

Central City Redevelopment


Transport Planning

October 2017

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1 Introduction

- 1.1 Regenerate Christchurch Limited (**RC**) has engaged QTP Ltd to provide transport planning advice to assist with producing the Cathedral Square and surrounds Regeneration Strategy.
- 1.2 The purpose of the advice and assessment is to identify transport elements that might contribute positively to the Regeneration Strategy, as well as provide clear evidence for any decisions that are made as the strategy is developed.
- 1.3 The broad scope of this transport planning input is summarised below:
 - Workshop - Preparation and attendance, to coordinate Transport and Movement with other work-streams (including Urban Design, Cultural, Architecture, Ecology and Water).
 - Consideration of the transport network in the square and surrounding area:
 - Review of An Accessible City¹ (**AAC**) in relation to Cathedral Square and surrounding area.
 - Establish future travel patterns from CAST model (trip origins and destinations, flows, signal optimisation etc.).
 - Consider options for a hierarchy of roads (Gloucester, Armagh etc. and treatment) including enforcement and traffic signal strategy.
 - Consideration of potential staging projects (noting long term goals vs temporary parking and use of network during AAC construction phases).
 - Wider network commentary and assessment:
 - Potential and implications of opening Colombo to traffic / and or public traffic across Cathedral Square vs closure/ removal of road behind the Cathedral (east side).
 - An internal city loop for public transport.
 - Outline servicing strategy for the businesses and operators around Cathedral Square:
 - Identification of issues and constraints.
 - Consideration of potential options.
 - Summary of any other transport mechanisms, methodologies or interventions:
 - Controlled parking zones to simplify the parking regime and reduce the need for signage.
 - Area wide traffic management plans or more stringent principles for construction.
 - Area wide servicing, coach and taxi strategy.
 - Potential for rapid transit and expansion or alteration to the existing public transport network.

¹ The Transport chapter of the Christchurch Central Recovery Plan

2 AAC review, road classifications and traffic demand

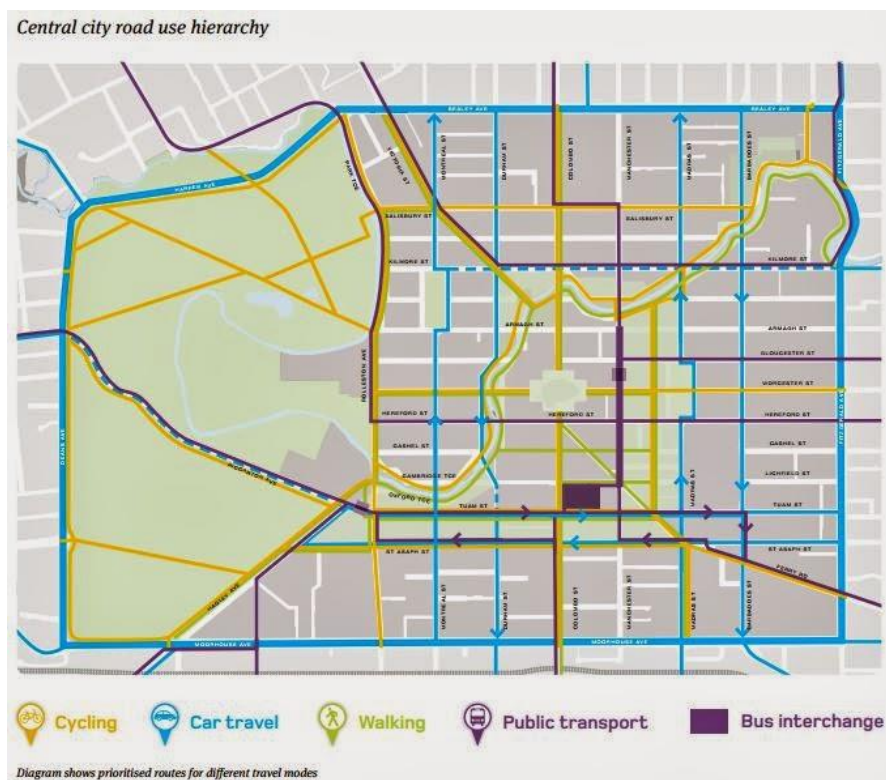
2.1 Review of AAC in relation to Cathedral Square and surrounding area

- 2.1.1 An Accessible City (AAC) was developed from community feedback during the 2011 Share an Idea campaign, where feedback received showed a strong desire for less traffic and cars in the central city. This draft AAC road hierarchy reflected this; seeking to increase accessibility by modes other than the private car, and especially by cycling (which was perceived by many as unsafe).
- 2.1.2 The draft An Accessible City chapter was released for public consultation, which ran from 15 November 2012 to 1 February 2013. This received 278 submissions, of which many were supportive of having less traffic and increasing accessibility of other modes.
- 2.1.3 The final An Accessible City chapter (released on 31 October 2013) was developed by the Canterbury Earthquake Recovery Authority (CERA) collaborating with the Christchurch City Council, Environment Canterbury and the NZ Transport Agency and incorporates feedback from the public consultation process. It is now the transport chapter of the Christchurch Central Recovery Plan.

2.2 Road Hierarchy

- 2.2.1 The AAC document shows a hierarchy of roads within the Central City that attempts to provide routes for all modes of travel while minimising conflict between modes and balancing movement with local access.
- 2.2.2 The adopted hierarchy of roads is shown below:

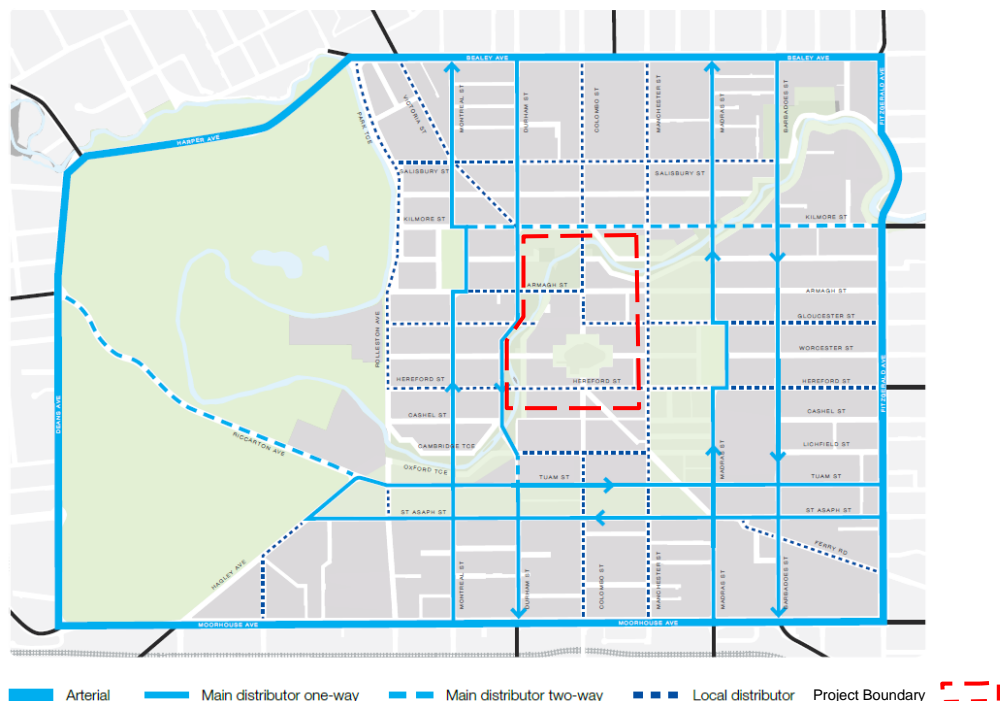
Figure 2-1: AAC Road Hierarchy



2.2.3 Further detail of the preferred vehicle routes (layer) are shown below:

Figure 2-2: AAC Preferred Vehicle Routes

Distributor streets - preferred vehicle routes



2.2.4 Figure 2-1 and Figure 2-2 show that key components of the road hierarchy are one-way corridors for moving traffic, whilst also allowing vehicle access to other roads which may be prioritised for cyclists and pedestrians.

2.2.5 In terms of how this affects the Cathedral Square regeneration project, it can be seen that there are no arterial or main distributor roads within the project area. The following roads are identified as 'local distributors' for vehicles:

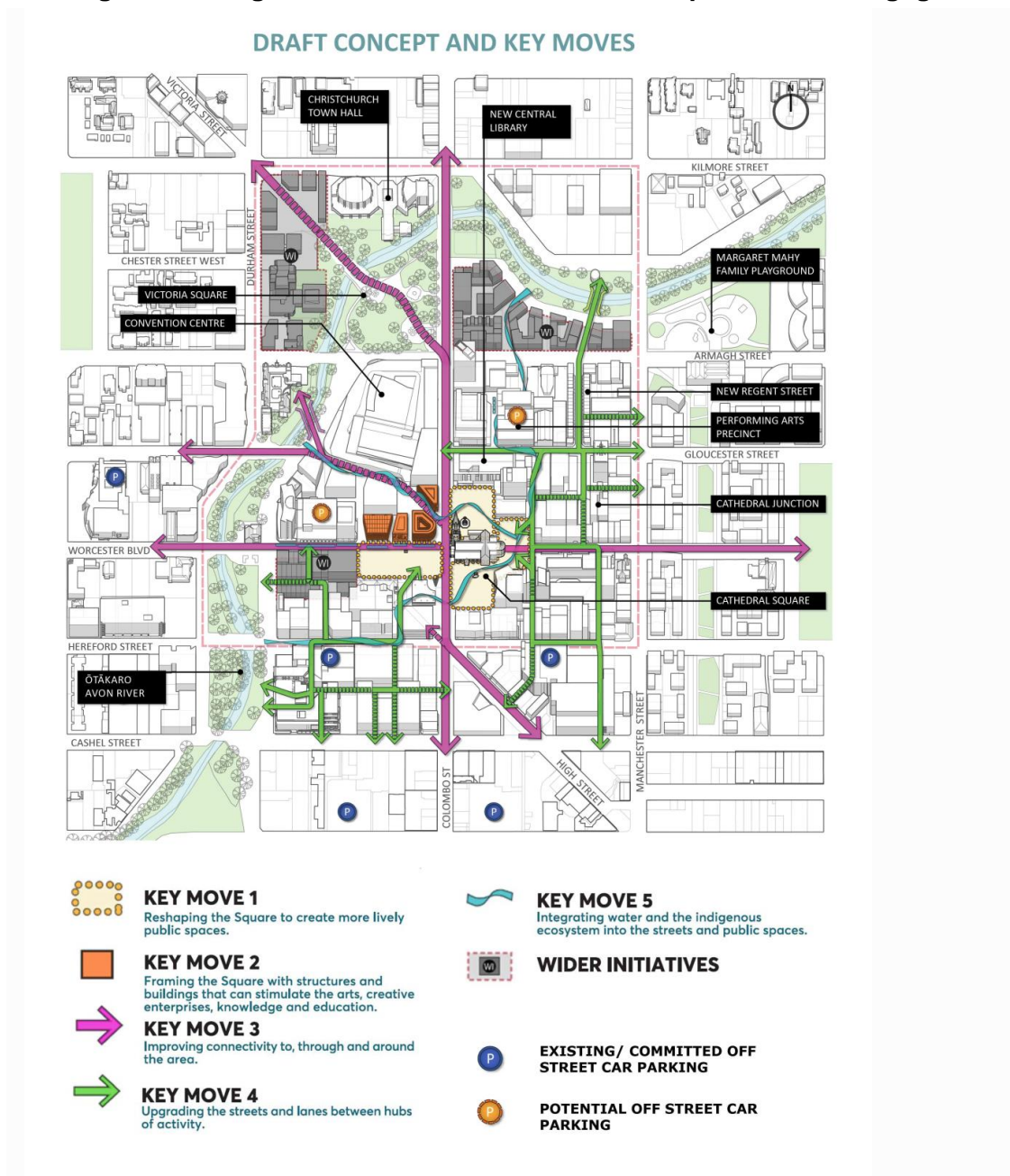
- Hereford Street
- Colombo Street, north of Gloucester Street and south of Lichfield Street
- Armagh Street between Montreal Street and Colombo Street
- Gloucester Street, west of Oxford Terrace and east of Colombo Street

2.2.6 The remaining roads within the study area are therefore intended for local access of vehicles only, with Colombo Street and Worcester Boulevard/Street intended as primary walking and cycling routes. Manchester Street is the primary PT route, with Hereford Street (west of Manchester Street) also serving a single bus route (Route 17 – Huntsbury <-> Bryndwr, running with 30 minute headway).

2.2.7 Because many of the roads within the Cathedral Square regeneration project area are only required to provide local vehicle access and accommodate cyclists and pedestrians, this opens up a wide range of possible options, such as shared spaces and limiting movement of through traffic on roads such as Colombo Street, Worcester Street and parts of Gloucester Street and Armagh Street.

2.2.8 Regenerate Christchurch proposed a draft concept² for the area in July 2017 to test some 'key moves' that they thought would help stimulate investment and deliver a centre that showcases the very best of our city. This is summarised spatially below:

Figure 2-3: Regenerate Christchurch Draft Concept for Public Engagement



2.2.9 The draft concept directly reflects the AAC hierarchy (assuming that the connectivity shown is intended for pedestrians rather than vehicles) and shows pedestrian-friendly streets and places, and mentions that the regeneration strategy will examine ways to achieve this, including innovative public transport options to connect the area to the wider city (such as trams, light rail, electric shuttles and even aerial gondolas).

2.2.10 Public engagement on the draft concept received mostly positive feedback for

² Draft concept and key moves for the Square and surrounding area

discouraging traffic through the square.

2.3 Traffic Signal Strategy

2.3.1 In AAC, Colombo Street north of Tuam Street is designated primarily for walking and cycling. Car travel does not feature as a priority for this corridor. Therefore the traffic signal strategy for this section of Colombo Street reflects the following:

- Both Colombo/Armagh and Colombo/Gloucester include a Barnes dance (exclusive diagonal pedestrian phase) pedestrian phase, to reinforce pedestrian priority and discourage through traffic. As with many inner city intersections, the pedestrian phase is automatically demanded between the hours of 7:30am and 6:00pm.
- Colombo/Hereford is yet to be resolved, but is expected to include a Barnes Dance and a special phase for the Tram, as it does at present. East - west vehicle movements will need to be accommodated to reflect the local distributor function and access to the multiple off-street parking buildings. To achieve this with the limited available green time, some vehicle movements to or from Colombo Street may need to be restricted.
- Colombo/Lichfield caters for the cyclists on the northbound Separated Bicycle Facility (**SBF**) as well as providing a Barnes dance pedestrian phase for the high number of pedestrians.
- Colombo/Tuam forms part of the Tuam Street corridor and again has a focus on eastbound cycle, bus and car travel. The northbound and southbound cycle movements are fully protected and a northbound right turn phase is provided to assist buses turning onto Tuam Street to access the bus interchange. Northbound and southbound car travel is given minimal green time due to these other competing demands.
- Colombo/St Asaph forms part of the St Asaph Street corridor and has a focus on westbound cycle, bus and car travel. The northbound and southbound cycle movements are fully protected but no other priority is given to vehicles travelling through this intersection on Colombo Street.
- There is no form of signal coordination along Colombo Street since both Colombo/St Asaph and Colombo/Tuam are part of the one-way street coordination and (in line with AAC) no priority is being provided for car travel on Colombo Street.

2.3.2 Manchester Street has been designed for bus priority (not bus exclusivity), where bus journey times and bus journey time variability is a consideration. A good level of service for pedestrians is also to be provided. Therefore the traffic signal strategy for Manchester Street adjacent to the Regeneration Project area reflects the following:

- Providing pedestrian Barnes Dance intersections at Armagh/Manchester, Gloucester/Manchester and Manchester/Worcester which also provides full protection for cyclists crossing these streets on the shared path. The main driver for the inclusion of these Barnes Dances is the lack of exclusive left turn lanes on most approaches. If standard parallel pedestrian movements were

provided with red arrow pedestrian protection, then left turn vehicles would hold up any through vehicles behind them, in particular, buses on Manchester Street. The Barnes Dance provides a fully protected phase for pedestrians and cyclists and also allows vehicles to proceed without conflicting with pedestrians. Each Barnes Dance phase requires a minimum of 26 seconds. The side streets have therefore been limited to a maximum of 25% of the signal cycle time to ensure sufficient green time for vehicles and buses on Manchester Street.

- At Hereford/Manchester, the two Manchester Street approaches run in separate phases (split approach phasing). This is necessary because of the central bus lane on the south approach and the need to control northbound buses and northbound vehicles independently. The result is a 4 signal phase operation with a maximum phase split for Hereford Street of 20%. This does not leave much time for traffic on Hereford Street, so delays and queuing may result. However this is one of the trade-offs associated with accepting several off-street car parking buildings directly within the core, rather than planning for off-street facilities to be provided adjacent to it.

2.4 Future travel Patterns

- 2.4.1 Future travel patterns for AAC have been estimated using Council's transportation models CTM³ and CAST⁴.
- 2.4.2 The CTM model is used to estimate future vehicle trips based on projected population, employment and landuse at Statistics New Zealand meshblock level. Forecasts for these attributes have been developed in a partnership between Christchurch City Council, Waimakariri District Council, Selwyn District Council, Environment Canterbury and the New Zealand Transport Agency, and are used as a consistent base for general planning, including future infrastructure.
- 2.4.3 The CTM model uses these forecasts to estimate the amount of trips associated with each zone (typically consisting of 1 to 3 meshblocks). It then matches up trip origins and destinations based on a range of travel modes and travel purposes.
- 2.4.4 The CAST model takes vehicle trips from the CTM model and assigns these to a more detailed representation of the road network. Each trip seeks to minimise both the time and distance travelled (with a higher weight given to time) between its allocated origin zone and destination zone. This is an iterative process, since the path that each trip takes then affects many others. Eventually equilibrium is reached, which has been confirmed to reasonably replicates observed travel behaviour (based on current day inputs, rather than the forecasts used for planning purposes).

³ Christchurch Transport Model – Regional 4 stage Transport Model

⁴ Christchurch Assignment and Simulation of Traffic – Mesoscopic Traffic Assignment Model

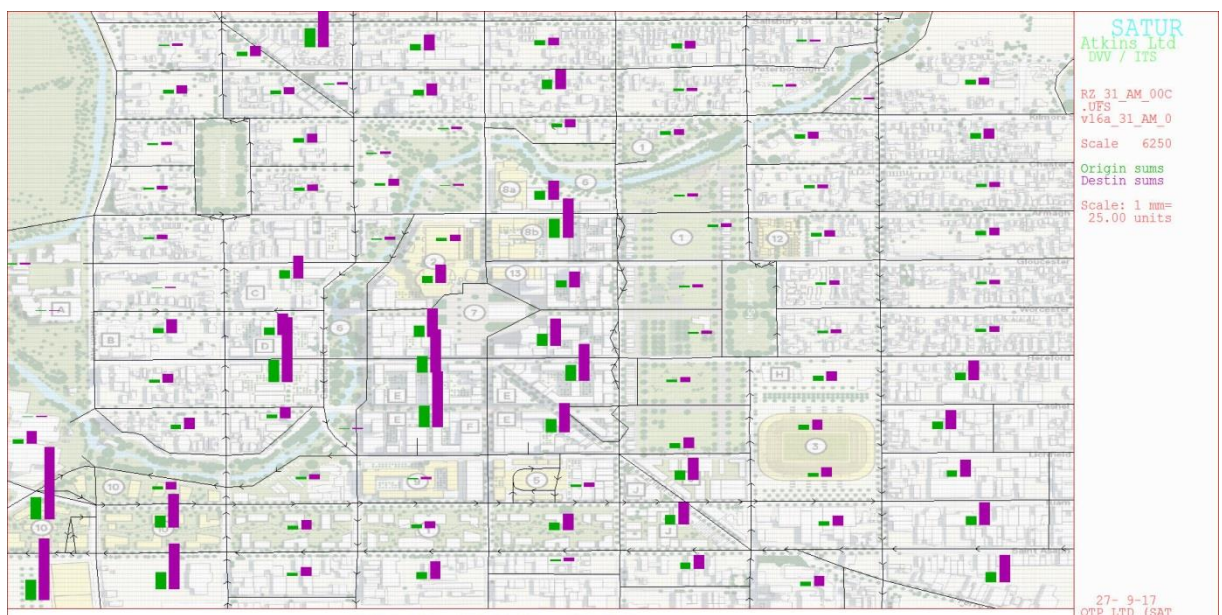
2.4.5 The models indicate the following level of daily trips to, from and within the Central City at various assessment years:

Table 2-1: Daily Person trips (2way) by mode 2016, 2021 and 2031

Year	Car Driver	Car Passenger	PT Passenger	Cycle	Total
2016	141,000	75,000	13,000	17,000	246,000
2021	215,000	113,000	20,000	32,000	379,000
2031	252,000	132,000	23,000	47,000	454,000

2.4.6 Future trips associated with each CAST central city traffic zone are shown below for each key time period (morning peak, inter peak and evening peak). Trip origins are shown as green and trip destinations as magenta.

Figure 2-4: Trip Origins and Destinations from Transport Model – Morning Peak 2031



2.4.7 The above trip origin and destinations reflect parking capacity in each zone, therefore it reflects where vehicles are parking, not necessarily the actual trip origin destination (which may involve a walking trip to or from an adjacent zone to complete the trip).

2.4.8 The above trips have not been adjusted to reflect any major changes in mode-share beyond what the model estimates by default.

Figure 2-5: Trip Origins and Destinations from Transport Model – Inter Peak 2031

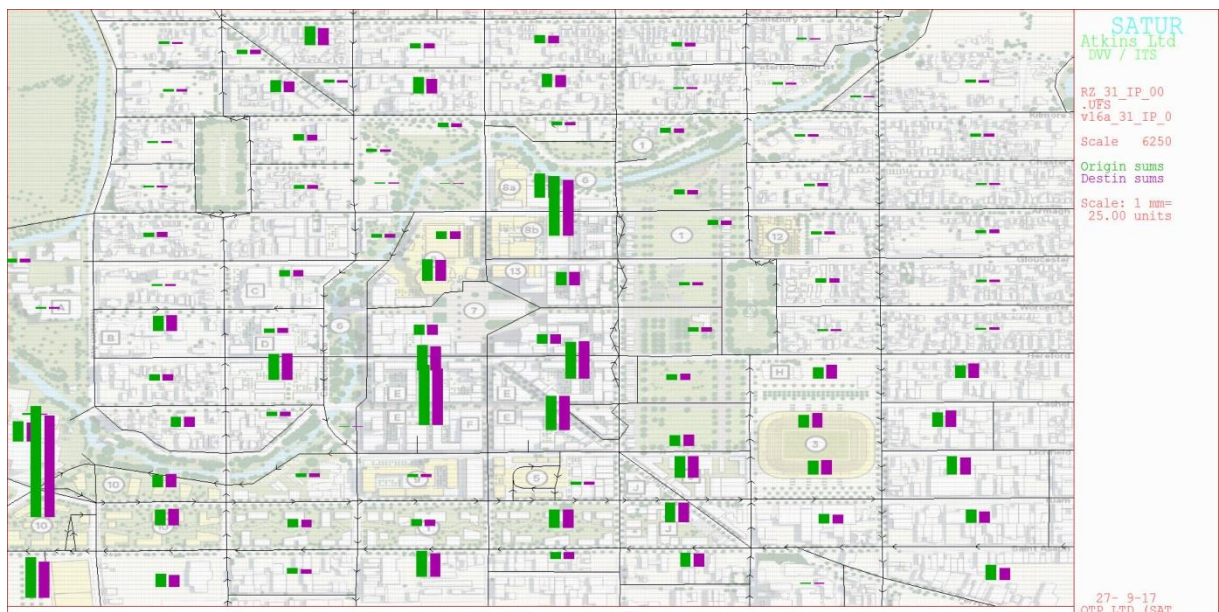
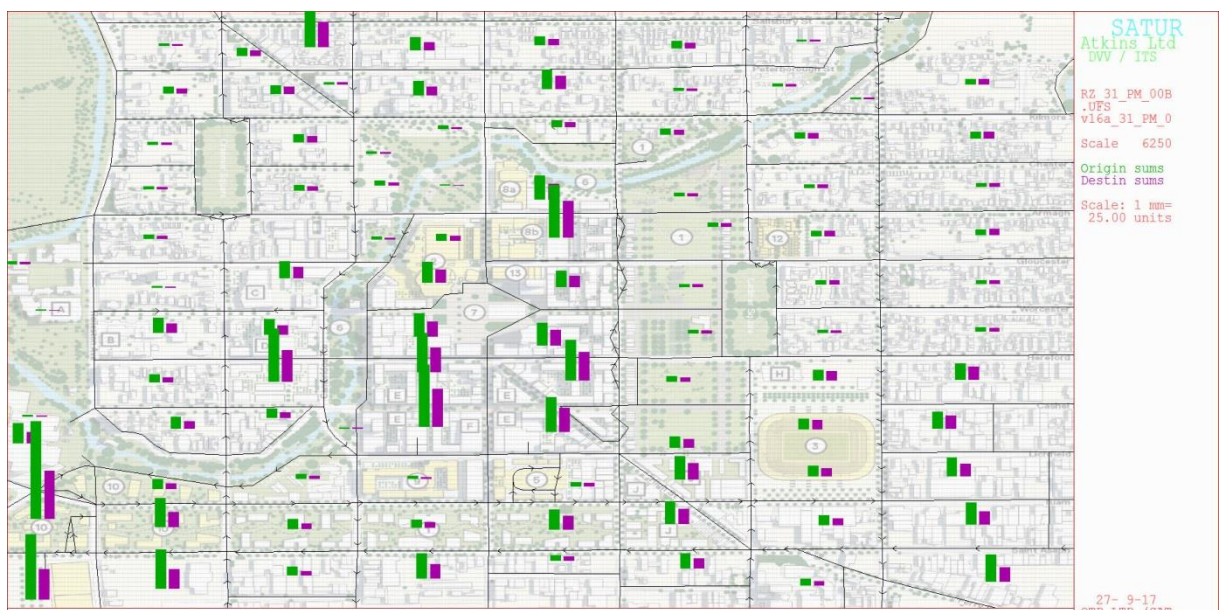


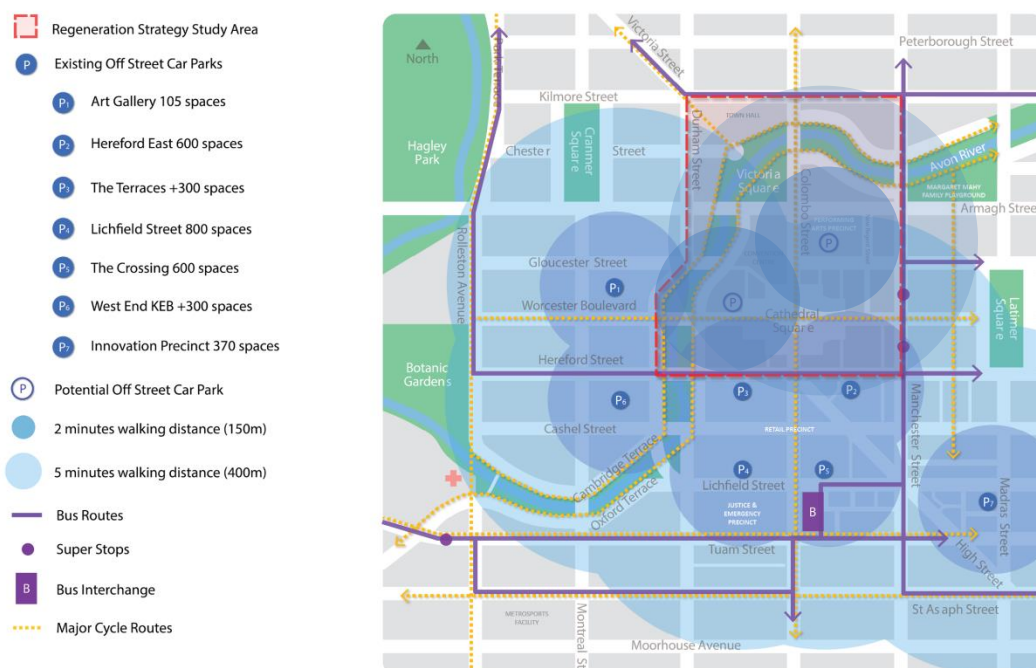
Figure 2-6: Trip Origins and Destinations from Transport Model – Inter Peak 2031



2.4.9 The figures above indicate the most popular destinations in central city relate to where off-street public car-parking is located. Because limited parking is proposed in Cathedral Square (and this will most likely be private), access to this area will be primarily via by foot traffic.

2.4.10 The location of off-street public visitor parking buildings (most of which have now been constructed, with presumably more to come), including those on Hereford Street close to Cathedral Square, are well located to provide safe and easy access from the local distributor streets, as shown in the figure below:

Figure 2-7: Off-Street Car Parking and Movement by Modes



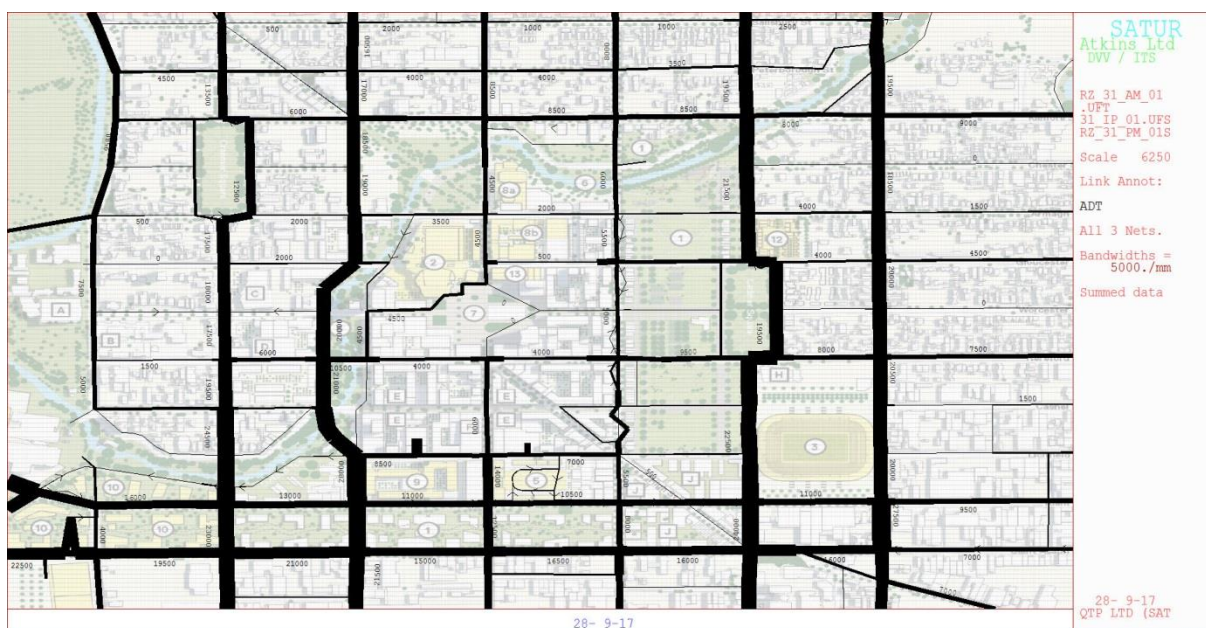
2.4.11 The above diagram includes the following potential off-street carparks:

- The Performing Arts Precinct potentially represents 600 spaces, to also serve needs of PAP, Library and potentially Cathedral Square.
- The Rydges location intends to show the limited Convention Centre parking (200 spaces, or reinstatement of the old Rydges carpark which was operated by CCC (340 spaces of which 250 were public, rest leased).

2.4.12 Assigning traffic⁵ the modelled origins and destinations to the AAC network results in the following daily traffic assignment:

⁵ Using the CAST traffic assignment model

Figure 2-8: Daily Modelled Traffic 2031



2.4.13 This highlights the one-way distributor roads carry the most traffic, as intended. As a result, this frees up the lower order roads such that other modes of travel can be accommodated, also as intended by AAC.

2.4.14 Consequently, very little traffic is indicated in the vicinity of Cathedral Square, noting that in this future (potential) network, no through movement has been assumed to be permitted (i.e. local access only), unlike the existing (current) situation. Section 3.1 investigates the effects if Colombo St were opened to through traffic.

2.5 Construction Timing and Staging

2.5.1 Consideration should be given to the staging of projects, transitioning from current use to the longer term goals.

2.5.2 An example of this is slowly (but steadily) phasing out all the temporary car parking (on vacant lots) whilst maintaining access to the various activities already operating and the continued operation of the transport network (including pedestrians and all other modes of travel) during the regeneration project as well as the remaining AAC construction phases.

2.5.3 After years of uncertainty, confirmation has recently⁶ been provided that the Christchurch Cathedral is to be restored. This could take up to 10 years, and therefore sets the timeframe for the overall regeneration project.

2.5.4 Therefore, staging of each element of the regeneration project should be used to minimise disruption and allow effective operation of the transport network (including access to businesses etc.) in the interim. Projects need to be introduced at the right time to be effective; not too early so they are not highly utilised, nor too late where construction adversely affects other projects that are operational.

⁶ By the Anglican's governing body (the Synod), 9 September 2014

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- 2.5.5 Part of this will require better management of Traffic Management Plans (TMPs), to avoid the negative feedback (longer than expected delays, lack of access to businesses) received during the early central city works. Otherwise, there is a risk confusing the disruption during construction as an AAC outcome.
- 2.5.6 The major Cycleway connection to the eastern end of Worcester St (at Fitzgerald Avenue) has just been constructed, bringing some certainty in establishing Worcester Street as a primary cycle route to the central city. Appropriate cycle routes will therefore need to be maintained within the regeneration area for the full duration of the project.

3 Wider network commentary and assessment

3.1 Colombo Street through Cathedral Square

- 3.1.1 The draft concept proposes to upgrade the public space, making it more attractive and safer, with routes that encourage more foot traffic connecting various hubs (e.g. Convention Centre, Library, Isaac Theatre, Hospitality areas and event areas).
- 3.1.2 To achieve this, it is proposed that people movement has a higher priority than vehicle movement in Cathedral Square. This would most likely require use of shared spaces, potentially banning (or restricting) through movement of vehicles while still providing for essential local access (for property access, loading and servicing).
- 3.1.3 As discussed earlier in Section 2.2, the AAC road hierarchy is consistent with this approach, and as a result, there is not really a need for vehicle trips to travel through Cathedral Square, with only local access being necessary.
- 3.1.4 The logic behind the AAC hierarchy is demonstrated in the figures below, which illustrate that vehicle (future) travel times on Colombo Street (either direction) between St Asaph Street and Kilmore Street are actually quicker when diverting via the one-way road system, which has been optimised to carry traffic much more efficiently than Colombo Street (despite the longer distance).

Figure 3-1: Colombo Street Northbound Routes between St Asaph St and Kilmore St

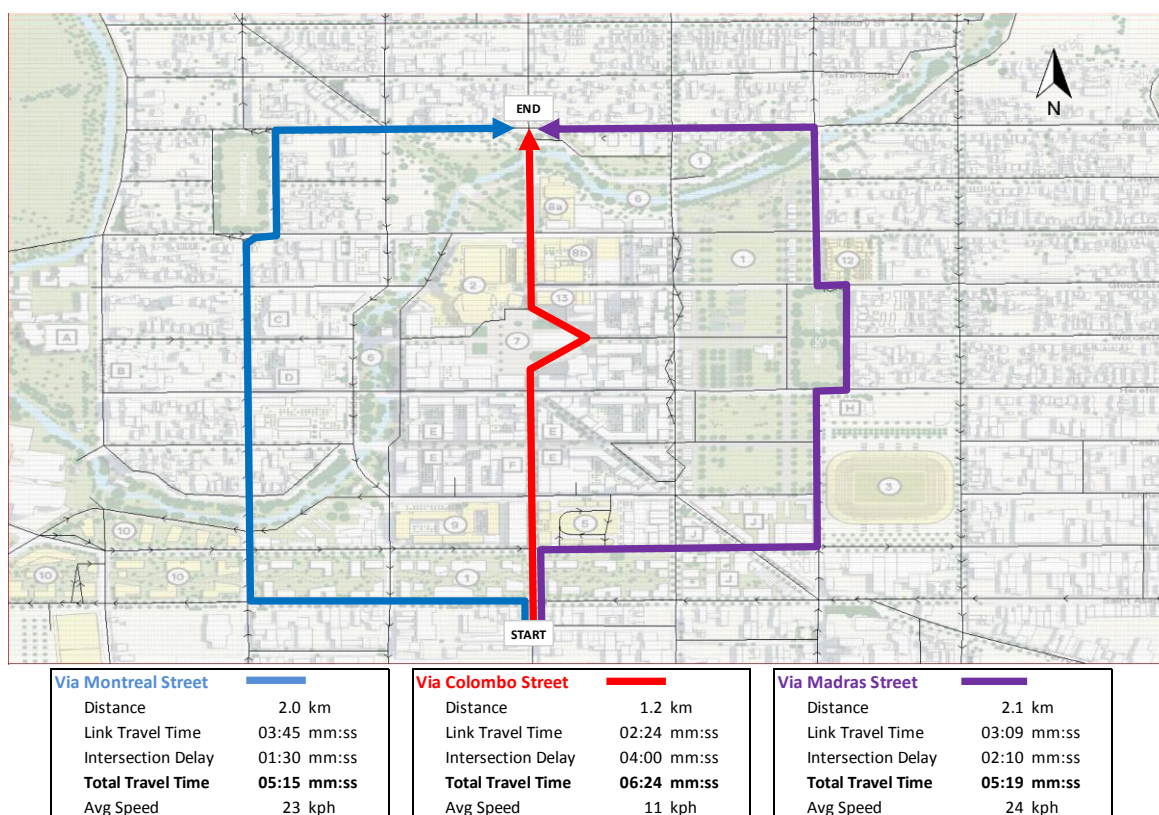
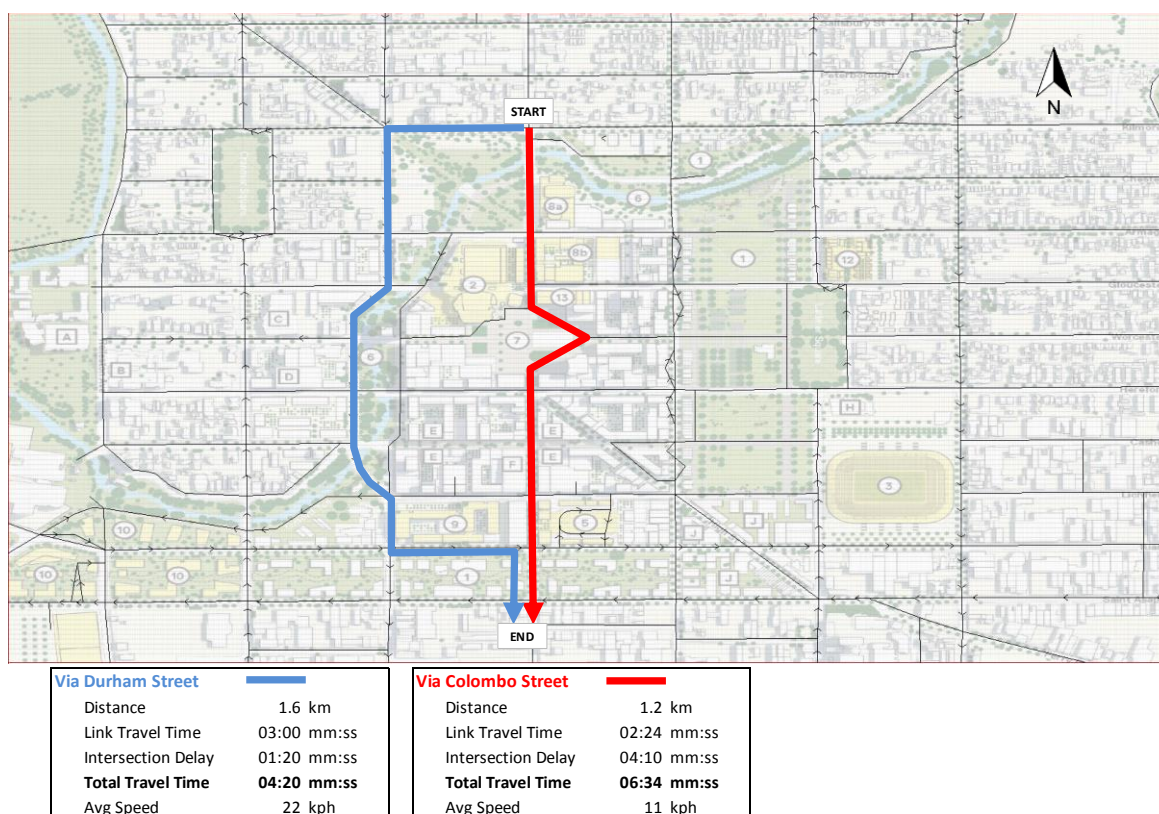


Figure 3-2: Colombo Street Southbound Routes between Kilmore St and St Asaph St



- 3.1.5 The above diagrams assume travel time on links is at the posted speed limit (either 30kph of 50 kph depending on location) and that once on the one-way system, vehicle will get an uninterrupted run from the 'green wave'. Delays at all other intersections are based on typical values reflecting the typically available green time relative to cycle time (and are therefore generic and do not represent a particular peak period).
- 3.1.6 The above diagrams also assume full doubling back to Colombo Street to continue a northbound or southbound journey. In reality, many through trips would not need to do this, staying on the one-way routes and saving even more time.
- 3.1.7 In addition to the longer travel time via Colombo Street, this route is likely to have a greater level of unreliability, and therefore on occasions could be significantly worse than the average times indicated.
- 3.1.8 Traffic modelling had been used to assess the potential and implications of opening or closing Colombo to traffic, especially in relation to wider area effects, and to better understand trips that would desire to travel through Cathedral Square.
- 3.1.9 Select Link Analysis (SLA) identifies the trip origins, destination and paths used for all vehicle trips using the road link through Cathedral Square. Figures for the morning and evening peak hours are included in Appendix A. Figures for the inter-peak period (representing the majority of the day) are shown below:

Figure 3-3: SLA Colombo Street Northbound (Interpeak)

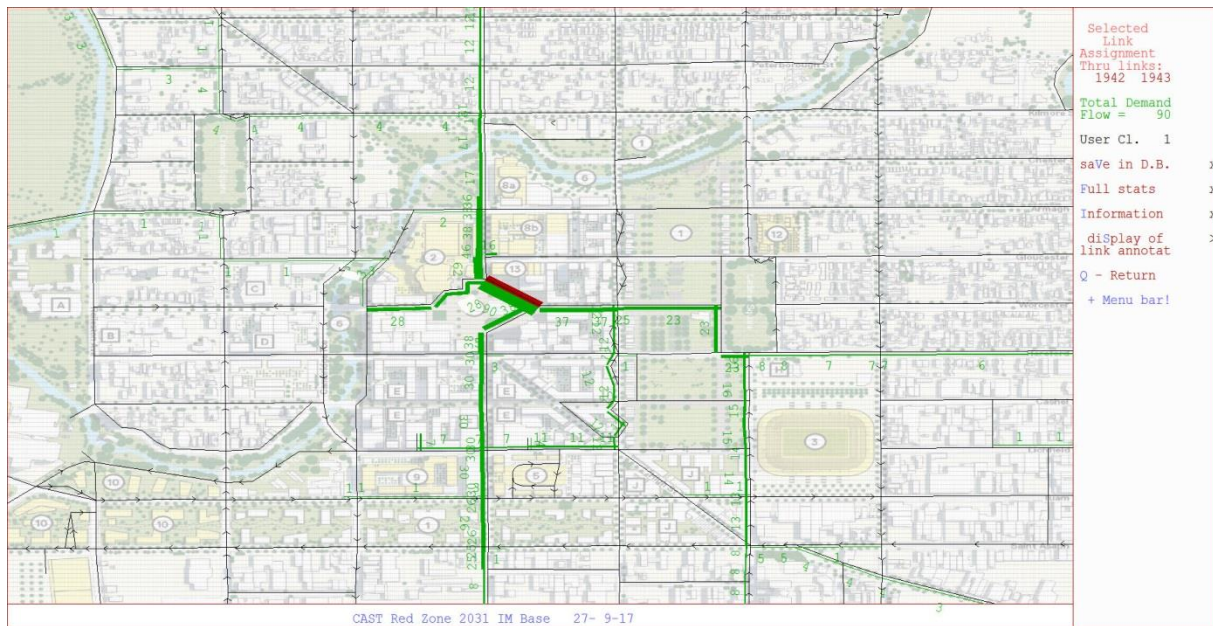


Figure 3-4: SLA Colombo Street Southbound (Interpeak)

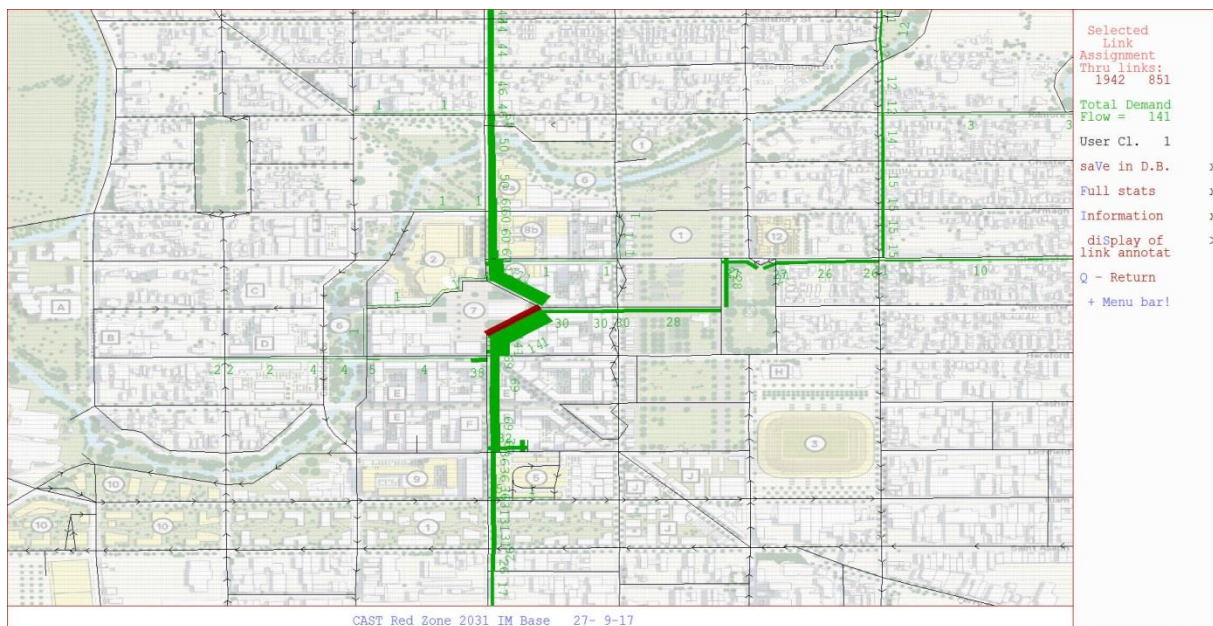
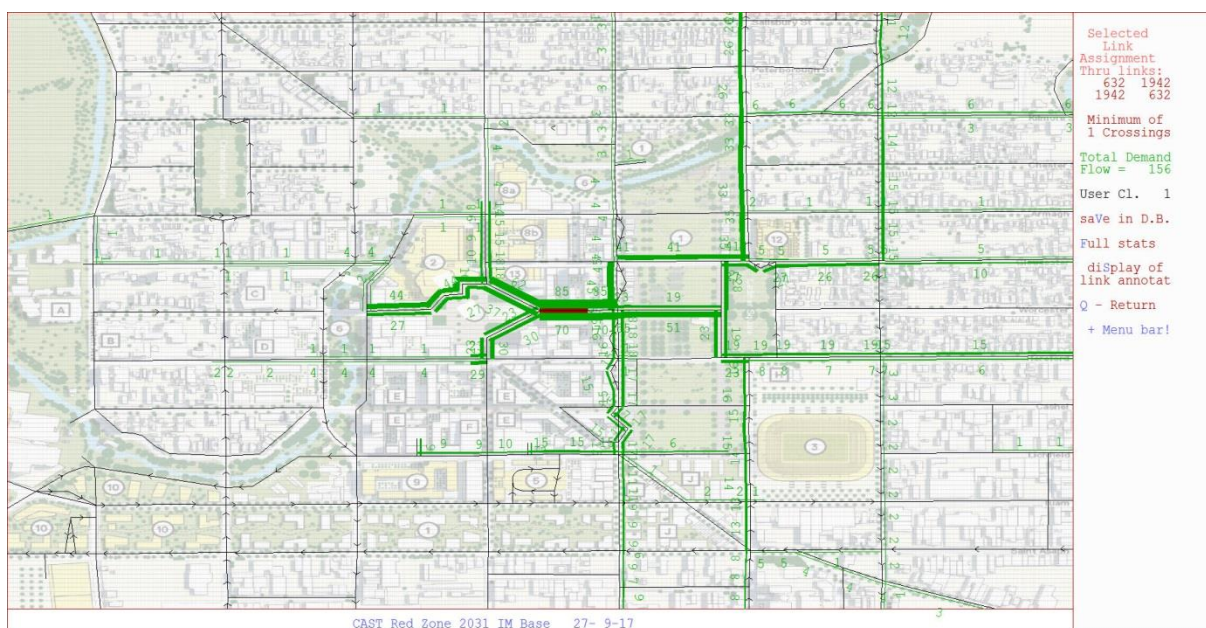


Figure 3-5: SLA Worcester Street (2way) (Interpeak)

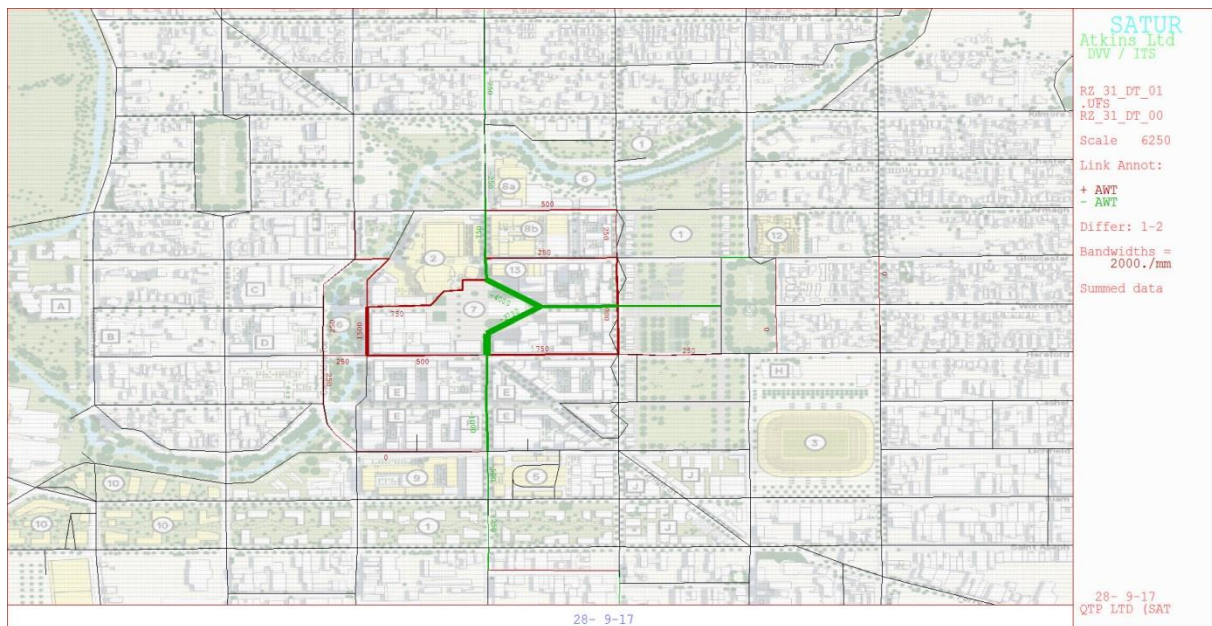


3.1.10 These figures indicate that much of the traffic travelling through the square doesn't necessarily need to be there (forecast 2031 weekday traffic flows are under 4,000⁷, with only 70% having a local origin or destination). For those trips with a local destination, there are approximately 900 public off-street parking spaces with 150m (2 minute walk) and over 2,500 spaces with a 400m (5 minute walk) which can be accesses without reliance on Colombo Street, as shown previously in the Figure 2-7.

3.1.11 The change in daily traffic flows that would result from closing Colombo Street through Cathedral Square are shown below, where red bandwidths show an increase in traffic and green bandwidths show a decrease. Only flow changes greater than 200 vehicles per day are shown (noting that traffic flow changes of less than 500 vpd are considered to be insignificant). Flow changes for the morning peak hour, evening peak hour and inter-peak period are shown in Appendix B.

⁷ This compares to around 10,000vpd counted using Colombo St through the Square prior to the earthquakes (although the 2006 Model actually only showed around 4,000vpd so the model forecasts may understate the potential).

Figure 3-6: Daily Flow and change diagram



- 3.1.12 Note that actual flows will depend on factors such as whether (or not) parking is provided in performing arts precinct. If parking is provided north of the square (given large supply already to the south) the need to travel through the square is minimised further.
- 3.1.13 The closure of Cathedral Square as a north-south through-route has a localised effect on Colombo Street traffic volumes, with the model predicting potential reductions of up to 3500 vpd (400 vph during peak periods) south of Cathedral Square. The consequence is a predicted increase in traffic on Hereford Street (up to 750 vpd), Armagh Street (up to 500 vpd) and Manchester Street (up to 1,000 vpd) as traffic is assigned to these alternative routes.
- 3.1.14 The potential reduction from full closure could conceivably be much higher however, if account is taken of the fact that the 'current' (2016) model is under-predicting the apparent existing use of Colombo Street.
- 3.1.15 Traffic also dispersed more widely, but the effect on roads beyond these mentioned above is considered to be negligible.
- 3.1.16 Some local vehicle access is required in the Square; to serve the Cathedral, convention centre and hotels. It is proposed that this access can be provided, and is discussed in more detail in Section 4.
- 3.1.17 The modelling assessment has also investigated a link that is either fully open or fully closed. A shared space will lie somewhere between these two extremes.
- 3.1.18 Closing the Square to through traffic will help achieve the desired streetscape character and reinforce the role of Colombo Street within the AAC network.
- 3.1.19 If Colombo Street is to remain open (e.g. as a shared space), then the exact alignment (e.g. public traffic across Cathedral Square vs. closure/ removal of road behind the Cathedral) is of little consequence given the low speed environment, and therefore can be led by urban design objectives.

3.1.20 For larger events, there are thousands of private and public parking spaces within reasonable walking distance. The Central City is also well served by PT from all parts of the City, which reduces the need to travel to events by private vehicle.

3.2 **An internal city loop for public transport**

3.2.1 The current (rebuilding) central city is fragmented and dispersed, which can make it difficult and unpleasant to travel within the central city. Travel within the central city is very important due to the high agglomeration benefits⁸ associated with concentrating large numbers of employees in a relatively small space. It is also important to provide a pleasant experience for tourists and also shoppers.

3.2.2 The current coverage and frequency of the existing public transport service within the central city does not, however, make it a viable travel choice for many users to move between key points of interest (for example, museum/gardens, art gallery, car parking, hotels, conference centre, square, library, hospitality etc.), many of which are more than 400m (acceptable walk distance) away from a PT route.

3.2.3 It is unlikely that increased coverage/frequency of Metro Services would adequately link these activities, as it would require deviating established routes away from PT priority corridors, increasing the overall distance and time travelled as well as requiring additional stops to accommodate many short trips. Each of these factors would work to reduce the attractiveness of the service to *existing* PT patrons. Similarly, short trips by private vehicle are not practical and are also contrary to many of the objectives of AAC (so should be discouraged as much as possible).

3.2.4 Therefore, a dedicated inner PT city loop would better serve movement between these key areas. It would also assist (and compliment the tram) in moving tourists between ‘hotspots’, making them more aware of things to do in Christchurch and letting them hop on and off at will for any activity that takes their interest.

3.2.5 An internal city loop using an electric hybrid shuttle bus operated with great success prior to the earthquakes. The Central City shuttle commenced operation in 1998 and operated until 22 February 2011. The shuttle service was ‘free’ to all passengers and ran on a 10-15 minute frequency. This became a central city icon and was easily recognisable in its distinctive yellow livery, as shown in the figure below.

⁸ Refer to AAC economic evaluation for more details

Figure 3-7: Pre Earthquake Hybrid Shuttle Bus on Inner City Loop



- 3.2.6 The advanced technology of the vehicles when introduced meant it quickly became a symbol of Christchurch's commitment to a green and sustainable public transport system. It was extensively promoted as an easy way to travel around the central city or access the greater Christchurch area by providing access to the Bus Exchange.
- 3.2.7 Patronage exceeded expectations. As many as 80,000 passengers travelled in the five weeks from 24 December 1998. In the 2009 calendar year, one million people used it.
- 3.2.8 A decision about reinstating the shuttle inner city loop had been on the agenda for 2018's long-term plan deliberations, but may now be pushed back to 2020. Potential options presented to Council and the case for re-establishing the shuttle is included in Appendix C.
- 3.2.9 Any of these proposed options would work with the proposed Cathedral Square redevelopment because there is no reliance on the route travelling through the square, but yet the route(s) passes within close walking distance at various points (the proposed options are effectively a central city loop that orbits Cathedral Square).
- 3.2.10 Longer term, the tram tracks could potentially also be used for the shuttle if needed, giving long term flexibility in adapting the route if required. At some point in the future, it may also make sense to add an east-west service (Hereford/Armagh) with stops that allow transfers to or from the main shuttle route.
- 3.2.11 It is also possible that the shuttle route could be modified to perform the "ride" component of park and ride facilities located on the fringe on the CBD at location(s), potentially outside of the 4 Avenues if crossing into the central during peak period traffic becomes difficult. A single bus would potentially replace 20-30 private vehicles each time it crosses this network bottleneck, which would be very effective if running at high frequencies (e.g. ever 5 or 10 minutes).
- 3.2.12 It is recommended that a shuttle type bus looks distinctly different from a metro bus, to reflect the different type of service it provides. Low emissions and noise are important characteristics for the central city environment. It may also drive on tram tracks (but have further flexibility and reduced running costs).
- 3.2.13 It could potentially target commuters in the morning and afternoon peaks and tourists/visitors/students/shoppers in the off peak periods.

4 Outline servicing strategy for the businesses and operators around Cathedral Square

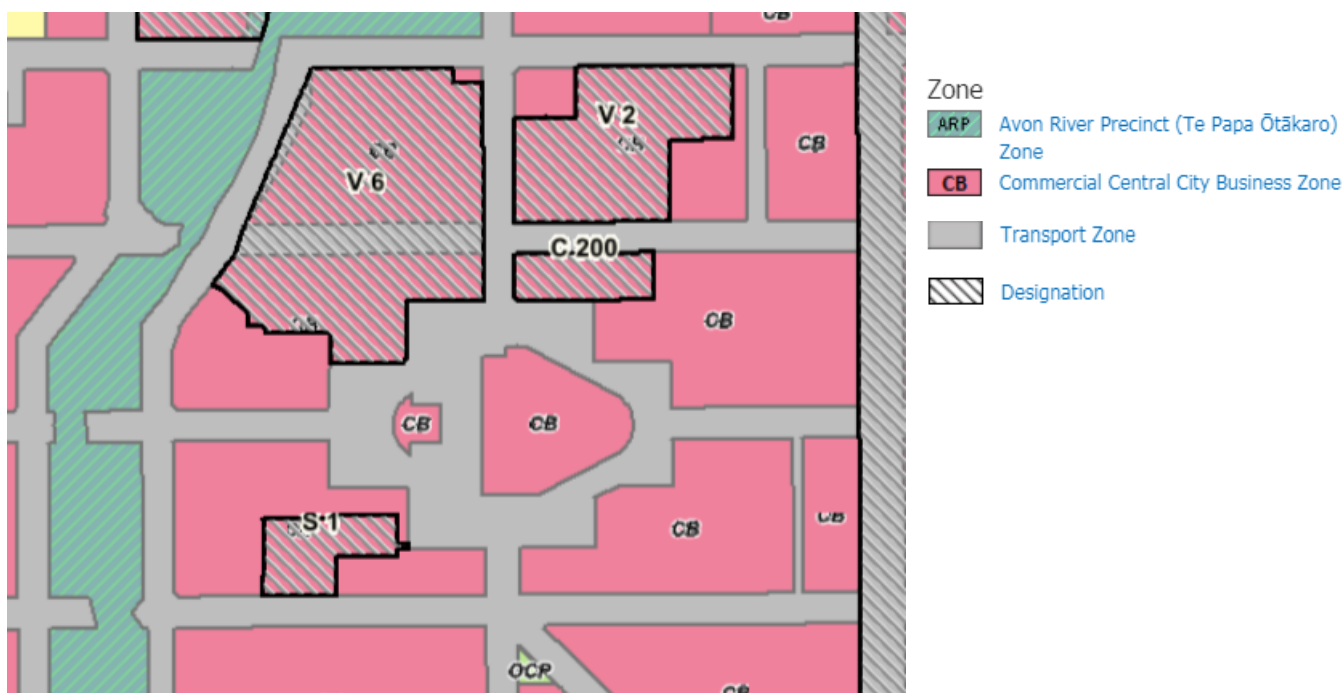
4.1 Identification of issues and constraints

- 4.1.1 The concept design for the redevelopment of Cathedral Square does not include any defined roads linking Colombo Street between Hereford Street and Gloucester Street nor through connections via Worcester Street.
- 4.1.2 A shared public space is proposed instead, which will allow appropriate servicing of businesses and operators within Cathedral Square but discourage through movements for vehicles (other than the historic tourist tram).
- 4.1.3 Implementation of a shared space is not necessarily an aim or objective in itself, there may be other options which have the desired effect(s), such as using demarcation between vehicle and pedestrian spaces within a level shared area. The concept of shared space is complex and relies on a variety of human behaviour concepts as well as traffic engineering principles.
- 4.1.4 The IPENZ Transportation Group ‘Shared Space in Urban Environments’ guidance note⁹ suggests that when implemented successfully, a shared space design can offer many advantages to a street such as:
- Improved pedestrian amenity
 - Reduced Vehicle Speeds
 - Reduced vehicle volumes
 - Improved safety
 - Creation of flexible space
 - Improved economic activity

⁹ Professional Engineers New Zealand (IPENZ) Transportation Group Study Award, Flow Transportation, July 2012

4.1.5 A key challenge is that a large proportion of Cathedral Square is zoned as Transport Zone in the District Plan, as shown in the figure below:

Figure 4-1: District Plan Zoning in Cathedral Square



4.1.6 The Christchurch District Plan¹⁰ states that if a road has been lawfully stopped under any enactment, then the land shall no longer be subject to the provisions for the Transport Zone but will instead be deemed to be included in the same zone as that of the land that adjoins it (i.e. Commercial Central City Business Zone in this case).

4.1.7 The legal position surrounding the implementation of shared space in New Zealand is somewhat vague. The Transport (Road User) Rule 2004 does not define the term shared space, however it does include the definition of the term shared zone (which is often applied in residential areas as part of Local Area Traffic Management). This is defined as; “A road that has been designed to slow traffic and give priority to pedestrians. Drivers give way to pedestrians who, in turn, should not impede traffic.”

4.1.8 It is therefore usually considered appropriate to classify shared space streets (with level surfaces) as official shared zones, although this is not a strict requirement. However, it is important to note that if a shared space scheme is to be implemented without classifying it as a shared zone, then the street technically still remains as a standard road, which results in vehicles having legal priority over pedestrians. But as discussed above, the legal position on pedestrian priority in a street classified as a shared zone remains unclear.

4.1.9 Tourist operators and hotels have confirmed the need to have pick-up and drop-off access (particularly for coaches) near their frontages within Cathedral Square.

4.1.10 The Anglican Church also needs vehicle access to their land where Christchurch Cathedral sits. Vehicle access will initially be required for rebuilding of the Cathedral,

¹⁰ Rule 7.4.1 Deeming provisions for Transport Zone

and later for ongoing use similar to prior to the Canterbury Earthquakes. There may, however, be ways to manage parking differently, such that better use is made of public parking in surrounding areas for trips where parking on site is not absolutely essential).

- 4.1.11 Loading and limited parking is therefore required in the shared spaces in order to service these properties. The IPENZ guidance note found no evidence of loading creating any problems in shared spaces (where the schemes visited during a study tour in the UK did not incorporate any specific loading regulations). However with schemes already adopted in Auckland (and also Christchurch¹¹ to date), loading is not permitted to take place during peak pedestrian use times and therefore it may be beneficial to apply consistent rules to other shared spaces if it is felt that loading activities may compromise the objectives of the space.
- 4.1.12 Parking and loading within a shared space should be managed on a case by case basis. There is no evidence that allowing either in a shared space results in a safety concern, but there are examples of where inappropriate parking behaviour has occurred if parking is not managed effectively. Parking is not generally seen as a quality use of space in a shared space environment but there may be instances where a limited supply of parking may be required, for example parking for mobility impaired users.
- 4.1.13 When designing the shared space, management of parking and loading will need to be considered. In New Zealand, parking regulations must be enforced through signage, but (given an objective is improved amenity) this should be minimised to avoid unnecessary clutter of street furniture. As an example, Auckland Council has introduced a by-law which bans parking from all areas classified as shared zones. This is reinforced through regulatory signage, but this is restricted to the entries to the schemes and every 200m (as outlined in the TCD Rule 2010 amendment).

4.2 Potential Options

- 4.2.1 Several Options for the area wide servicing (including coach, loading vehicles and taxis) have therefore been considered using the above concepts. These are summarised below:
- Use of tram lines (with layovers for coaches/loading)
 - One-way Coach circulation options
 - Use of alley ways to service hotels (potentially with carts via Hereford or Gloucester)
 - Taxi access via Hereford and Gloucester (preferably with Taxi parking near conference Centre; Colombo St, Gloucester St or Oxford Tce)
- 4.2.2 The initial assessment indicates there can be quite a bit of flexibility in how access is provided. It is therefore recommended that this component is urban design-led, to best enable integration with the project as a whole.

¹¹ E.g. parts of Oxford Terrace, Cashel Street and High Street

4.2.3 It has been confirmed (in Section 0) that suitable access arrangements can be achieved with or without through-routing of vehicles (i.e. Colombo Street can potentially be closed for through traffic through Cathedral Square).

4.2.4 Indicative layouts for potential options are shown below:

Figure 4-2: Use of tram lines (with demarked layovers for coaches/loading)

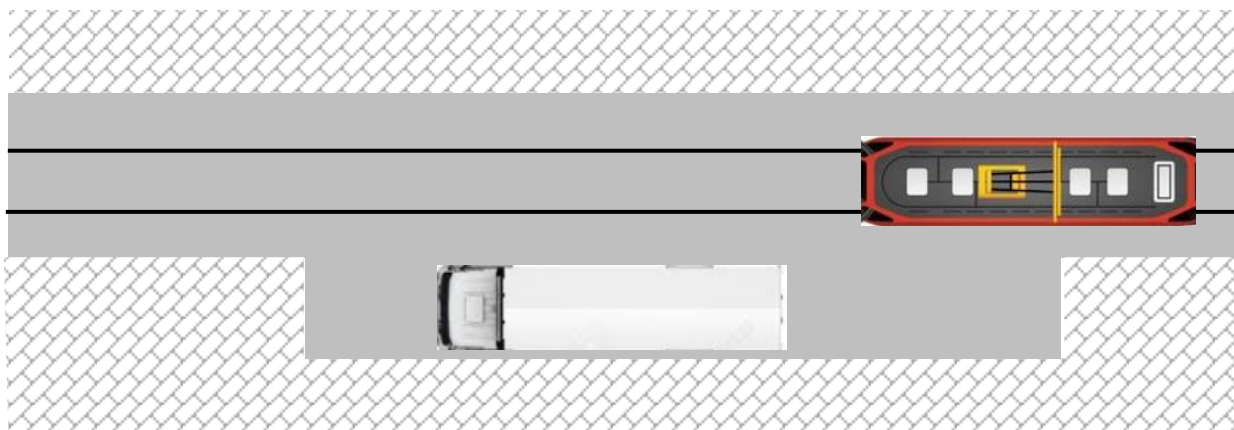


Figure 4-3: One-way Coach/Loading Circulation Options that ties in with AAC Hierarchy

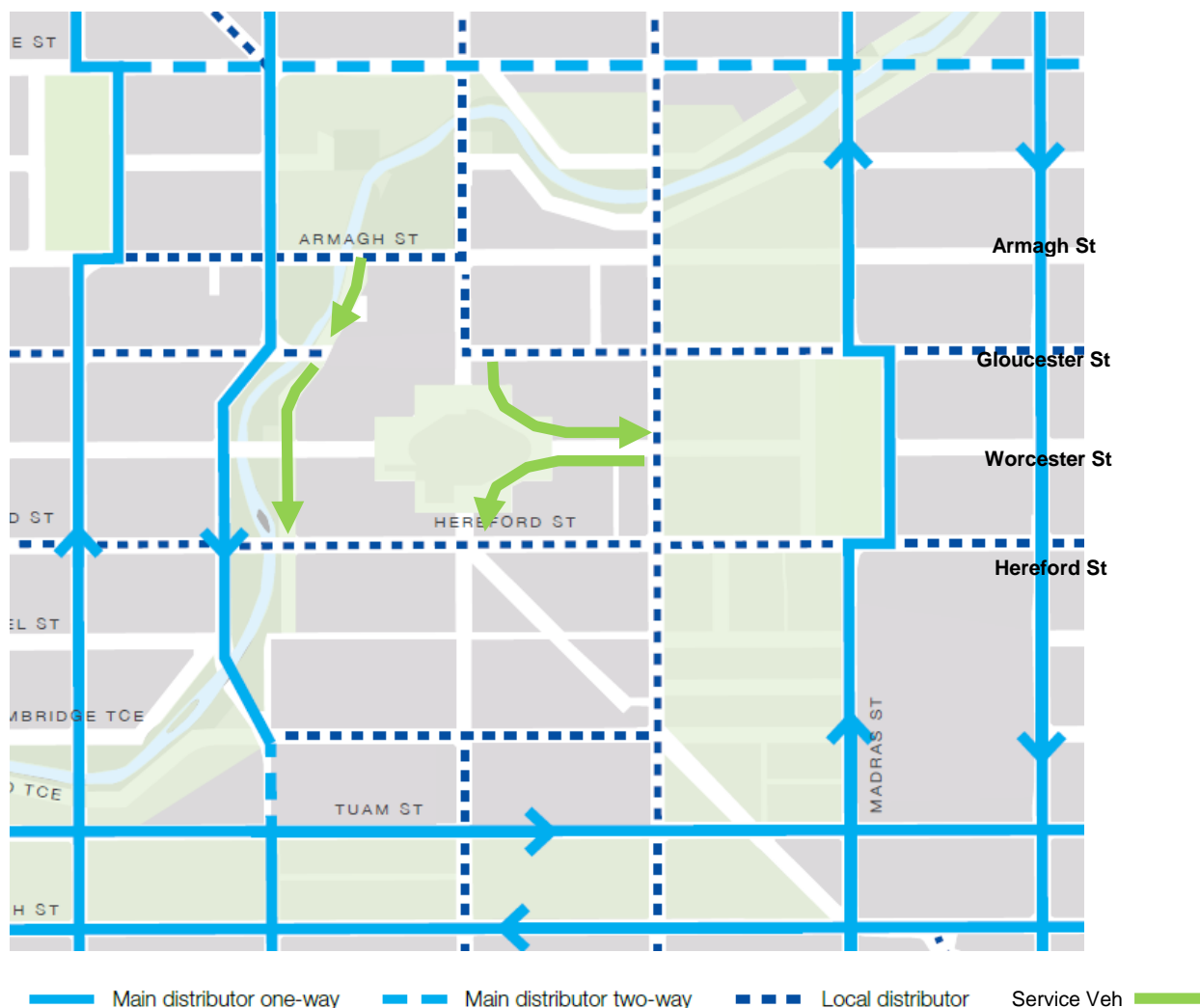
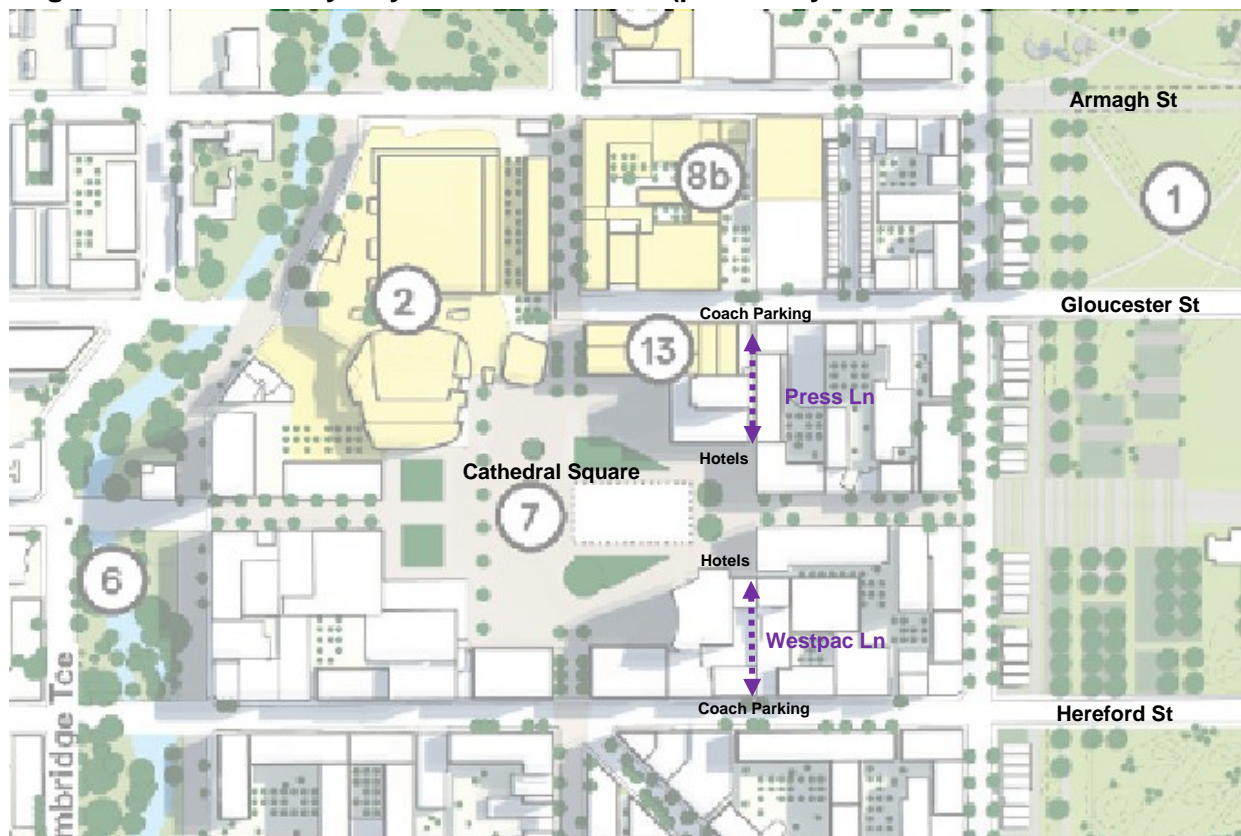


Figure 4-4: Use of alley ways to service hotels (potentially with carts via Hereford or Gloucester)



5 Possible Transport Interventions

5.1.1 This section includes a summary of any other potential transport mechanisms, methodologies or interventions (not covered in previous sections) that might support the regeneration project.

5.2 Car Parking

5.2.1 Controlled parking zones would simplify the parking regime and reduce the need for signage (which in turn would reduce visual clutter).

5.2.2 The existing temporary gravel carparks (e.g. Wilsons located off Worcester Street behind the Cathedral) are not a good use of quality space, and use could be served by the provisions made elsewhere (e.g. nearby public car parking buildings). The temporary car parks should therefore start to be phased out by including year on year reductions, to give people time to adapt (e.g. as has occurred in San Francisco). As part of this, the sites could be increasingly made available for contractors implementing the regeneration plan, so that removing them all towards the end of the construction phase would be relatively straight forward.

5.2.3 Some parking may need to be provided within the shared space (e.g. for loading and for mobility impaired). In New Zealand, parking regulations must be enforced through signage. This has already been adopted in Christchurch for shared spaces on Oxford Terrace, Cashel Street and High Street.

- 5.2.4 When considering signage, there needs to be a balance between regulatory requirements, communicating a clear message to the driver and maintaining the philosophy of reduced signs and markings. It is recommended that as little signage as possible be provided at the outset and then more be added if required.
- 5.2.5 An example of how this might be achieved using markings rather than signage is shown below (although it is noted that in this particular case, regulatory signs were provided on entry to the shared space):

Figure 5-1: Use of Markings Instead of Signage in Shared Spaces



Source: IPENZ Transportation Group 'Shared Space in Urban Environments' guidance note

5.3 Area wide traffic management during construction

- 5.3.1 Much of the disruption in traffic in the central city that has occurred recently is not due to AAC (as some might think), but rather disruptions due to construction and sub-optimal traffic management (but acknowledging the enormity of the task and the need to prioritise safety above other effects).
- 5.3.2 Area wide (rather than single project) traffic management plans that enable better coordination of projects would be useful to ensure that network operation is not significantly affected (especially on Hereford Street).
- 5.3.3 More stringent principles for construction may also be required to minimise the time that network links are unavailable. This would have to be balanced with the need to provide the appropriate level of quality in delivering the project.
- 5.3.4 A flexible tentative cycle lane could be provided on Hereford Street to preserve the space until other cycleway projects have been sufficiently progressed, at which point it could be upgraded to a higher standard.

5.4 Future Public Transport

5.4.1 One of the objectives of the Regional Public Transport Plan (2014) is to increase public transport patronage from current levels of 2.3% of total trips in Greater Christchurch (14 million trips per year) to 3% of total trips by 2020 and 5% by 2030 (35 million trips per year).

5.4.2 The Strategic Case¹² for the future of public transport in Christchurch has identified that this significant improvement in PT is required for the following reasons:

- The current public transport patronage trends risk not meeting the aspiration for a greener, compact, accessible, sustainable and innovative economically vibrant city
- The current transport system leads to poor comparative travel times for public transport compared with general traffic and poor journey time reliability for public transport fails to enable effective travel choice
- As Christchurch grows, unless there is a shift to increased public transport use, insufficient peak time network capacity will cause increased local congestion for all road users, which means that public transport will remain slower than alternatives and drivers are unlikely to change modes.

5.4.3 ECan and their partners researched possible future public transport mode options and considered the costs and benefits, ranging from buses with dedicated priority lanes to Bus Rapid Transit on segregated busways (like Auckland) and light or heavy rail.

5.4.4 These reports suggested a staged approach would be most appropriate to build the network up as our population and travel demand grows. They also acknowledge that supportive land use is important and that Christchurch is a relatively low density city which is difficult to serve with public transport. Development will therefore need to be focused around key corridors and activity centres to make higher capacity public transport modes viable in the future. Longer term, the Central City would most likely be the most significant centre in the entire network, and therefore should be future proofed accordingly.

5.4.5 Since the earthquakes, ECan and their partner agencies have investigated how to do this. This study found that attempting to utilise (or extend) existing railway lines for a short term service was not a viable option for three key reasons:

- The existing railway line doesn't take people where they need to go
- Costs are too high for a short term service
- Freight using existing single track

5.4.6 The 'PT Corridors Stage 2 Report'¹³ found various thresholds where upgrading the PT network (including adding in light rail) might be viable.

5.4.7 A staging approach was favoured as it can reduce the financial risk associated with

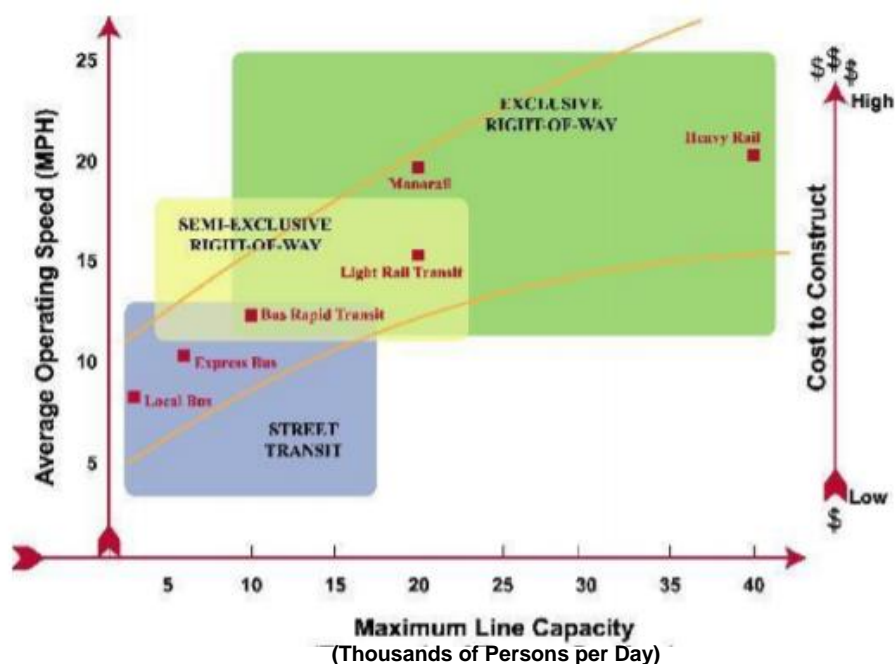
¹² Strategic Case - Future of Public Transport in Christchurch, GHD, 2017

¹³ North and Southwest Public Transport Corridors Study: Stage Two Non-Technical Summary, MWH 2010

optimistic patronage forecasts when investing in the building and operating a significant piece of public transport infrastructure such as a modern tram-train system. It allows the system to expand in line with surrounding development and the pace of development. The key thresholds are summarised below:

- The yearly operating costs for running a segregated busway service are calculated at \$7.7 million. To cover these costs, assuming a 40% patronage subsidy, would require 6.0% of all the people starting and finishing their journey along the corridor to use the system; roughly 11,000 passengers per day.
- The yearly operating costs for running Light Rapid Transit (LRT) are \$10.6 million. To cover these costs assuming a 40% patronage subsidy would require 8.4% of all the people starting and finishing their journey along this corridor to use the system; roughly 15,000 passengers per day.
- The yearly operating costs for running a train and linked LRT services are envisaged at \$18.0 million. To cover these costs assuming a 40% patronage subsidy would require 14.7% of all the people starting and finishing their journey along the rail corridors to use the system; roughly 25,000 passengers per day.

Figure 5-2: Operational Viability of various Public Transport Systems¹⁴



5.4.8 In contrast, current numbers using the buses for the busiest lines are estimated to be 3,000 to 6,000 (and 43,000¹⁵ for the entire city).

5.4.9 Light rail systems are electric railways in urban settings, operating on-street or off-street, but generally in their own right of way. Whilst they may have an advantage of speed when travelling on dedicated lines (and a mode-specific attractiveness factor),

¹⁴ Christchurch Passenger Transport Futures Study, Parsons Brinkerhoff, 2008

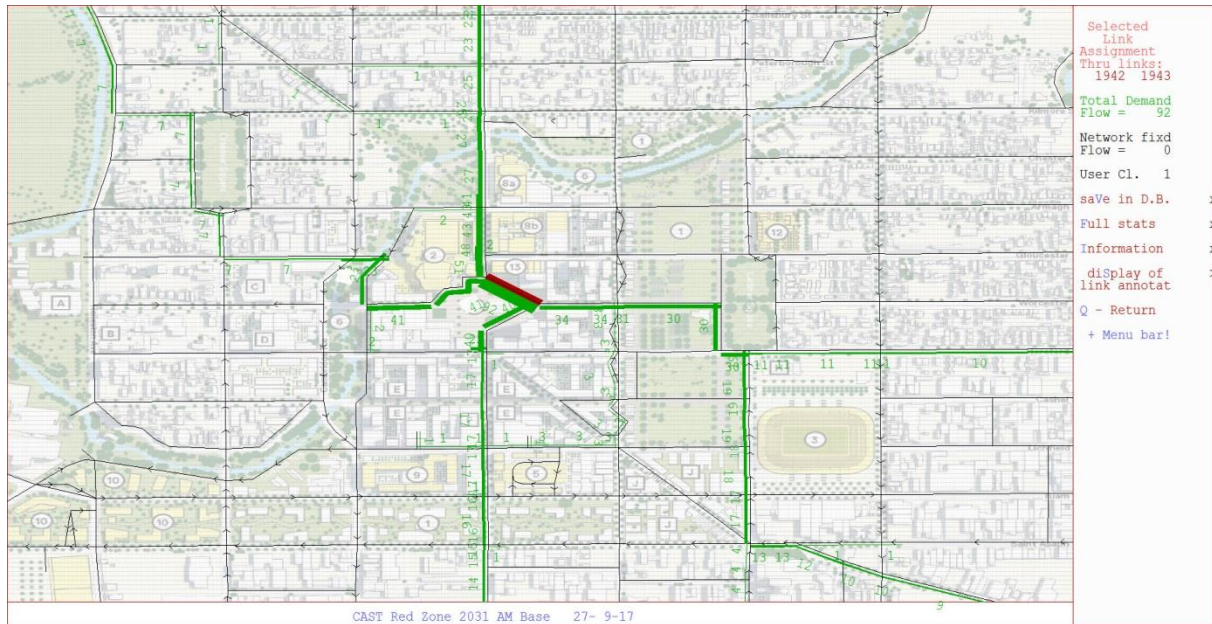
¹⁵ Average passenger trips per weekday (year to date), ECan PT dashboard, February 2017

when running on-street and mixing with general traffic, light rail is generally designated as a tram and operating speed and passenger carrying capacity are similar to buses. As such, in city-centre environments they may offer no real operational advantage over a bus unless they are in a separate right of way (which is substantially more costly). In terms of passenger capacity, light rail (in an exclusive right of way) could potentially carry 8,000 to 25,000 passengers per day. Many light rail systems do, however, operate at the low end of this capacity and a practical demand of 10,000 passengers per day is considered to be viable).

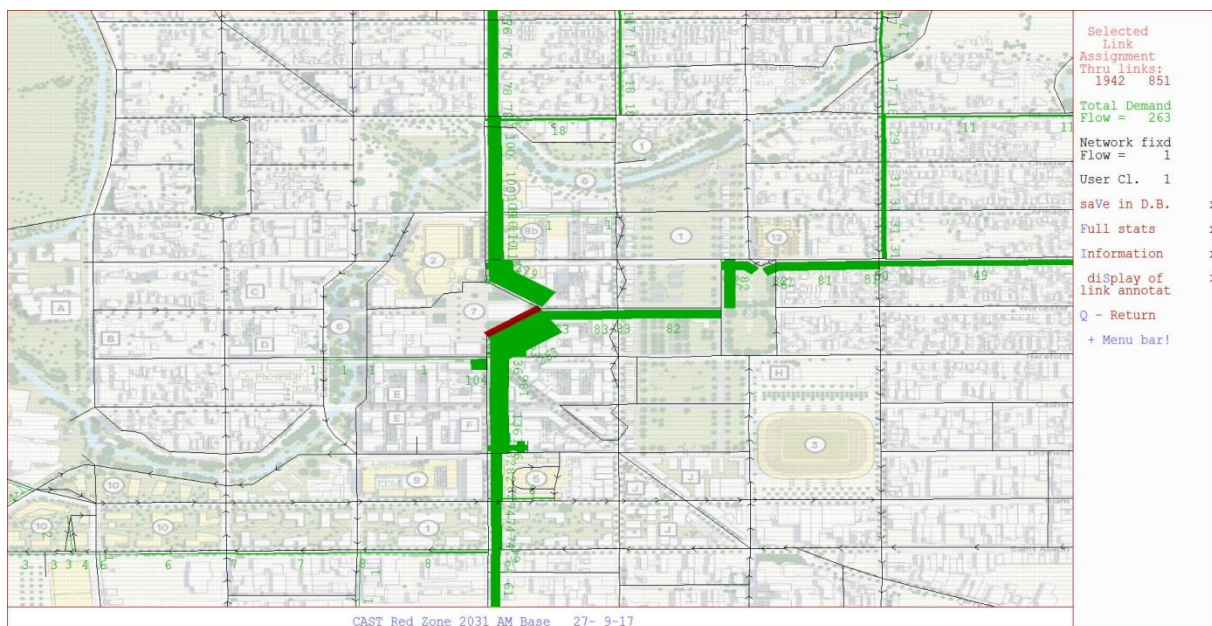
- 5.4.10 It is therefore apparent that the passenger numbers to support anything beyond a bus based system to serve the Central City (and Cathedral Square in particular) are a long way off; beyond the current planning forecast horizons (2041).
- 5.4.11 However, key corridors to (and within) the Central City should therefore be preserved to maintain flexibility to introduce each of the stages identified, right up to including rail as a means of long-term future proofing. Colombo Street may be well placed in that regard.

APPENDIX A – Select Link Analysis of Traffic through Cathedral Square

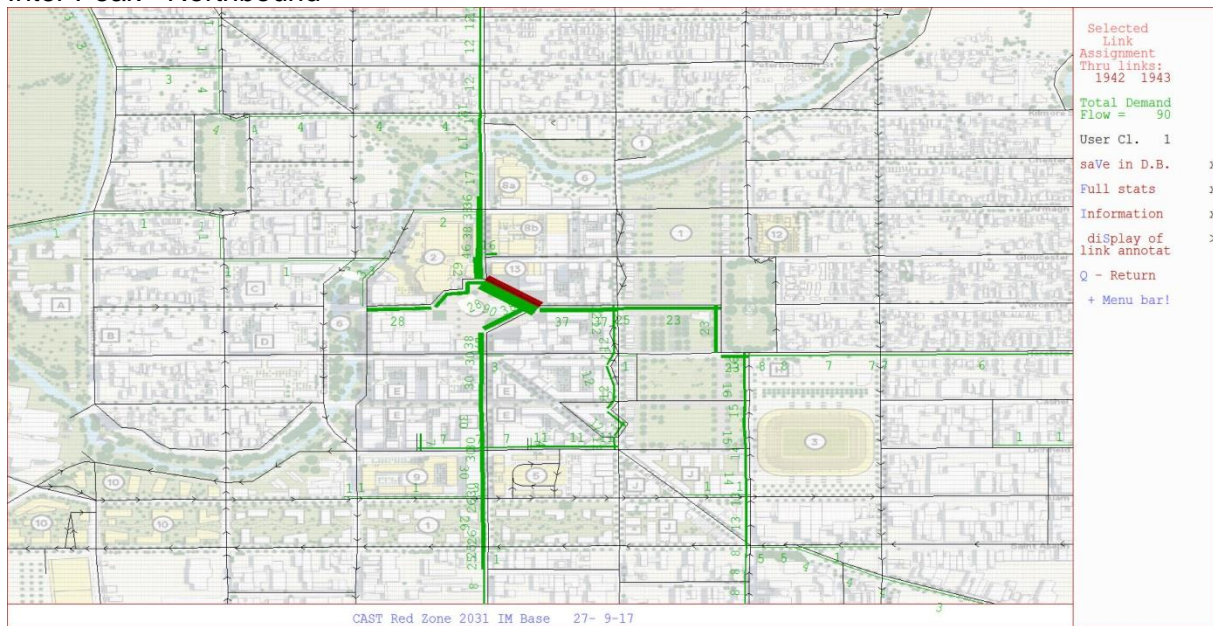
AM Peak - Northbound



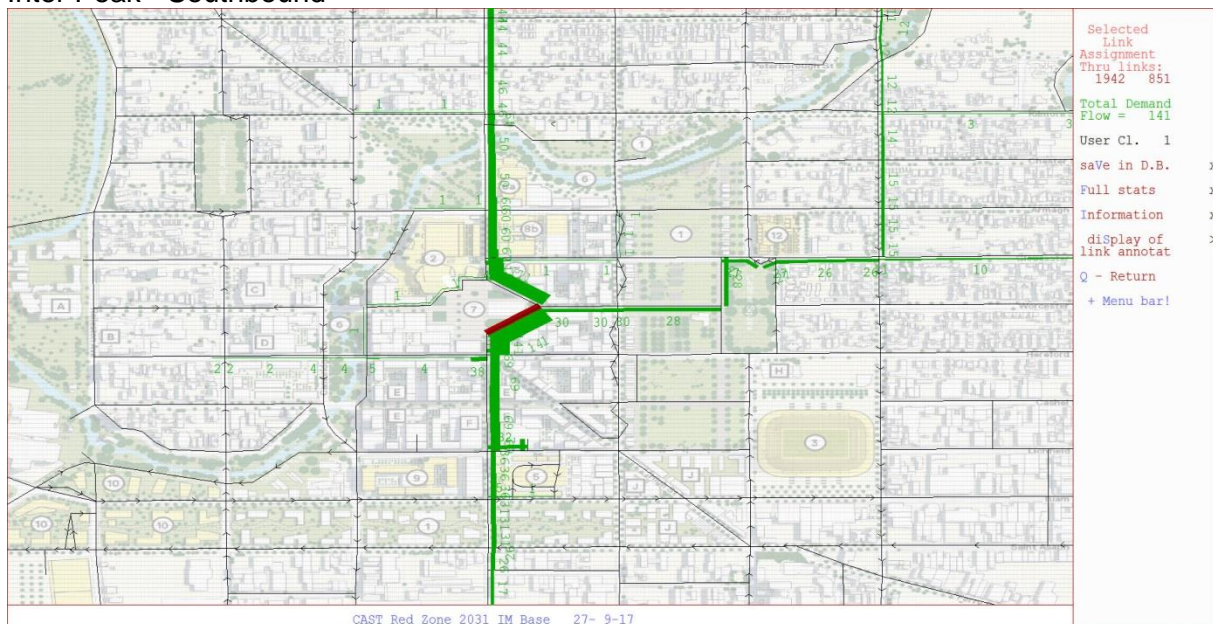
AM Peak - Southbound



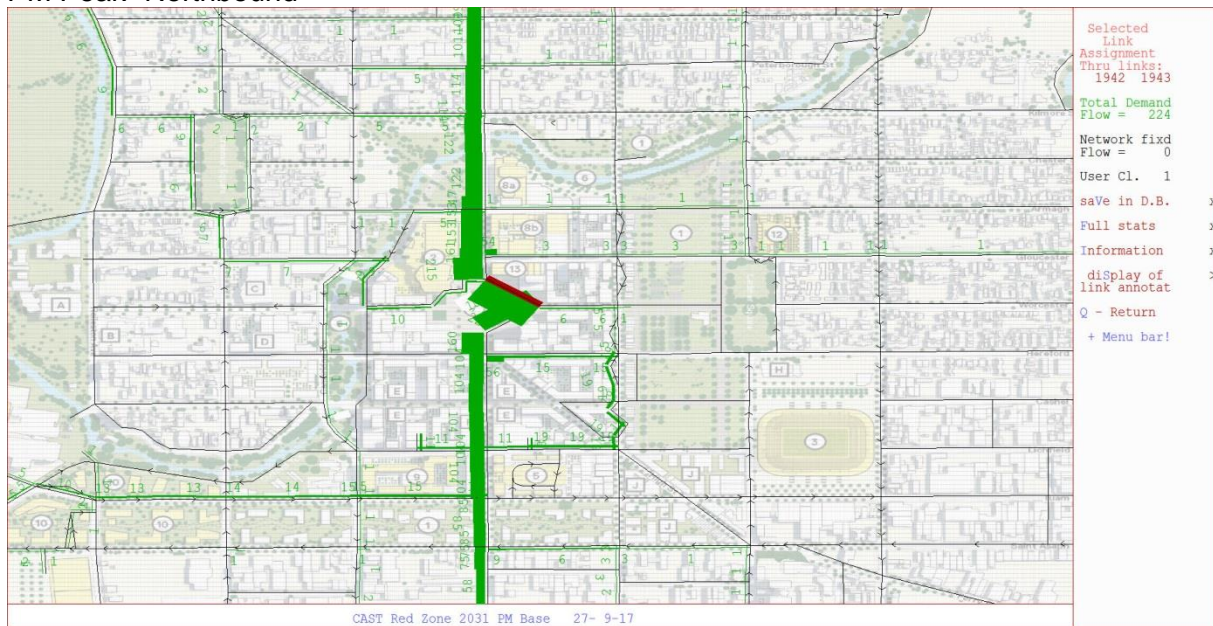
Inter Peak - Northbound



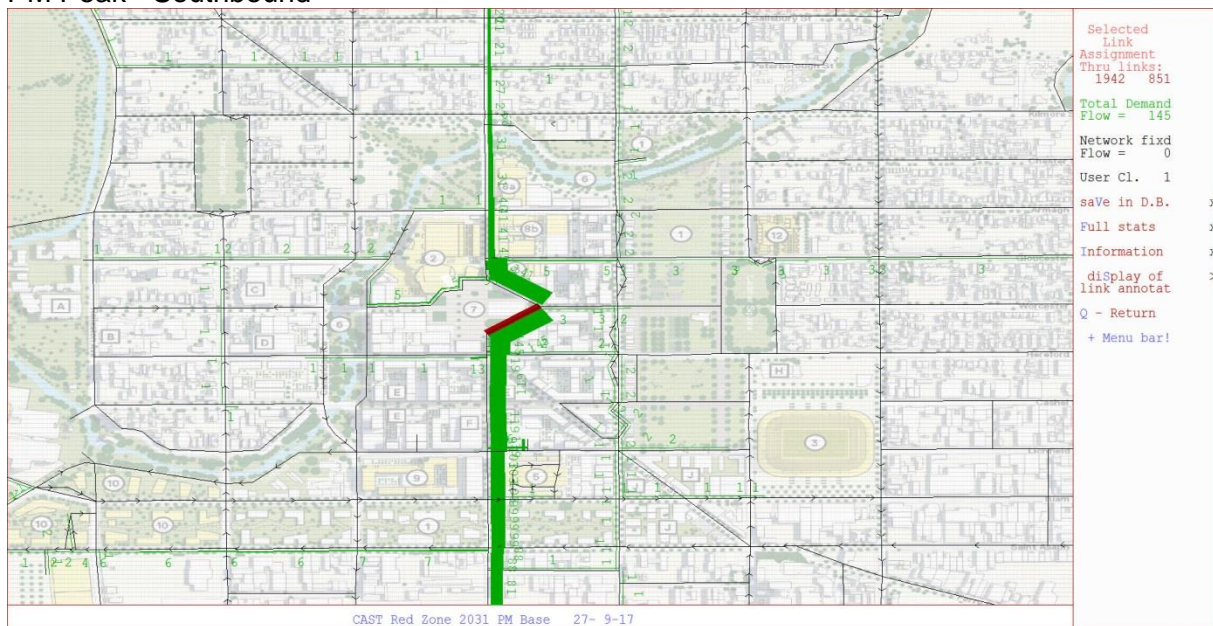
Inter Peak - Southbound



PM Peak- Northbound

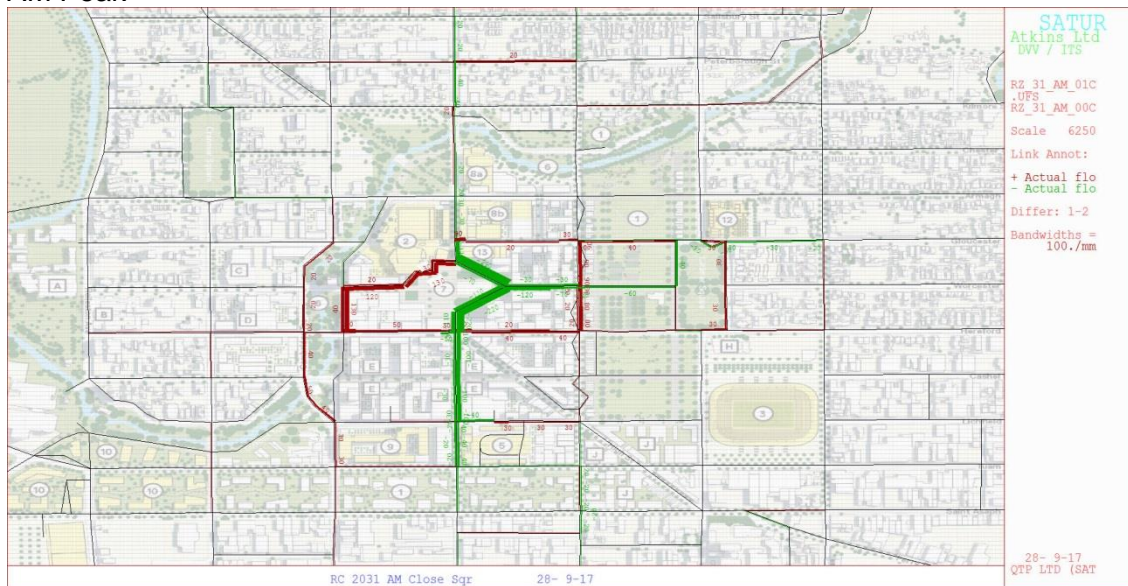


PM Peak - Southbound

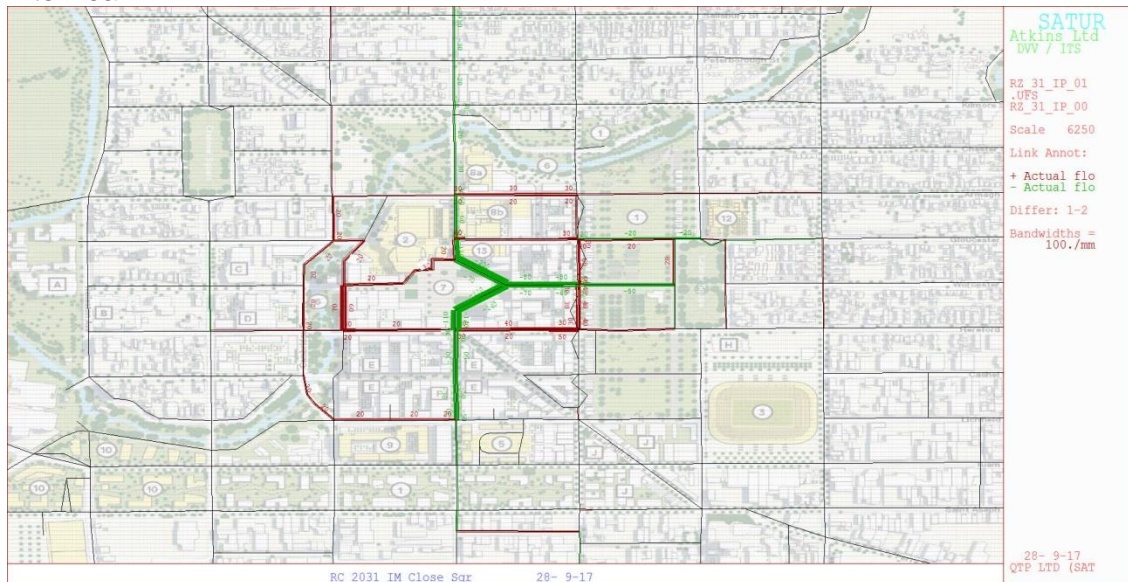


APPENDIX B – Change in Traffic – Closing Colombo Street Through Cathedral Square

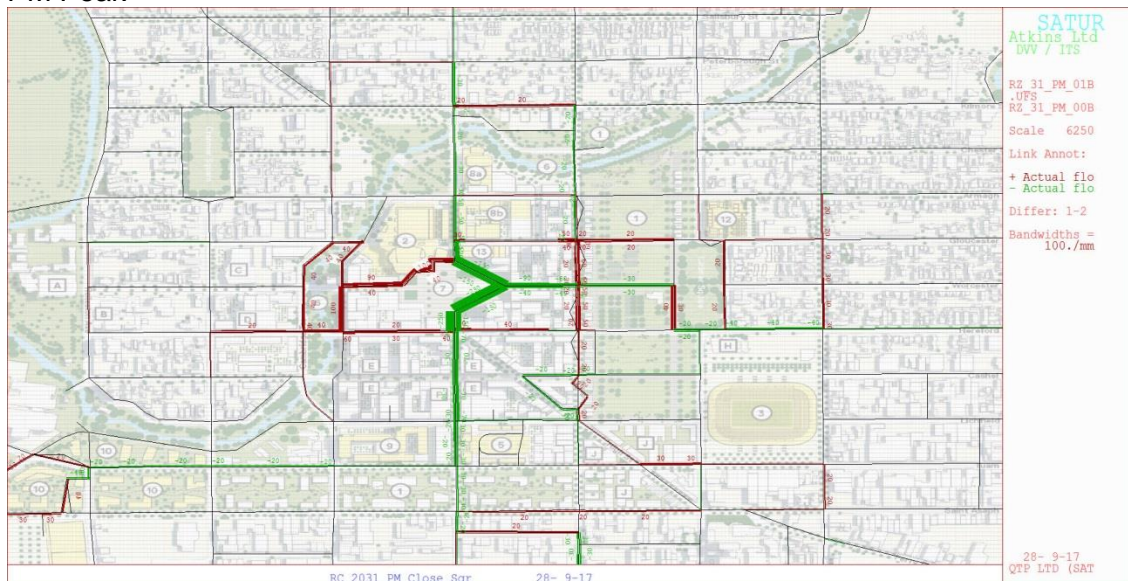
AM Peak



InterPeak



PM Peak



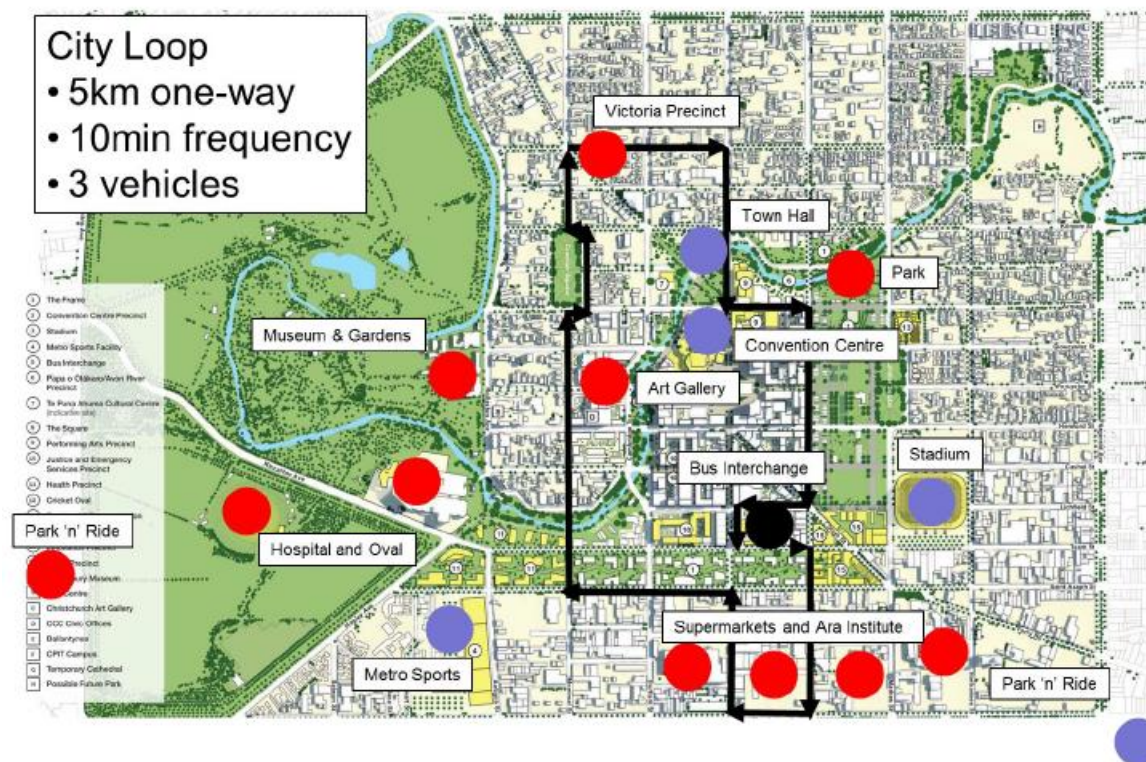
APPENDIX C – Inner City Shuttle Service Options Presented to Council

Original Shuttle Route (Pre Earthquake):



- 4.2km
- 10min frequency
- 21 stops
- 3 vehicles

Attachment 3 – Option 2(D and E) – Inner City Loop



Attachment 4 – Option 3(D and E) – Inner City Loop Plus Park and Ride Loop

