0.9	6.0	1.00	0.66	22.6
Approach		309	1.7	0.308	15.7	LOS B	6.7	48.0	0.66	0.56	35.1
NorthWest: Rutland St [NW]											
18	L2	26	0.0	0.750	46.8	LOS D	5.1	36.6	0.97	0.83	21.0
28	T1	21	0.0	0.040	27.3	LOS C	1.0	2.6	0.64	0.60	15.4
12	R2	105	2.0	0.750	49.2	LOS D	5.1	36.6	0.99	0.88	22.3
Approach		153	1.4	0.750	45.3	LOS D	5.1	36.6	0.97	0.83	20.9
SouthWest: St Albans St [SW]											
1	L2	500	2.3	0.870	35.9	LOS D	19.0	134.6	0.75	0.94	26.9
2	T1	466	0.9	0.870	21.9	LOS C	19.0	134.6	0.72	0.75	31.5
Approach		966	1.6	0.870	29.2	LOS C	19.0	134.6	0.74	0.85	28.9
All Vehicles		1471	1.6	0.870	28.0	LOS C	19.0	134.6	0.75	0.78	28.5

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

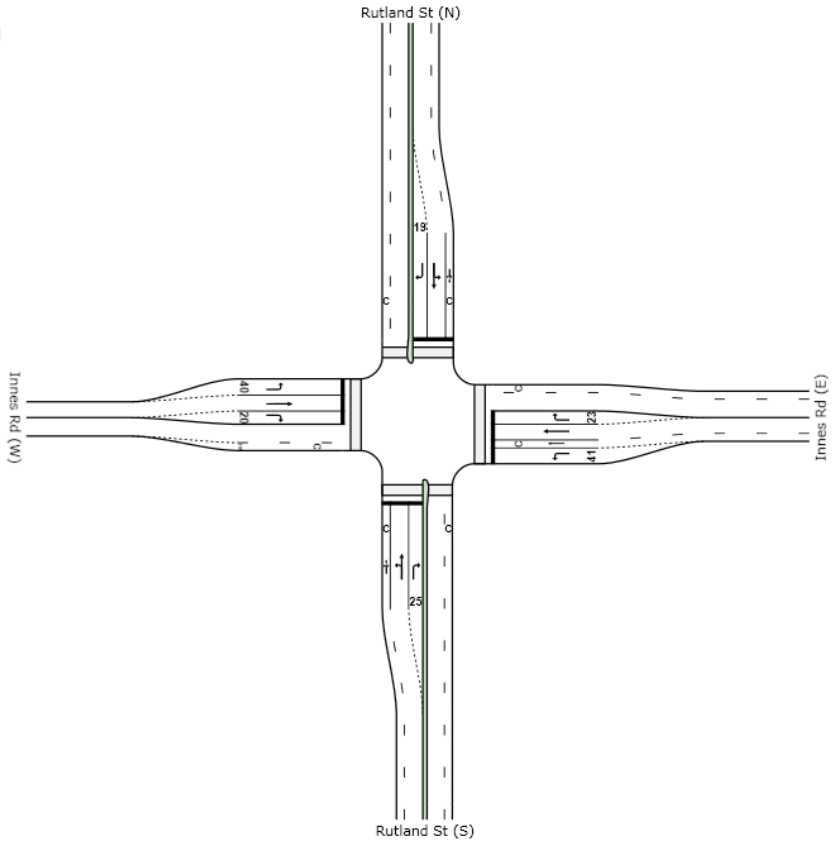
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	NorthEast Full Crossing	53	32.5	LOS D	0.1	0.1	0.90	0.90
P4	NorthWest Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P1	SouthWest Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		158	33.7	LOS D			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

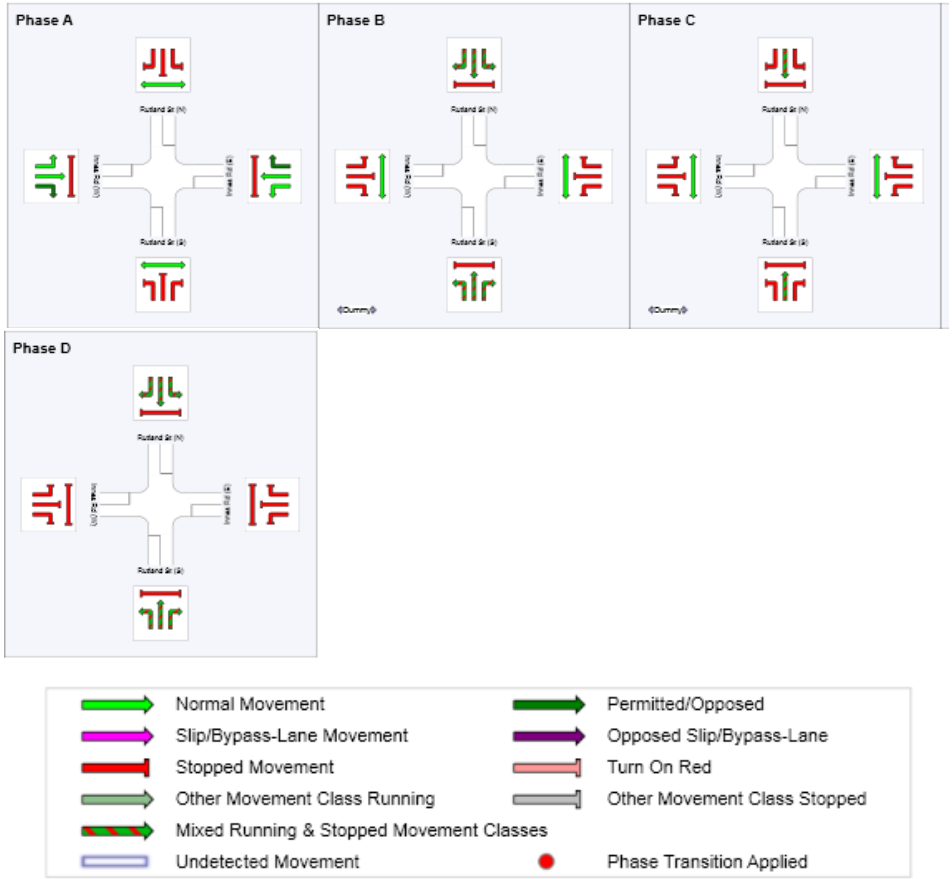
Innes Road/Rutland Street – SIDRA Operational Modelling – 2031 Peak Hours

SIDRA Layout & Signal Phasing

SIDRA Layout



Signal Phasing



Movement Summaries

MOVEMENT SUMMARY

Site: Innes/Rutland 2031 AM - Adj

One Way Cycle Lanes Option
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Rutland St (S)											
1	L2	67	1.6	0.491	56.8	LOS E	6.0	42.5	0.96	0.77	21.0
2	T1	59	1.6	0.491	50.0	LOS D	6.0	42.5	0.96	0.77	21.1
3	R2	26	0.0	0.292	66.3	LOS E	1.2	8.4	1.00	0.68	18.5
Approach		152	1.4	0.491	55.4	LOS E	6.0	42.5	0.96	0.76	20.6
East: Innes Rd (E)											
4	L2	25	0.0	0.023	18.3	LOS B	0.6	3.9	0.49	0.66	32.9
5	T1	921	2.5	0.889	30.2	LOS C	45.2	323.9	0.66	0.66	27.4
6	R2	47	2.2	0.096	21.8	LOS C	1.3	9.0	0.55	0.70	32.8
Approach		994	2.4	0.889	29.5	LOS C	45.2	323.9	0.64	0.66	27.7
North: Rutland St (N)											
7	L2	32	0.0	0.798	58.1	LOS E	14.5	101.9	1.00	0.91	20.7
8	T1	242	0.9	0.798	51.2	LOS D	14.5	101.9	1.00	0.93	21.3
9	R2	27	0.0	0.292	65.9	LOS E	1.2	8.4	0.99	0.68	18.2
Approach		301	0.7	0.798	53.1	LOS D	14.5	101.9	1.00	0.91	21.0
West: Innes Rd (W)											
10	L2	148	9.2	0.157	20.2	LOS C	4.0	29.5	0.54	0.69	33.5
11	T1	255	5.0	0.240	12.8	LOS B	6.8	49.0	0.54	0.46	36.8
12	R2	26	4.0	0.189	48.5	LOS D	1.3	8.2	0.87	0.73	22.2
Approach		429	6.4	0.240	17.5	LOS B	6.8	49.0	0.56	0.56	34.3
All Vehicles		1876	3.0	0.889	32.7	LOS C	45.2	323.9	0.81	0.79	26.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	15.3	LOS B	0.1	0.1	0.53	0.53
P2	East Full Crossing	53	43.6	LOS E	0.1	0.1	0.89	0.89
P3	North Full Crossing	53	15.3	LOS B	0.1	0.1	0.53	0.53
P4	West Full Crossing	53	42.0	LOS E	0.1	0.1	0.87	0.87
All Pedestrians		211	29.1	LOS C			0.71	0.71

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay).
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Innes/Rutland 2031 PM - Adj

One Way Cycle Lanes Option
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Rutland St (S)											
1	L2	26	4.0	0.833	52.3	LOS D	18.8	134.2	1.00	0.94	21.8
2	T1	349	2.1	0.833	45.2	LOS D	18.8	134.2	1.00	0.99	22.9
3	R2	25	0.0	0.266	69.5	LOS E	1.1	7.6	0.99	0.66	19.5
Approach		401	2.1	0.833	46.6	LOS D	18.8	134.2	1.00	0.96	22.6
East: Innes Rd (E)											
4	L2	57	0.0	0.044	25.9	LOS C	1.6	4.4	0.69	0.66	23.8
5	T1	624	3.4	0.800	23.9	LOS C	24.5	176.4	0.62	0.77	30.4
6	R2	88	1.2	0.523	47.2	LOS D	3.9	27.8	0.93	0.79	23.2
Approach		769	2.9	0.800	26.8	LOS C	24.5	176.4	0.62	0.77	28.8
North: Rutland St (N)											
7	L2	96	1.1	0.739	51.3	LOS D	11.9	83.9	0.99	0.66	22.6
8	T1	156	1.4	0.739	44.7	LOS D	11.9	83.9	0.99	0.66	22.6
9	R2	25	0.0	0.266	69.6	LOS E	1.1	7.6	0.99	0.66	19.5
Approach		279	1.1	0.739	48.3	LOS D	11.9	83.9	0.99	0.66	22.3
West: Innes Rd (W)											
10	L2	146	3.6	0.203	25.2	LOS C	5.1	33.3	0.66	0.73	30.1
11	T1	711	1.5	0.881	33.1	LOS C	33.1	234.8	0.66	0.91	26.8
12	R2	25	0.0	0.203	37.0	LOS D	5.1	33.3	0.76	0.72	26.3
Approach		882	1.8	0.881	32.0	LOS C	33.1	234.8	0.62	0.87	27.2
All Vehicles		2332	2.1	0.881	34.7	LOS C	33.1	234.8	0.67	0.85	26.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	18.6	LOS B	0.1	0.1	0.61	0.61
P2	East Full Crossing	53	36.6	LOS D	0.1	0.1	0.88	0.88
P3	North Full Crossing	53	18.6	LOS B	0.1	0.1	0.61	0.61
P4	West Full Crossing	53	37.1	LOS D	0.1	0.1	0.86	0.86
All Pedestrians		211	28.3	LOS C			0.74	0.74

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay).
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.