WELLINGTON LIGHT RAIL TRANSPORT INTEGRATION
TE ARO TO NEWTOWN

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Introduction

MRCagney is working with the Let’s Get Wellington Moving joint initiative to develop scenarios for a future integrated light rail and bus networks.

This multi-modal transport and street design study for the light rail (LRT) line between Te Aro and Newtown centred on transport integration of the proposed LRT alignment and bus routes.

The analysis considers how the LRT alignment can be coordinated with other transit modes to deliver an integrated transport solution. In addition to designing public transport, walking and cycling networks which encourage fewer car trips, solutions presented are focused on catalysing appropriate urban redevelopment and land use intensification.

This study covers the following:

- LRT and bus corridor alignments and interchange points.
- LRT and bus stations and stop locations.
- Street corridor designs and stop configuration (i.e. multi-modal corridor designs).
- Traffic circulation requirements and opportunities.
- Cycleway network integration.
- Walking connectivity and station access.
- Urban design interventions and opportunities.

The study focuses on three corridors:

- Taranaki Street, Te Aro
- Adelaide Road, Mt Cook
- Riddiford Street, Newtown

This report was prepared by:
Nicolas Reid, nreid@mrcagney.com
Kent Lundberg, klundberg@mrcagney.com
Lukas Adam, ladam@mrcagney.com
Ellie Craft, ecraft@mrcagney.com
Adjust the bus network to leverage the speed, capacity and reliability afforded by Light Rail Transit:

- Minimise LRT running on the same corridor as trunk bus routes.
- Convert local buses and expresses to LRT feeders. Create high frequency shuttles to closest LRT station instead of running local buses at low frequency to the city.
- Keep trunk buses running on separate/parallel corridors, do not force transfers of major passenger flows.
- Ensure major destinations (i.e. City Centre, Hospital, Universities) are no more than one transfer away.
TE ARO
PT Network Concept

Through Te Aro the No.1 bus (Island Bay via Massey University) and the No. 21 bus (Victoria University/Lyall Bay) bus routes converge with the light rail service on Taranaki Street.

Two light rail stops are located in Te Aro - one very close to Courtenay Place and the other midway between Vivian Street and Karo Drive. Depending on the ultimate location decision, the stops will be between 600m - 800m apart.

The No. 1 and No. 21 bus service stops are spaced closer together (about 400m apart.) There would be three pairs of bus stops in the area, one near Courtenay Place, one near Ghuznee Street and one between Vivian Street and Arthur Street.

Connections between modes is a fundamental feature of the light rail network design. To enable seamless connections between public transport modes, a light rail to bus interchange is required at Courtenay Place. An example of the importance of a multimodal station is a user travelling from downtown Newtown to Victoria University can take light rail up until Courtney Place and can then have an easy transfer to the No. 21 bus up to the University.
Why Transit Streets Matter

Transit-oriented streets increase road capacity. Vehicular priority is shifted from cars to public transit unlocking more space to be given to people walking, parklets, plazas and people riding bikes. Transit streets maintain local access for service and delivery movement while reducing through movement of cars, reducing potential mode conflicts.

Building Access is Maintained

All building access is maintained through the use of left-in and left-out turns.

No Through Traffic

General traffic is restricted along Taranaki Street. Through traffic is forced off Taranaki Street with strategically located left turn only lanes. Note that right-turns over light rail requires traffic signals. Camera technology can enforce restrictions.

One-way and Two-ways

To enable the traffic circulation to work, some streets will be converted from one-way to two-ways and others from two-ways to one-way.

Service and Delivery, Mobility

Service and delivery is improved with reduced general vehicle congestion. Short term parking is
Wellington Light Rail - Transport Integration - Te Aro

Central city circulation

Focused traffic

Accessibility is maintained for all modes within the city. Although it will take a little longer than currently for people who travel by car, people will quickly adapt new travel patterns by using alternative modes or alternative routes. For people accessing destinations on and near Taranaki Street their journeys will change. For example some right turns will become left-left-left turns.

Through traffic will not be permitted along Taranaki Street. Trips that might have used Taranaki Street will have to use one of the other main north-south streets. Generally traffic will be focused on the existing arterial network. Understanding how traffic is diverted will be an important consideration.

Regular drivers would quickly learn the new traffic routes. Infrequent drivers may need to use software like Google Maps.
Corridor Capacity

Transit streets like Taranaki Street have the potential to move a significant number of people while supporting dense, attractive urban environments.

Assuming 45m light rail vehicles (300 person capacity) at 4 minute headways, the light rail system can serve 4,500 people per hour in each direction.

The proposed bus services (70 person capacity) include two frequent routes both running at 10 minute headways, the bus capacity on the corridor is 840 people per hour in each direction. This volume of buses could be increased if demand requires.

Each of the cycleways could theoretically accommodate 1000-2,000 people per hour. A high level of demand in the short term would be about 500 people per hour in each direction.

The footpath capacity could move several thousand people an hour. For simplicity reasons, 500 people/hour is used.

Using these assumptions, the total corridor capacity could be almost 13,000 people/hour.

Urban lanes with frequent signalised intersections typically move 600 - 800 vehicles per lane. Currently 4-laned Taranaki Street carries 16,000 cars on a weekday. With a rough estimate of peak hour flow being 10% of the daily traffic flow and the mean light 4 wheeled vehicle occupancy for Wellington being 1.35, it can be assumed that Taranaki street currently moves approximately 2,200 people per hour.

13,000 People per hour
(Currently: 2,500 People per hour)
Courtenay Place
Station Area Concept

The Te Aro Station block between Ghuznee Street and Courtenay Place will host an important LRT-bus interchange along the LRT route. The stop will strengthen Courtenay Place’s importance as a place and improve the condition for people walking, cycling and taking public transport.

The spaces around the station will be improved for people walking (including people interchanging between the LRT and bus lines) by reallocating space away from general traffic lanes and car parking. A new station plaza on Taranaki Street will add to the existing public spaces in Courtenay Place and Te Aro Park.

Protected cycleways will run along Taranaki Street and Ghuznee Street as core routes of the city centre cycling network. Protected intersections at both ends of the station block will facilitate safe and convenient movement for people on bicycles.

New East-West mid-block walking and cycling connections could be provided to improve connectivity to the station and pedestrian permeability by reducing distances. New links could be delivered as part of redevelopments induced by the addition of LRT.

The LRT line runs North-South through the station block, only making a minor deviation from a central alignment to accommodate other modes in the new station plaza. LRT will be given signal priority through the intersections (minimising delay) at either end of the station block while maintaining safety and convenience for people walking and cycling.

The major signalised intersection at Manners/Dixon/Taranaki and Courtenay Place is modified to prioritise LRT movements through signal phasing. Protected intersection geometry and signal phasing provides safety and convenience for people walking and cycling. Bus movements are also given a high level of service.

No. 1 and No. 21 bus routes travel alongside the LRT running through the station block and turn westward down Dixon and Manners Street respectively. The number 14 bus also crosses the LRT line. Stops for all lines are located in easy walking distance from the LRT stop.

The signalised Ghuznee Street/ Taranaki Street T-intersection prioritises LRT and cycling through movements and crossing pedestrians. General traffic is allowed to make left turns into and out of Ghuznee Street and to go straight through southbound.

General vehicle traffic receives the least priority in the station area concept design with turn restrictions discouraging through movements, minimising traffic volumes.
Taranaki Street Transit Street Concept

Taranaki Street will require careful design to accommodate all modes of transport and transform the corridor into a desirable space for people. Widths for vehicle (private vehicles and buses) carriageways, the buffer space, cycleways and the LRT lanes will need to be scrutinised to ensure that adequate footpath widths are achieved. Note that there is a flexible zone which is shown by a parked car behind a tree. Along the length of the road the flexible zone areas will be allocated to loading/drop off zones, bike parking, mobility parking, bus stops and trees.
The transit street concept presented for Wellington light rail has the following features:

**Expanded public realm**
The footpath, cycleway, and flexible zone (including street trees) extends the public realm from 2m-3m to 7m. Separation from traffic by street trees and parked cars in the flexible zone improves the pedestrian and adjacent building working experiences.

**Pedestrian clear path**
Though narrow the footpath width is functional. The dimension will allow two people to walk side-by-side comfortably. Street infrastructure and furniture (signs, poles, etc) are located in the flexible zone ensuring that a clear pedestrian path is maintained.

**Cycleway**
The cycleway is relatively narrow. Low kerb separators between the cycleway and pedestrian clear path and flexible zone allow cyclists to use the full width provided. The setback from the moving traffic makes cycling more pleasant. This distance is also useful for designing safe sideroads and intersections.

**Flexible zone**
The flexible zone hosts regularly spaced street trees. Short term parking (loading) is provided between the trees. This space can also be used for bike parking, mobility parking and street hardware. At bus stops this space is used for bus platforms.
PT Network Concept

Between the National War Memorial area and the Hospital the LRT and frequent bus corridor separates into two alignments.

The frequent bus corridor consists of the No. 1 and No. 21 buses. These buses turn off Adelaide Rd and uses Wallace Street and Taranaki Street. The two services combined provide very frequent service (5 minute headways) between Courtenay Place and the Hospital. The bus stops on this corridor should be widely spaced between 400m - 600m apart. The stops should be designed so that two buses can arrive at the same time and passengers can board simultaneously. Bus priority provisions including bus lanes, bus queue jumps and signals advances should be employed along this corridor to reduce travel delay.

The ‘Basin’ light rail stop is proposed South of the Basin Reserve. The stop location would catalyse residential redevelopment in the area while serving a dense catchment of people and jobs.

To accommodate cycling and other low speed transport (cargo bikes, electric scooters etc), it is recommended that a 25m road reserve is established. This would require approximately 3m of property acquisition on the eastern side of Adelaide Rd. This would require removing a handful of buildings. Most of the existing buildings are already set back from the street to allow this land take.
Basin Station Area Concept

The ‘Basin’ stop will be a catalyst for urban redevelopment in Mt Cook.

Under this concept, to accommodate the central LRT stop, LRT lanes, narrow traffic carriageways, cycleways and footpaths, acquisition of parts of adjacent properties will be required. This could happen on either side of the LRT line, or on both sides. Note that lower levels of separation for LRT would result in less property impact but this would adversely affect LRT travel speeds and reliability and would make it harder to achieve project objectives. The plan on this page indicates where property acquisitions and building removals will be required.
Wellington Light Rail - Transport Integration - Mt Cook

Basin Station Corridor Widths

Through Mt Cook, the LRT line will require a minimum general cross section of 25m. At stops, this widens to 28m to accommodate platforms.
** Adelaide Road Transit Street **

Specific blocks on Taranaki and Riddiford Streets will be laid out as typical designs, including the spatial arrangement of footpaths, cycleways, public transport running ways, traffic lanes, loading and parking bays (as applicable). The designs will be communicated using typical mid-block plans and section graphics.
Station Concept (Adelaide Road)

The Adelaide Road stop will require a similar cross section to the Hospital stop. Land take is required to make this stop possible.
NEWTOWN
Three light rail stops are located in Newtown— one at the hospital, one in the centre of Newtown and one at the Zoo. The stops would be about 750m apart.

Trunk bus routes are run on separate corridors to light rail where possible. South of The Basin, light rail uses Adelaide Road and then Riddiford Street.

Through Newtown, the frequent No. 1 (Island Bay) bus route continues to uses Adelaide Rd south of the Hospital and Wallace Street North.

The frequent No. 21 (Lyall Bay) bus route is moved off Riddiford St and instead uses Owen and Mein Street and eventually converges with the No. 1 bus on Adelaide Rd. Note that under this concept the impacts of running buses on narrow residential streets would need to be further investigated.

A transit interchange is required near the hospital to enable seamless connections between all transport services in particular between light rail and frequent bus routes.

Less frequent local bus collector services (No. 23 and No. 29 buses) serve Kingston, Vogeltown, Melrose, Southgate, and Houghton Bay. Some of these services might terminate at the Hospital interchange requiring terminal facilities (turn around, layover space, etc).
The Hospital precinct transport interchange straddles the triangular block between Riddiford Street and Adelaide Road. Public realm design will allow the interchange to function as a contiguous station plaza.

The LRT stop is immediately in front of the Hospital’s main entrance on Riddiford Street, using an island platform to minimise its width. Two sets of three inline bus stops are provided on Adelaide Road for services in both directions.

Mid-block pedestrian crossings are provided at either ends of the LRT platform and between the bus stops. Pedestrian crossings facilitate transfers between LRT and bus services and improve road crossing.
Through Newtown, the LRT line will require a minimum general cross section of 25m. At stops, this widens to 28m to accommodate platforms.

The configuration of parcel boundaries outside the Hospital means that land take from the Hospital is required. However the land affected is land that is currently occupied by footpaths, parking and traffic lanes. There will be no impact on hospital buildings.
Typical Mid-Block Street Design Concept (Riddiford Street)

Specific blocks on Taranaki and Riddiford Streets will be laid out as typical designs, including the spatial arrangement of footpaths, cycleways, public transport running ways, traffic lanes, loading and parking bays (as applicable). The designs will be communicated using typical mid-block plan and section graphics.
Station Concept (Riddiford Street)

Specific blocks on Taranaki and Riddiford Streets will be laid out as typical designs, including the spatial arrangement of footpaths, cycleways, public transport running ways, traffic lanes, loading and parking bays (as applicable). The designs will be communicated using typical mid-block plan and section graphics.
The cycleway concept proposed here depicts how the light rail transit streets can form the backbone and catalyst of a central city cycle network.

A cycleway following the proposed light rail alignment would create an ideal core cycle route through the central city and would also connect the Basin and and Newtown to the downtown.

Ultimately the central city requires a fine grid of cycle-friendly streets including Kent and Cambridge Terraces.
BENCHMARKS
Benchmark

Ceintuurbaan, Amsterdam, Netherlands

Ceintuurbaan in Amsterdam was recently reconstructed to include separated cycleways. Previously there were only painted cycle lanes adjacent to traffic. Configurations where cycleways are separated by a car parking buffer are becoming standard treatments in state-of-the-art transit streets around the world.
**Benchmark**

**King Street Pilot Project, Toronto, Canada**

The King Street pilot project in Toronto improves transit reliability, speed, and capacity. The pilot project changed how King Street works by not allowing private vehicles through intersections and instead giving priority to streetcars. The Pilot launched on Sunday, November 12, 2017. The scheme has been wildly successful, slashing public transport travels times and improving public life and retail spend.

“Cars are not banned on King Street. While some through movements are restricted, it’s now easier for vehicles needing local access to get where they need to go on King Street. All local access to parking garages, condominiums, businesses, etc is being maintained, and designated passenger loading zones and taxi stands are available at all times.” (City of Toronto website)

The Taranaki Street transit street uses a similar technique as this project. Cars can no longer pass through the street from end-to-end, instead they are forced off at key locations.