Pontiac Land Group

The Sandstone Precinct

Stage 2 DA - Traffic Impact Assessment

Issue | 25 October 2016

Job number 248547

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Contents

1 Introduction

1.1 Background

This report has been prepared by Arup on behalf of Pontiac Land Group in support of a Stage 2 State Significant Development Application (SSDA) to be submitted to the Department of Planning and Environment (DP&E). The DA relates to the proposal to secure approval for development of the subject site at 23-33 Bridge Street (Lands Building) and 35-39 Bridge Street (Education Building), Sydney (herein referred to as the 'Sandstone Precinct'). This report covers the detailed design elements and physical works required to support the proposed application in relation to traffic and transport.

1.2 Site Description

The development site comprises two buildings (Lands Building and Education Building) with frontages to Bridge Street in the northern CBD area, with a combined site area of approximately 6,000m^2. These building currently function as Government departmental offices.

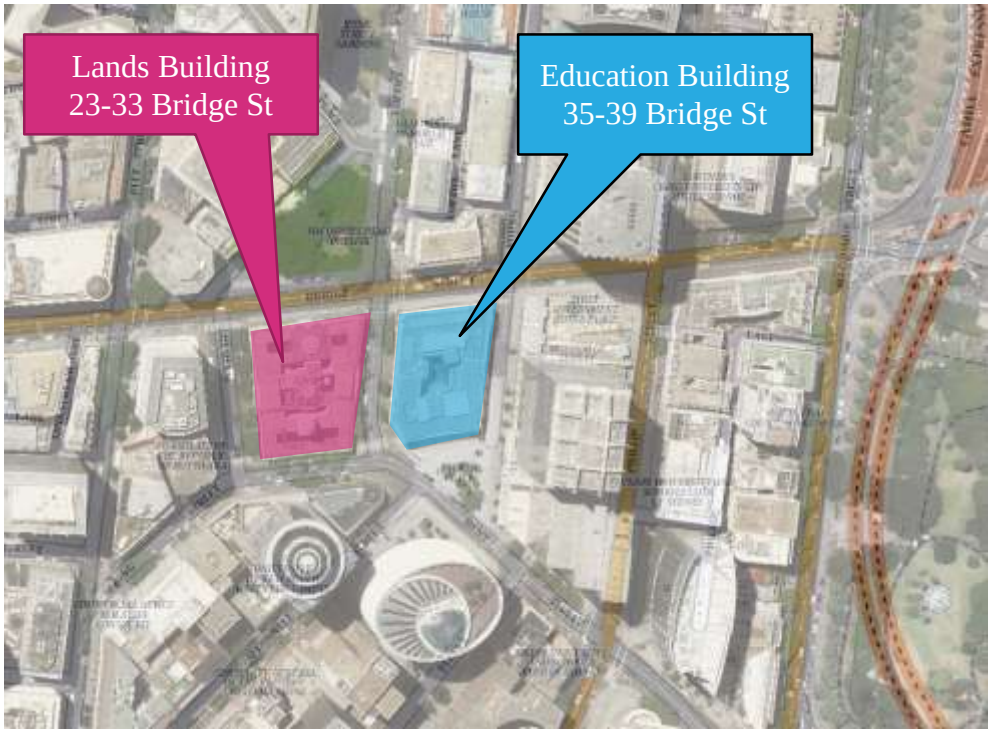

Figure 1 Site Overview

1.3 Study Objectives

This transport assessment responds to the Secretary's Environmental Assessment Requirements (SEARs), as outlined below:

Traffic and Parking report to address access to public transport, number and functionality of parking space, servicing and loading dock strategy/management plan, hotel pick up and drop off. To address conditions B14 and B15.

SEARs requirements: Traffic Impact Assessment must include:

- details of the current and likely estimated future daily and peak hour vehicle, public transport, pedestrian and bicycle movements from the site;
- an assessment of the impact of the proposal on existing traffic and transport performance and safety at key intersections in the area, and likely impact of the proposal on bus operations (stops, routes and parking) and taxi parking in the surrounding streets;
- an assessment of proposed temporary or permanent changes to transport and access on surrounding streets, and in particular the implications of the changes to the road network in Farrer Place and surrounding streets;
- details of existing and proposed vehicular access and an assessment of any potential impacts, such as potential pedestrian, cyclist and bus conflict from introducing vehicles into Farrer Place;
- an indication of any road/intersection upgrades required as a result of the development, supported by appropriate modelling and analysis, and any other measures to mitigate impacts of the development;
- details of the existing and proposed vehicle, bicycle, motorcycle, taxi, bus and coach parking, and justification of proposed parking against relevant guidelines/standards and Australian Standards;
- proposals to encourage employees and guests to make sustainable travel choices, such as walking, cycling, public transport and car sharing; and
- proposals for safe and efficient access to loading, deliveries and servicing of the development.

Additional items have been raised in the letter from City of Sydney dated 6 June 2016 which states the following:

- Confirmation of vehicular drop-off arrangements;
- Further consideration of narrowing drop off lane and the safety of this arrangement for pedestrians;
- The design of Bent Street must maintain 2 westbound lanes on the approach to O'Connell Street and past Loftus Street. This is to ensure there is sufficient room for a vehicle to pass a left turning vehicle into O'Connell Street or a right turning vehicle into Loftus Street;
- Only a single eastbound traffic lane and kerbside parking (taxis) need be retained; and

- Any changes to the existing taxi parking (ie. Reduction in length or relocation) will require endorsement by the NSW Taxi Council and the City's Local Pedestrian Cycling and Traffic Calming Committee.

1.4 Consultation

Meetings relating to traffic and transport were held with the City of Sydney and the CBD Taskforce, attended by the design team as follows:

Thursday 12 May 2016
City of Sydney
Bridget Smyth, Col Warne, Amy Bendall, Christopher Corradi, Andrew Aspden

Tuesday 24 May 2016
CBD Taskforce (TfNSW and RMS representatives)
Grant Knoetze, Francois LaRue, Heather Gavriel, Katherine McCray

6 June 2016
City of Sydney letter received which outlined the traffic requirements for the Farrer Place drop-off.

Comments and inputs from these meetings have been incorporated into the design and it is expected that further meetings would occur during the detailed design process.

2 Existing Transport Conditions

2.1 Existing Travel Patterns

An assessment of existing travel patterns has been conducted using 2011 Journey to Work (JTW) data for the relevant travel zones[1] surrounding the Sandstone Precinct. In this zone more than 1,000 employees were recorded travelling to work on the day of the 2011 Census, with their travel modes summarised in Figure 2.

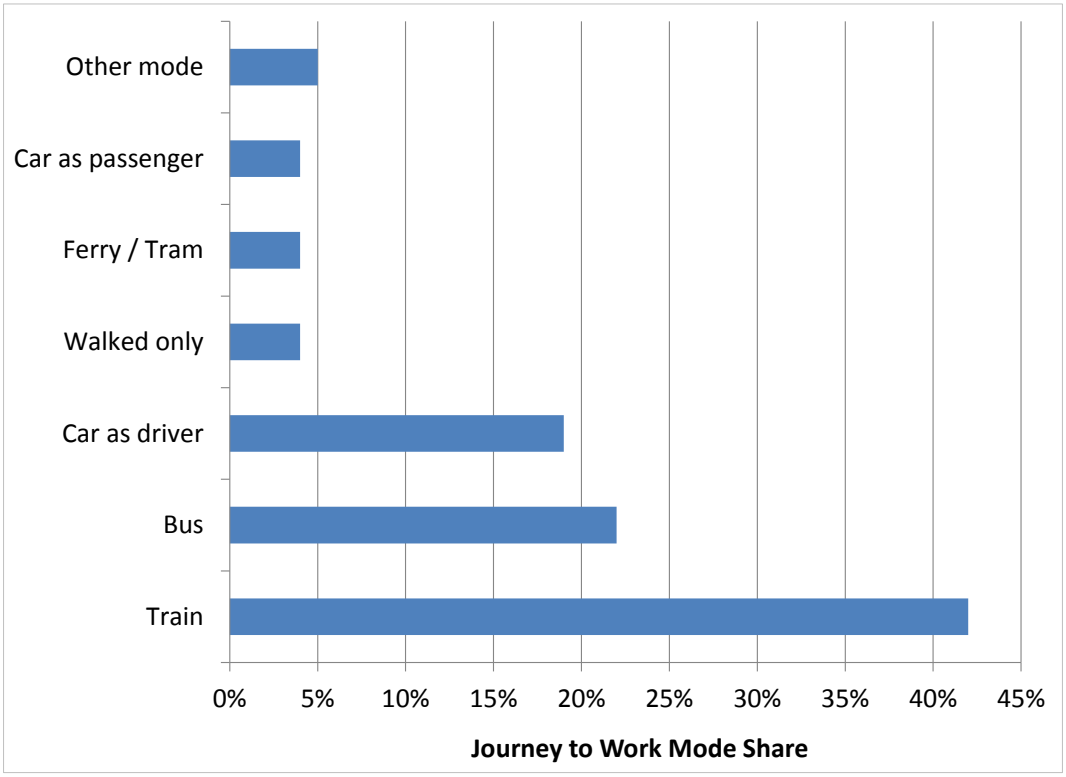

Figure 2 Existing Journey to Work Data for the Sandstone Precinct

The data indicates the significant majority of people working in Sandstone Precinct arrive via non-car modes of transport, mostly bus and train. The proportion of private vehicle trips is less than 20% - reflecting the good public transport availability in the precinct.

Located in a high public transport accessible area and with minimal car existing car parking on these sites, it is likely that car mode is less for the Sandstone Precinct than the wider area. This trend for employee access by public transport will have strengthened in recent years as CBD access by private vehicle becomes more constrained.

The origin location of those arriving to the precinct by private vehicle was assessed to determine the key approach and departure routes utilised. This directional split can be summarised as follows:

[1] Travel zones 0042 and 0043 utilised for the analysis

- Arriving from the north: 42%
- Arriving from the south: 15%
- Arriving from the east: 22%
- Arriving from the west: 20%

2.2 Vehicular Access

The Education Building has a vehicle entry off Loftus Street which acts as both a loading area and on-site parking for up to 12 cars. The Lands Building has access to a small loading dock on Gresham Street at the corner with Bent Street.

The current vehicular access points into the two buildings, as well as the indicative footprint of the parking and loading areas, are illustrated in Figure 3.

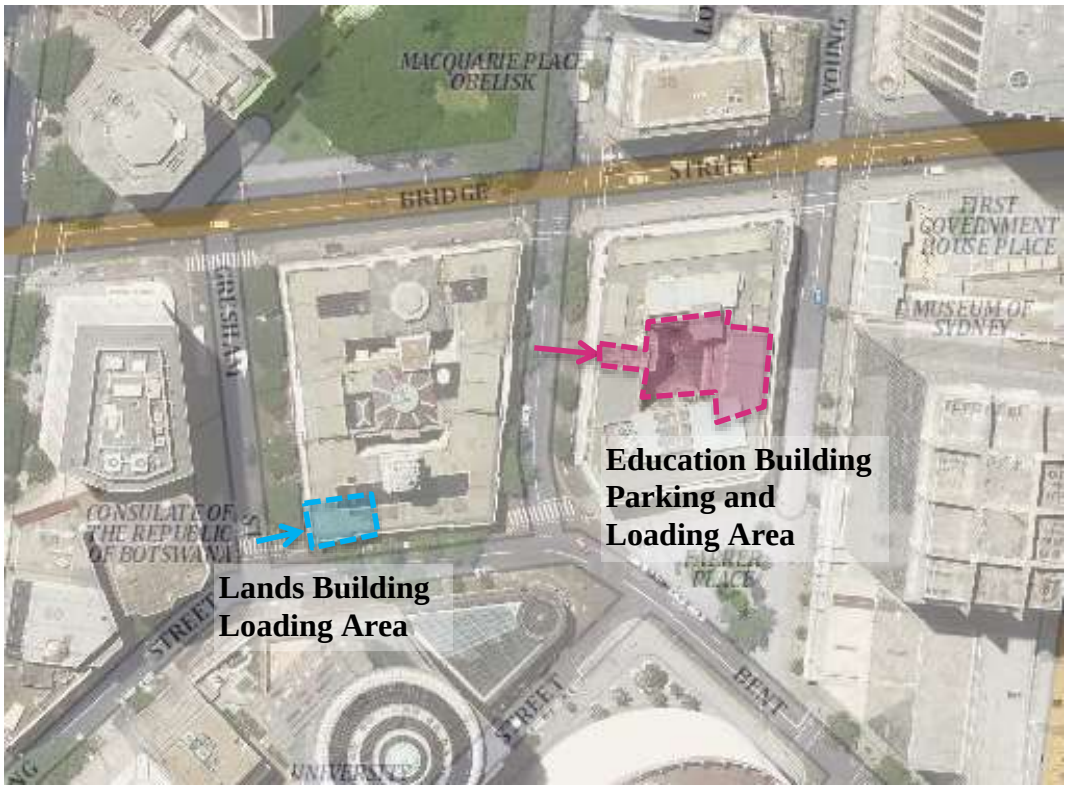

Figure 3 Existing Vehicle Access

2.3 Traffic Volumes

Traffic counts were undertaken at intersections adjacent to the Sandstone Precinct on Wednesday 6 November 2013 (typical weekday outside of school holidays). Counts were undertaken during the following time periods:

- AM Peak: 7am – 9am
- PM Peak: 4pm – 6pm

The AM/PM peak hour was identified to be between 8am – 9am and 5pm – 6pm respectively. The following intersections were surveyed:

- Bridge Street / Pitt Street;
- Bridge Street / Gresham Street;
- Bridge Street / Loftus Street; and
- Bridge Street / Young Street

A summary of traffic volumes in the peak hours is provided in Figure 4.

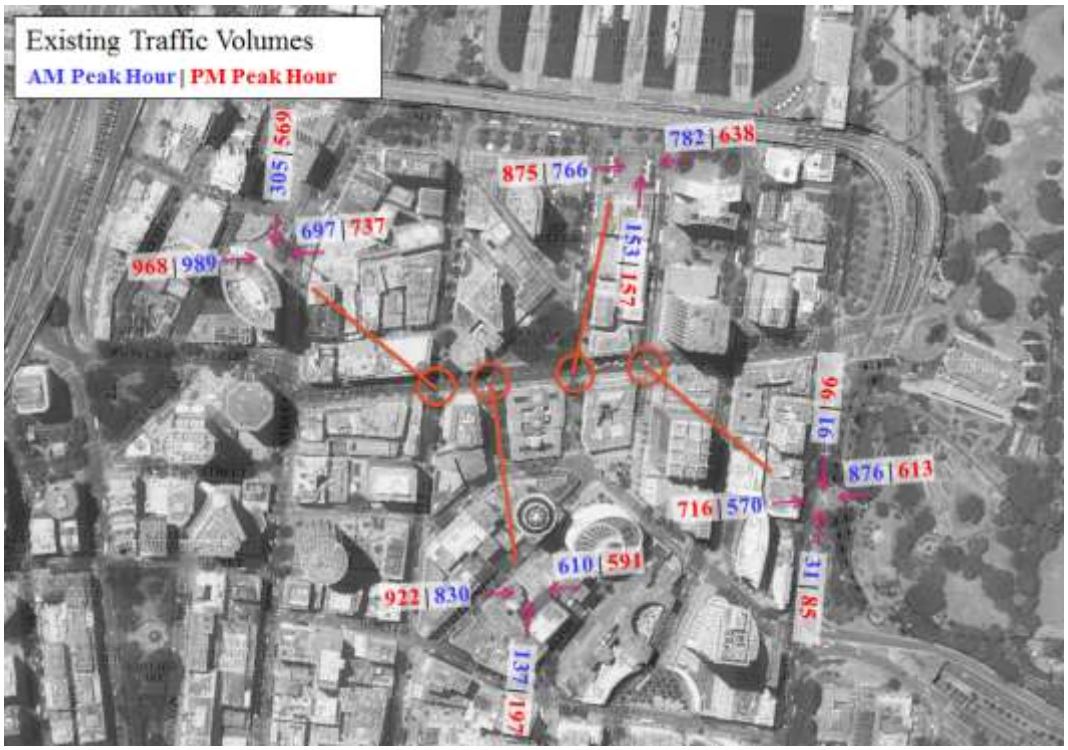

Figure 4 Traffic Survey Results

The results demonstrate Bridge Street carries the majority of traffic in the precinct, with over 900 vehicles travelling eastbound out of the city in the PM peak hour. Eastbound traffic volumes gradually reduce along Bridge Street towards Macquarie Street, with less than 800 eastbound vehicles recorded at the Bridge Street / Young Street intersection. By comparison, Loftus Street and Gresham Street are utilised by a minor number of vehicles, with less than 200 two-way vehicle movements recorded in both peak hours.

2.4 Parking

12 on-site parking bays are currently provided in the Education Building. No on-site parking is provided in the Lands Building.

2.5 Public Transport Access

The Sandstone Precinct is served by the high quality Circular Quay public transport interchange – which provides an environment where passengers may easily transfer between bus, rail and ferry modes. Over 550,000 passenger journeys are made through the interchange every week[2].

It has previously been identified that public transport accounts for approximately 70% of all work related trips to the area. A summary of the key public transport modes serving the Sandstone Precinct is described below.

2.5.1 Train

Circular Quay Railway Station is located approximately 250m away from the precinct, equating to a walk of less than 5 minutes from the centre of the platform. The station is on the Bankstown, Airport/East Hills, Inner West and South lines, with services running every few minutes in each direction during the morning and afternoon peak hours.

Other heavy rail stations within a 10 minute walk of the precinct include Martin Place and Wynyard Station, which provide access to the Eastern Suburbs and North Shore railway lines respectively.

2.5.2 Bus

The Sandstone Precinct is currently served by a large number of bus routes covering the Eastern Suburbs, Western Suburbs and Southern Region services. Since the closure of George Street to bus routes, all services travel via Elizabeth Street to access Circular Quay. There are also services utilising Bent Street, Pitt Street and Hunter Street in a loop. A number of north shore services utilise a bus stop in Loftus Street as their starting point after layover in Gresham Street.

The existing bus arrangements provide bus stops on Bridge Street, Gresham Street and Loftus Street directly adjacent to the two buildings.

The major eastern and southern suburbs bus services are illustrated in Figure 5 and lower north shore services are shown in Figure 6.

[2] Transport for NSW Press Release – May 2011

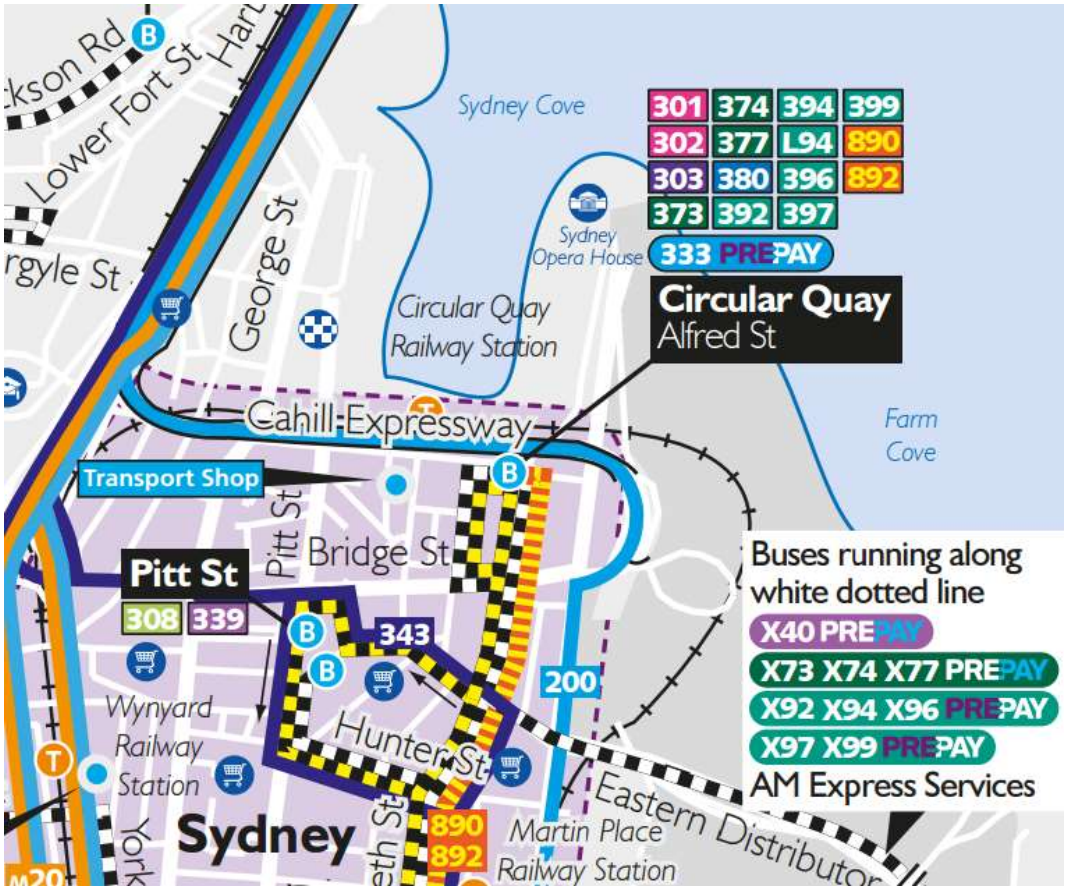

Figure 5 Eastern and Southern Bus Routes Serving the Sandstone Precinct

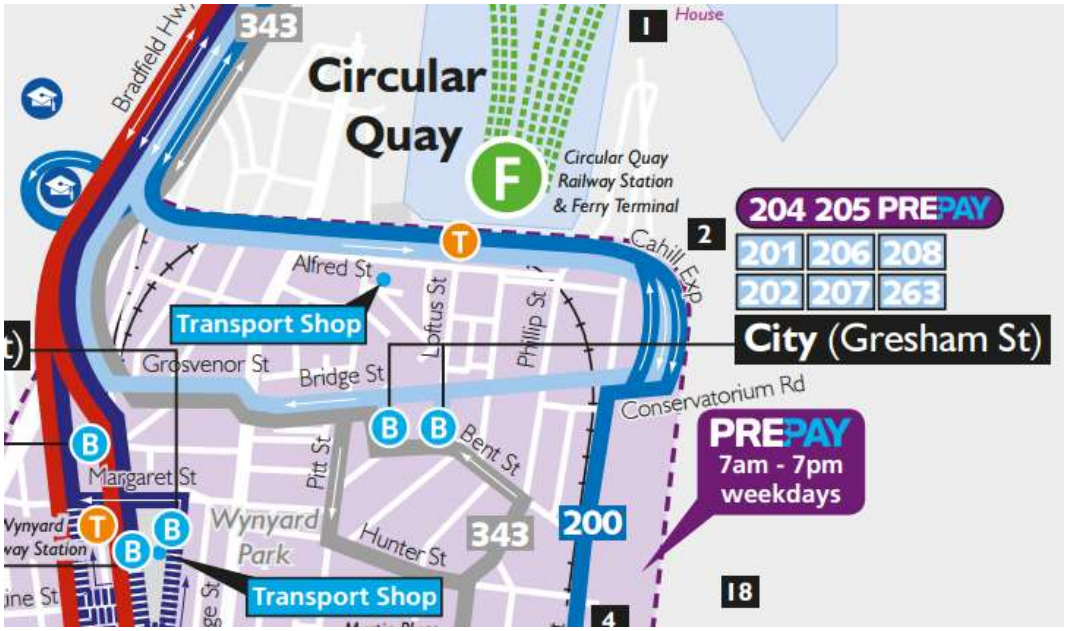

Figure 6 Lower North Shore Bus Routes adjacent to the Sandstone Precinct

2.5.3 Ferry

Located within a 5 minute walk of the Sandstone Precinct, Circular Quay provides over eight regular ferry routes serving the Eastern Suburbs, lower North Shore (Manly, Taronga Zoo, Mosman and Neutral Bay) and wharves along the Parramatta River area.

2.6 Pedestrian Access

The Sandstone Precinct is well connected via a network of good quality, wide pedestrian footpaths with signalised crossings of main roads. Zebra crossings are provided on Bent Street at both Loftus Street and Gresham Street, as well as on Gresham Street at Bridge Street. This provides for efficient pedestrian movements in the precinct. Adjacent to the end of the Education Building, the southern end of Young Street is a pedestrianised environment conducive to walking trips.

2.7 Pedestrian Volumes

Pedestrian volumes were collected in the precinct on Wednesday 6 November 2014 in the AM and PM peak hours. The data indicates pedestrian volumes in the precinct are significant, approaching 1,000 pedestrian movements per hour across certain intersection legs - reflective of the high employment population of the area. A summary of existing pedestrian flows is illustrated in Figure 7.

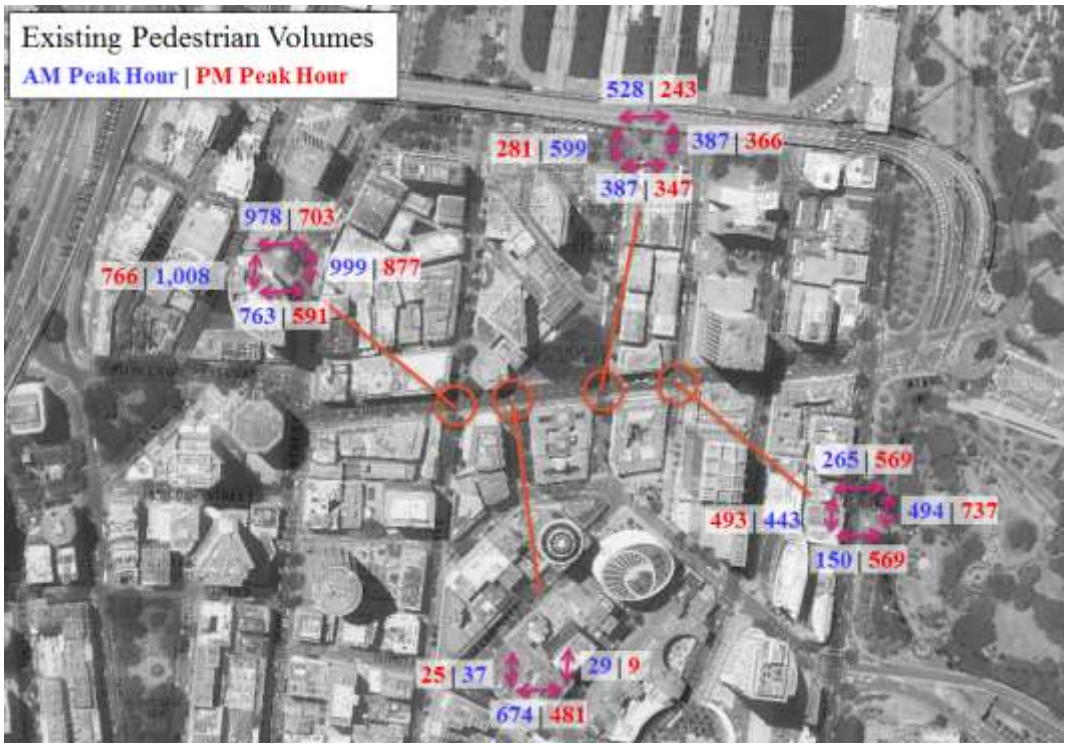

Figure 7 Existing Pedestrian Volumes

2.8 Cycling Network

There are a number of key cross-city cycle routes which form part of City of Sydney Council's new cycling network which provide linkages to the Sandstone Precinct. These routes are as follows:

- Kent Street (separated, bi-directional cycleway)
- King Street (separated, bi-directional cycleway)
- Pyrmont Bridge (shared cycle path)
- Macquarie Street (mixed street environment)
- Alfred Street north (shared cycle path)
- College Street (separated, bi-directional cycleway)

The Sydney City Centre Access Strategy was released by the NSW Government in December 2013. The strategy outlines the future city centre cycleway network to encourage growth in cycling and reduce pressure on the public transport system. The future city centre cycle network is shown in Figure 8, and includes:

- Extending the Kent Street cycleway south to Liverpool Street
- Construction of a bi-directional cycleway on Liverpool Street
- Construction of a bi-directional cycleway on Castlereagh Street and Pitt Street, providing a new north-south connection through the CBD
- Extending the existing King Street cycleway to Castlereagh Street
- Extending the east- west cycleway along Park Street to Castlereagh Street

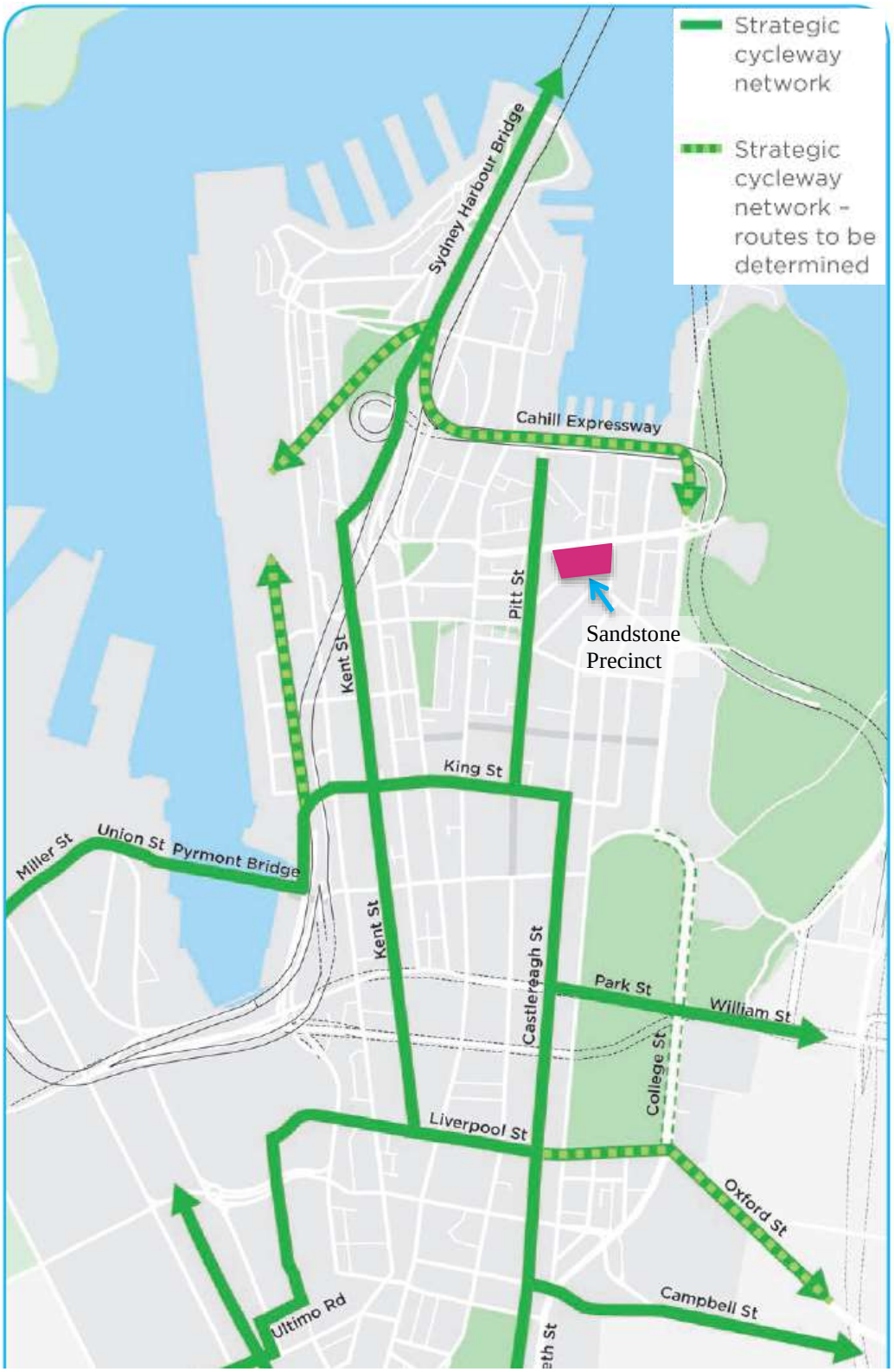

Figure 8 Strategic Cycleway Network Map

Source: Sydney City Centre Access Strategy (NSW Government, 2013)

3 Development Proposal

3.1 Description

The Stage 2 SSD proposal, designed by Make Architects, BAR Studio and ASPECT Studios with our traffic input, is detailed in the submitted plans and Statement of Environmental Effects that accompany Application SSD 7484.

The Stage 1 Approval SSD 6751 was granted by the NSW State Government as follows:

Stage 1 Concept Proposal for tourism and visitor accommodation including associated ancillary uses for:

- Adaptive reuse of the Lands Building and Education Building for tourist accommodation, and ancillary uses;
- An extended building envelope with three to four additional storeys above the Education Building; and
- An indicative subterranean building envelope below the Lands Building and Education Building, under Loftus Street, Farrer Place and Gresham Street.

The aim of the proposal is to conserve and adaptively reuse the Lands and Education Buildings for tourist accommodation, and ancillary uses, in accordance with the intent of Stage 1 Approval SSD 6751 granted by the NSW State Government.

The proposal includes a subterranean link and a vertical extension to the Education Building in accordance with the Stage 1 Approval SSD 6751.

The application seeks approval for the following development:

- Demolition of existing improvements and alterations to the existing Lands and Education buildings to facilitate their adaptive reuse for the purposes of ‘hotel or motel accommodation’, with ancillary licensed food and drink premises and retail premises;
- Excavation and construction of three basement levels below the Education Building and a subterranean link beneath Loftus Street between the two buildings;
- Construction of three to four additional levels above the Education Building;
- Removal of existing pitched roof elements and construction of a replacement roof structure on the Lands Building;
- Public domain improvements to Farrer Place to include regrading works to Farrer Place, new landscaping, removal of the existing kiosk and the construction of a new drop-off area leading from Bent Street;
- Public domain improvements to the pavements on Young Street, Gresham Street and Loftus Street; and
- Provision of external building illumination system.

The land use components of the proposed development are as follows:

- 253 hotel rooms
- ground floor retail
- associated hotel function and restaurants

3.2 Patron and Visitor Activity

Currently functioning as Government departmental offices, it is proposed that the two buildings within the Sandstone Precinct will be used for tourist and visitor accommodation. It is proposed to provide 253 hotel rooms across the two buildings. At full occupancy, it could be expected that the 253 hotel rooms may accommodate approximately 506 guests and up to 300 members of staff.

In addition to the hotel guest rooms, the 210 seat ballroom will be utilised for events.

The ground floor of each building will also provide a range of retail and food outlets that will be accessible to the public. It is expected that activity generated by these land uses will be by patrons of the hotel and people already working in the precinct or visiting as a component of a wider trip.

3.3 Vehicular Site Access

The vehicle entry off Loftus Street into the Education Building will be retained and provide access to a new loading dock. The existing on-site parking for up to 12 cars which utilise this entrance will be removed

The Lands Building vehicle access to a small loading dock on Gresham Street at the corner with Bent Street will be closed to vehicle use and become part of the pedestrian access network.

3.4 Car Parking

The Sydney Local Environment Plan 2012 designates a ***maximum*** number of car parking spaces for a building used for the purposes of serviced apartments or hotel or motel accommodation as:

(a) 1 space for every 4 bedrooms up to 100 bedrooms, and

(b) 1 space for every 5 bedrooms more than 100 bedrooms.

Given the constrained nature of the heritage buildings, on-site car parking will not be provided. For patrons requiring car parking, off site arrangements will be made with nearby publicly accessible commercial parking stations. As demonstrated in Figure 9, there are numerous existing off-street publicly accessible commercial car parks located in close proximity to the site. After dropping off baggage and guests, the car driver will be directed to the most appropriate off-site car park for overnight parking. A valet service will also be available for hotel guests.

Shared parking arrangements could also be established with nearby commercial buildings as an appropriate and efficient means of managing parking requirements. For example, a number of basement car parks primarily used by

commercial workers during the day will likely to be available for hotel users on weekday evenings and weekends when demand generated by commercial uses is low.

It is common for hotel operators to enter into an agreement with a nearby commercial car park to provide a guest parking arrangement. For example, The Metro Hotel on Pitt Street in the CBD has a parking deal with World Square Car Park which is only one block south of the site.

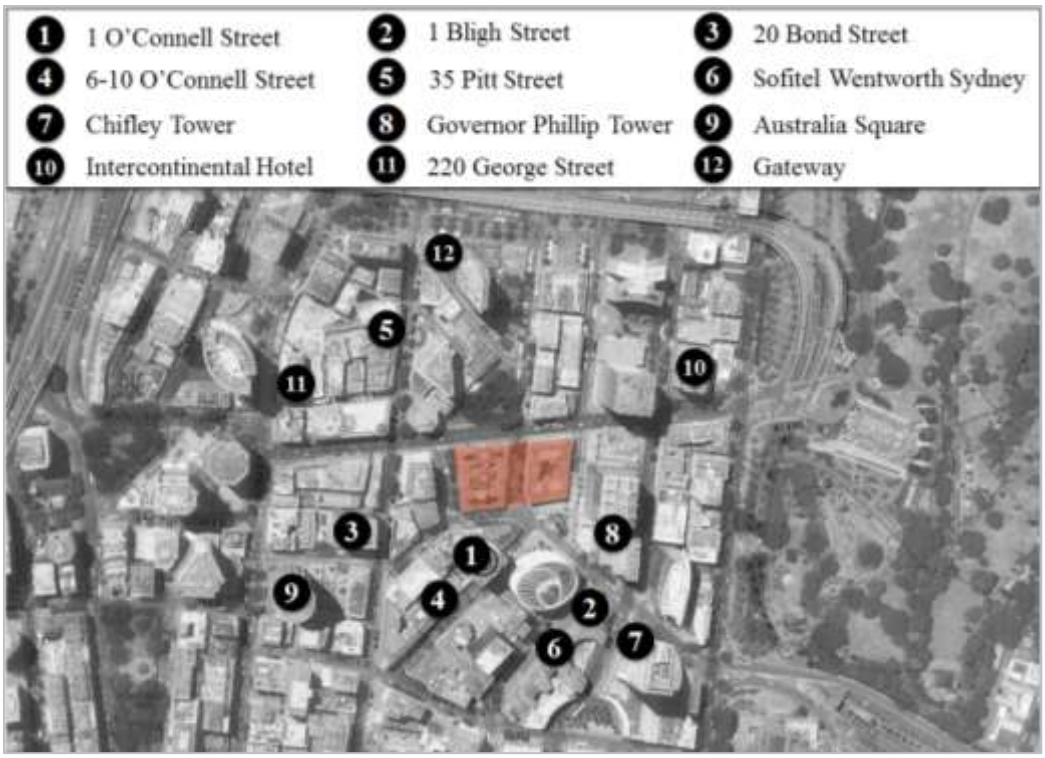

Figure 9 Off-Street Car Parking Opportunities

Typically visitors to Sydney CBD hotels utilise taxi and public transport to transfer from the airport or wider Sydney region. Many guests will be business travellers who will stay for a small number of consecutive nights.

A very low car mode of approximately 10% could be expected which equates to 25 cars needing to be parked overnight. The nearby car parks are easily able to accommodate this level of demand.

3.5 Motorcycle parking

Sydney DCP 2012 requires that motorcycle parking be provided in developments where car parking is being provided. Given that no car parking is provided on-site, no motorcycle parking is proposed. Patrons who choose to arrive on a motorcycle will utilise off-street car parking in the precinct as outlined in Section 3.4.

3.6 Loading Dock

The vehicle entry off Loftus Street into the Education Building will be retained and provide access to a new loading dock. The opening in the sandstone façade is very constrained as shown in Figure 10. There is an effective width of 3.0m and a height clearance of 3.0m. This limits the size of delivery vehicle to a small rigid vehicle (SRV) which is 6.4m long and 2.3m wide.

A loading dock management strategy will be implemented by the hotel to manage the arrival times of delivery trucks and garbage collection vehicles. (see Section 3.6.1)

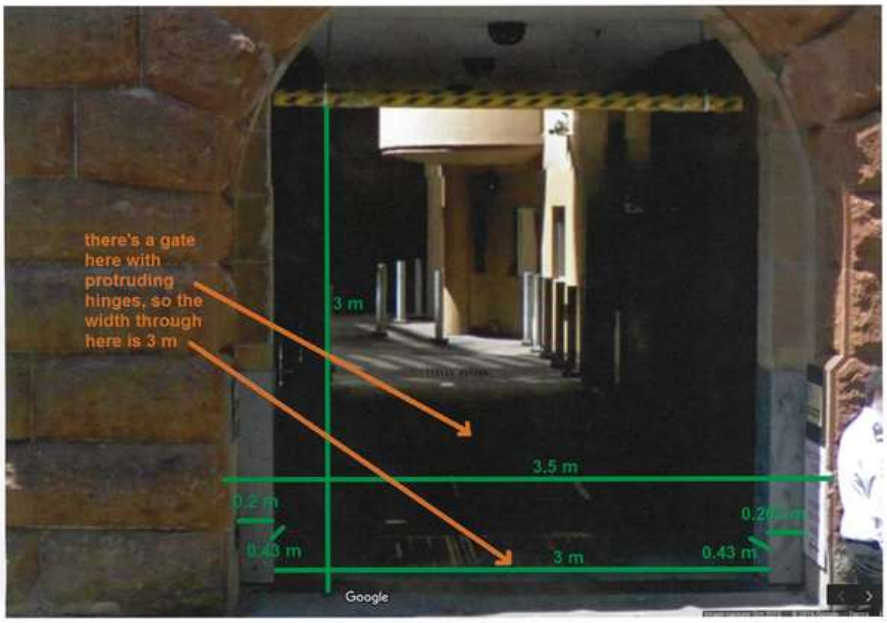

Figure 10 Loftus Street access driveway

The loading dock will accommodate one SRV and two Vans for loading as shown in Figure 11. Deliveries are transferred to the Education Building core for distribution in the building, or transferred via the Basement 03 Level tunnel connection to the Lands Building core as shown in Figure 12 and Figure 13.

Figure 11 Loading Dock

Figure 12 Lower Ground Level

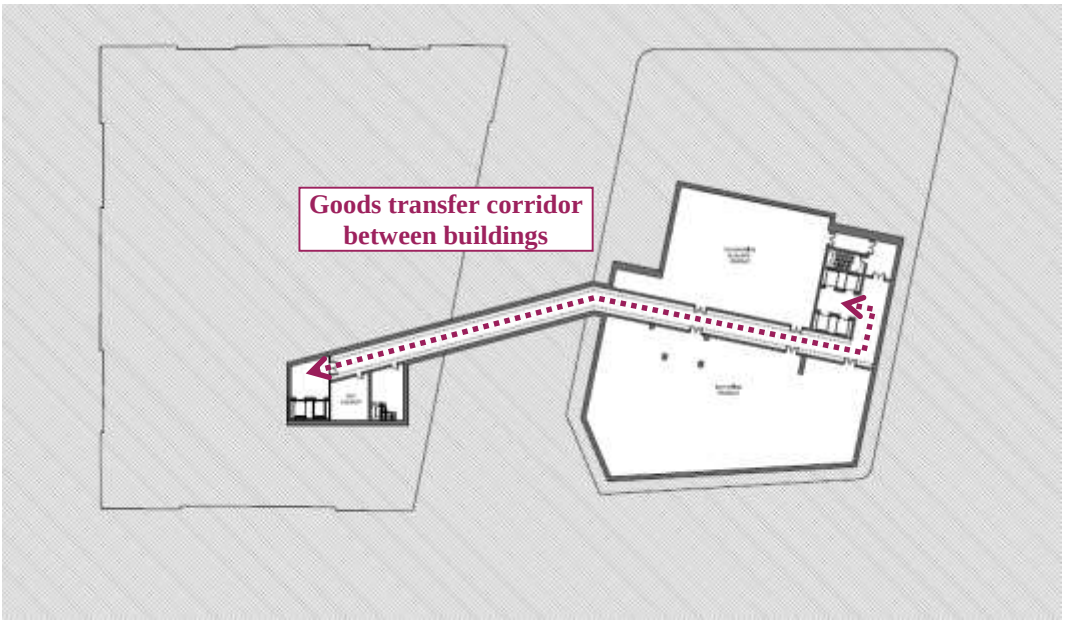

Figure 13 Basement 03 Level

The vehicle manoeuvring paths for the SRV and van are shown in Figure 14 to Figure 17. This shows that all vehicles will be able to enter and exit the building in a forwards direction.

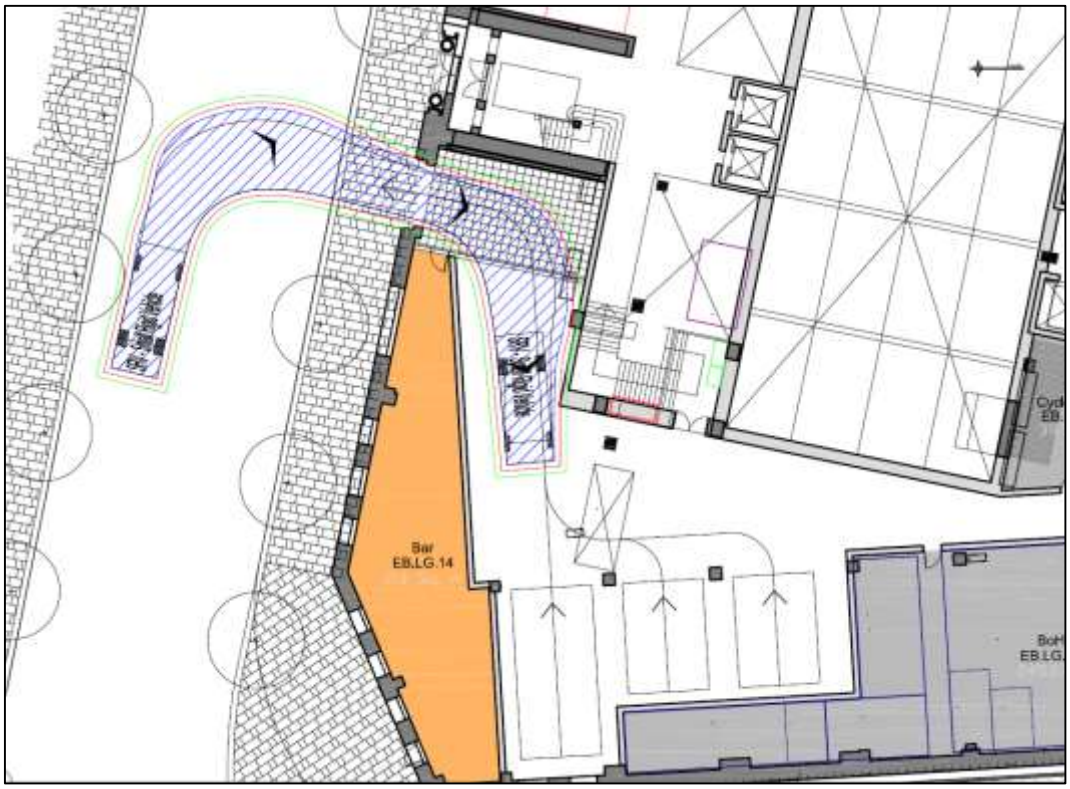

Figure 14 SRV Entry from Loftus Street

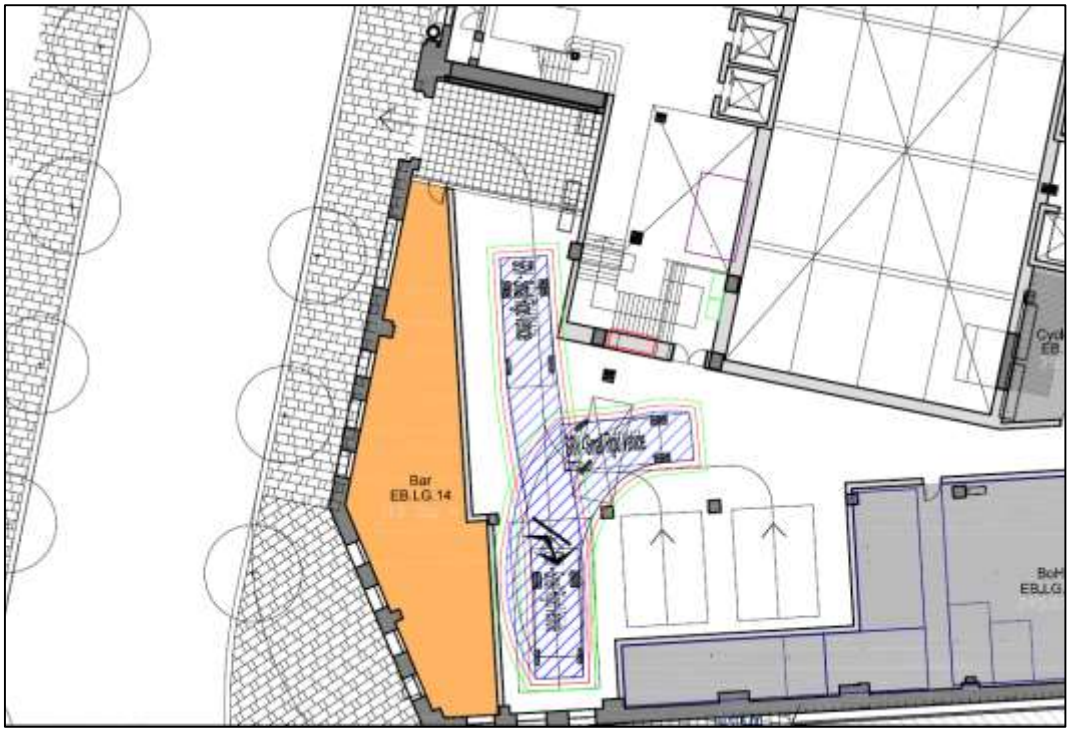

Figure 15 SRV manoeuvring in loading dock

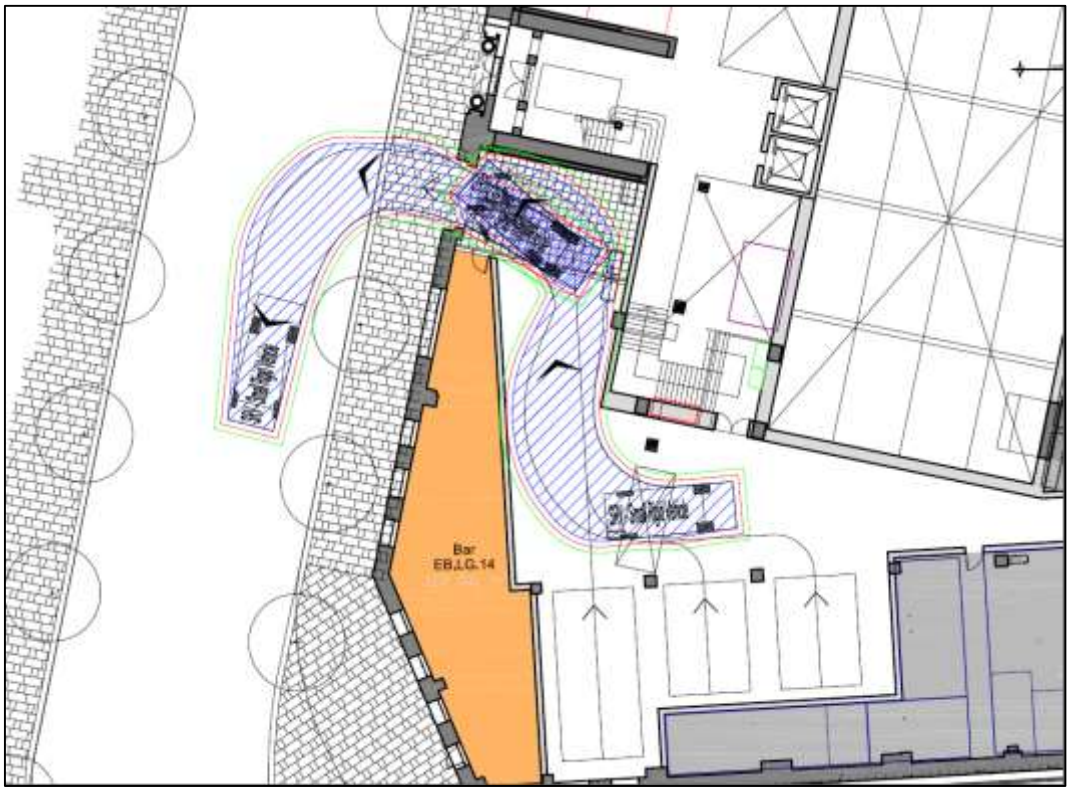

Figure 16 SRV Exit to Loftus Street

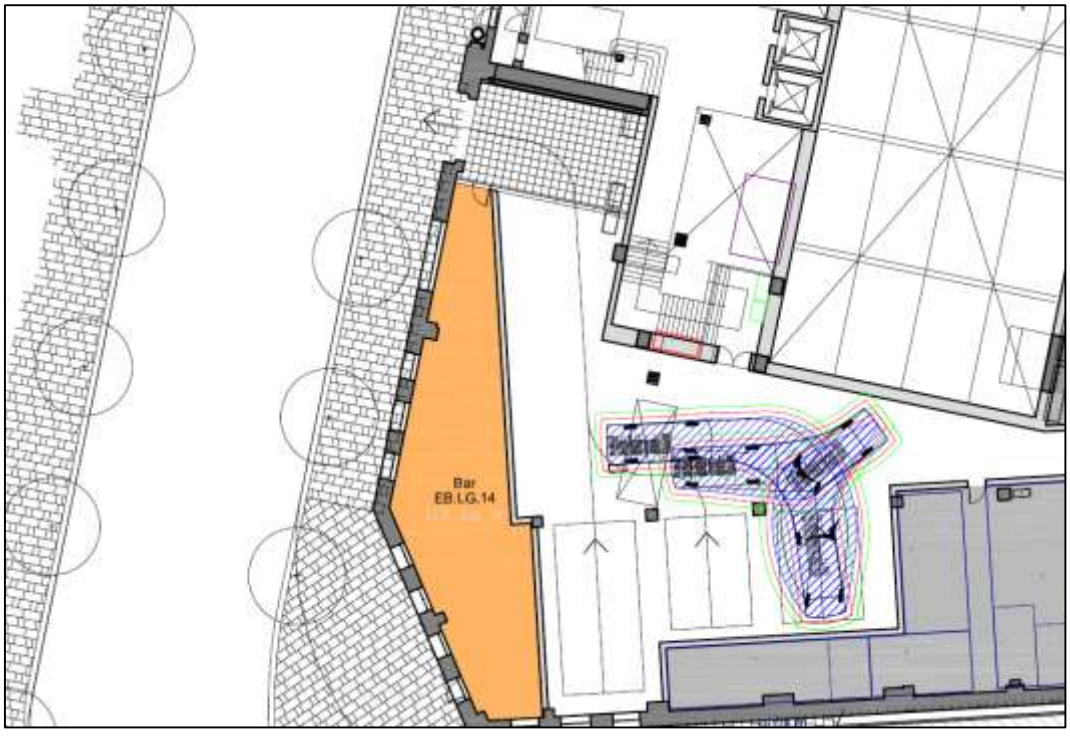

Figure 17 Van manoeuvring in loading dock

3.6.1 Outline loading dock management plan

The proposed development is configured for a variety of retail and associated hotel function uses in addition to the hotel room requirements. Given that there will be a limited number of tenants, delivery of stock can be easily managed to suit the availability of loading zones and size of vehicle to be used. At any one time it is anticipated that one SRV truck and 2 vans would be using the loading dock.

The waste and collection requirements will be determined by the waste management plan. The approximate number of trucks expected include two daily collections for hotel and retail waste. Arrangements and final estimated truck movements will be considered after consultation with Council and waste contractors, and appropriately managed so not all collections occur concurrently.

The maximum height of a vehicle accessing the loading dock is proposed to be 3.0m dictated by the heritage opening. The proposed loading layouts were reviewed for compliance with AS2890.2 Parking facilities. The largest vehicle expected to enter the site will be a 6.4m Small Rigid Vehicle (SRV).

The hotel operator will be required to engage and maintain a Loading Dock Supervisor to organise and supervise delivery and removal activities. Personnel will be on site at all times. The Loading Dock Supervisor will need to be present on the site during all normal servicing hours and contactable by mobile phone at other times to oversee the operation of the loading dock areas.

All deliveries and waste collection will be conducted by a booking system for building occupants, which will be coordinated by the Loading Dock Supervisor. It is expected that the designated loading bay will be locally managed to achieve an average of 15-20 minutes per delivery. This could achieve a total throughput of around 50 vehicles during normal business hours. Extended delivery windows will be set-up to permit variation in the arrival times of vehicles.

A Loading Dock Management Plan will be prepared prior to occupation of the building to ensure adequate management of deliveries and waste collection.

3.7 Bicycle Parking

3.7.1 DCP Requirements

The DCP requires the following:

- Bike parking at the following minimum rates:
  - 1 space per 4 staff
  - 1 space per 20 rooms
- Secure bike parking facilities are to be provided in accordance with the following:
  - Class 2 bike facilities for staff/employees of any land use; and
  - Class 3 bike rails for visitors of any land use.
- Where bike parking for tenants is provided in a basement, it is to be located:
  - on the uppermost level of the basement;
  - close to entry/exit points; and
  - subject to security camera surveillance where such security systems exist.
- A safe path of travel from bike parking areas to entry/exit points is to be marked.
- Access to bike parking areas are to be:
  - a minimum of 1.8m wide to allow a pedestrian and a person on a bike to pass each other and may be shared with vehicles within buildings and at entries to buildings);
  - accessible via a ramp;
  - clearly identified by signage; and
  - accessible via appropriate security or intercom systems.
- Bike parking for visitors is to be provided in an accessible on-grade location near a major public entrance to the development and is to be signposted.
- For non-residential uses, the following facilities for bike parking are to be provided at the following rates:
  - 1 personal locker for each bike parking space;
  - 1 shower and change cubicle for up to 10 bike parking spaces;
  - 2 shower and change cubicles for 11 to 20 or more bike parking spaces are provided;
  - 2 additional showers and cubicles for each additional 20 bike parking spaces or part thereof;
  - showers and change facilities may be provided in the form of shower and change cubicles in a unisex area in both female and male change rooms; and

- locker, change room and shower facilities are to be located close to the bike parking area, entry and exit points and within an area of security camera surveillance where there are such building security systems.

3.7.2 Proposed provision of bicycle facilities

The bicycle parking requirement for staff will be based on the peak shift number on site at any one time. Given the 24 hour/7 day per week operation, peak staff attendance is expected to be 180 staff (60% of total). Based on the DCP rates, 45 bicycle parking spaces are required as shown in Table 1.

Table 1 Bicycle parking space requirement

Hotel component	Number	DCP Bicycle parking rate	Number of spaces
Staff (at any one time)	150	1 space per 4 staff	45
Hotel rooms	253	1 space per 20 rooms	13
Total			58

It is proposed to provide a secure room for storage of 60 bicycles, as shown in Figure 18, accessed by hotel staff. Staff riding to work will self-park their bicycle whilst hotel guest bikes will be valet parked. There will be small number of bicycle rails provided in Farrer Place for visitor use to the hotel and for surrounding businesses.

All staff have access to locker and shower facilities on-site for personnel use.

Figure 18 Proposed secure bicycle parking room – 60 bicycles

3.8 Coach drop-off and pick-up

Day tour group operators usually designate a number of major hotels across the CBD as pick-up and drop-off points. Visitors can make their way to these designated hotels.

The nearest on-street coach set down area is located in Loftus Street between Bent Street and Bridge Road where a bus zone provides for up to 3 buses. Tour group buses could pick up guests and drop off guests from the site at this location if not at the No Parking zones around the site.

4 On-street Vehicular Circulation

4.1 On-street designation of kerbside uses

It is proposed that the primary drop-off locations for both buildings be located in Bent Street addressing the front public entrances to the buildings. The Lands Building will utilise a short length of Bent Street kerb to the west of Loftus Street and the Education Building will utilise a proposed indented drop-off lane in Bent Street adjacent to Farrer Place as shown in Figure 19.

Both of these drop-off locations will require change to the existing taxi rank and queuing area. Bent Street between Gresham Street and Loftus Street provides a taxi queuing area for 5 taxis between 6am and 10pm Mon – Fri. On Saturday, Sunday and public holidays a 4P parking zone is in place from 8am – 10pm. It is proposed to convert the first 2 parking positions to a drop-off zone. Changes to Bent Street between Loftus Street and Bligh Street are described in Section 4.2. All of these changes will require adjustments to the kerbside controls.

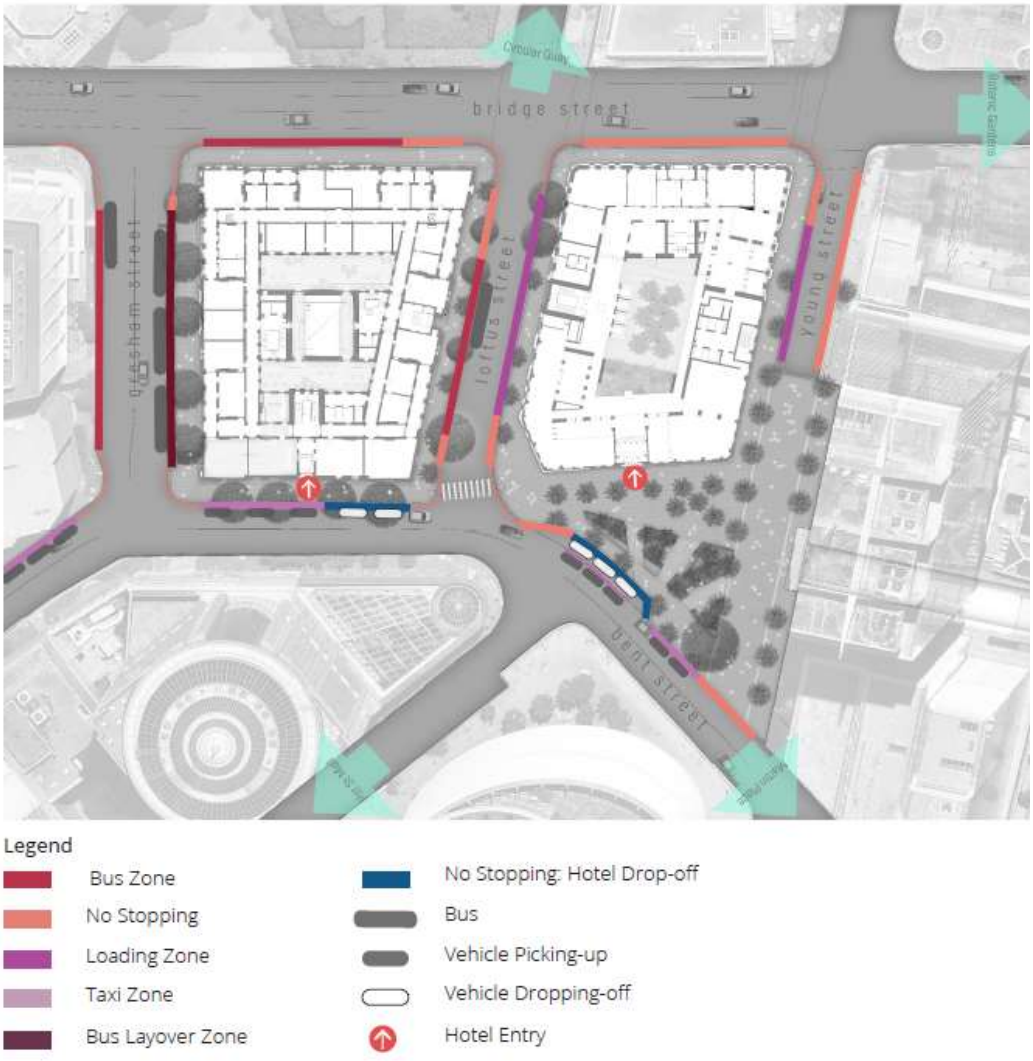

Figure 19 On-street designation of kerb side uses

(Source: Public Domain Report, Aspect Studios)

4.2 Bent Street – Farrer Place Street Access

A new indented drop-off facility has been incorporated into the Farrer Place design as shown in Figure 21 and Figure 22. The existing taxi rank in this location accommodates four taxis as shown in Figure 20.

Figure 20 Existing Bent Street taxi rank

Figure 21 Proposed Farrer Place drop-off facility

(Source: Public Domain Report, Aspect Studios)

It is proposed to move the first two taxi spaces to the east along Bent Street to be 20m from the Bligh Street traffic signals. This is possible due to the removal or relocation of the kerbside kiosk. These spaces will be the pick-up point. A further three queuing spaces will be provided adjacent to the set-down bay with a median separator. This arrangement adds an additional taxi bay to this location and maintains the same level of operation whilst incorporating the hotel drop-off bay.

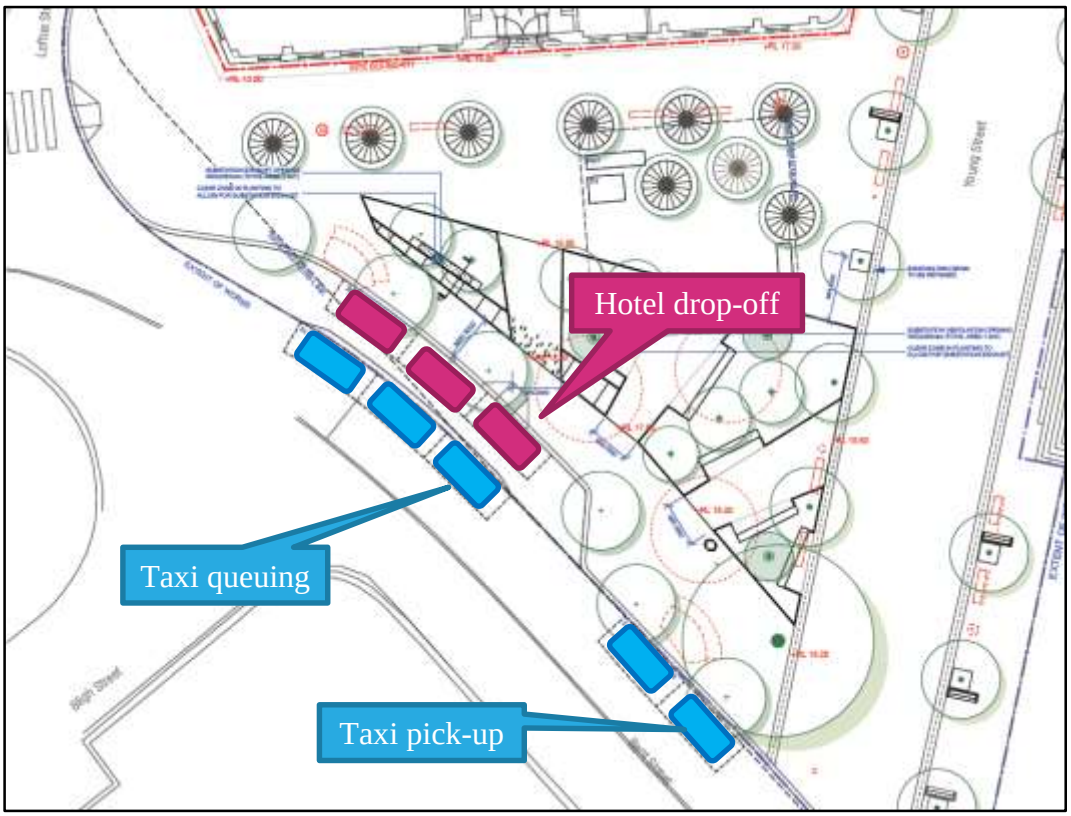

Figure 22 Proposed hotel drop-off and taxi arrangements in Bent Street

The key outcomes of the proposed design are in accordance with the City of Sydney design parameters:

- The general approach has been to maintain all existing pedestrian desire lines whilst providing amenity for those wanting to use Farrer Place as a dwelling space.
- Vehicular movement has been kept out of the public domain, with a new drop-off being proposed roughly in line with the existing roadway.
- The drop off lane has been provided at a minimum width to enable safe use by passengers exiting vehicles.
- The design of Bent Street has maintained 2 westbound lanes on the approach to O'Connell Street and past Loftus Street. This provides sufficient room for a vehicle to pass a left turning vehicle into O'Connell Street or a right turning vehicle into Loftus Street.
- A single eastbound traffic lane and kerbside taxi rank/parking lane has been retained.

The revised taxi rank and proposed drop-off facility will provide a good level of service for the users of Farrer Place.

5 Transport Assessment

5.1 Traffic Generation

The hotel will generate a small number of private vehicle movements associated with drop off of passengers and luggage prior to parking in a nearby public parking station.

It has been identified that the Sandstone Precinct may generate demand for 25 vehicles to be parked overnight. As a worst case scenario, it has been assumed that 100% of these vehicles depart the site in the AM peak hour (8am-9am) and arrive to the site in the PM peak hour (5pm-6pm). More realistically, vehicle arrivals and departures will be dispersed over the course of the day, reducing the impact on the local road network.

In the northern part of the Sydney CBD, taxis currently circulate on the road network and therefore guest arrivals and departures via taxi will not increase the level of traffic on roads in the precinct.

5.2 Road Network Impacts

5.2.1 Methodology

Traffic modelling has been undertaken to determine the impact on the local road network arising from the proposed development.

The future road network performance has been assessed using the RMS approved SIDRA software. The performance of intersections has been assessed in terms of the Level of Service (LOS), which is based on the average delay per vehicle. LOS ranges from A = very good to F = unsatisfactory.

Another common measure of intersection performance is the degree of saturation (DOS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DOS of 1.0 indicates that an intersection is operating at capacity.

The modelling has considered the critical AM (8am – 9am) and PM (5pm – 6pm) peak hours as identified in the traffic surveys.

5.2.2 Results

The results of the traffic modelling are summarised in Table 2 below. The detailed traffic modelling outputs are provided in Appendix A.

Table 2 Traffic Modelling Results

Intersection	Peak Hour	DOS	Av Delay (s)	LOS
Bridge Street / Pitt Street	AM Existing	0.91	22	C
	AM Future	0.91	22	C
	PM Existing	0.84	20	B
	PM Future	0.85	20	B
Bridge Street / Gresham Street	AM Existing	1.00	7	N/A
	AM Future	1.00	7	N/A
	PM Existing	1.00	7	N/A
	PM Future	1.00	7	N/A
Bridge Street / Loftus Street	AM Existing	0.92	20	B
	AM Future	0.93	21	B
	PM Existing	0.66	15	B
	PM Future	0.66	15	B
Bridge Street / Young Street	AM Existing	0.70	17	B
	AM Future	0.71	17	B
	PM Existing	0.77	18	B
	PM Future	0.79	18	B

DOS – Degree of Saturation, Av Delay – Average Vehicle Delay, LOS – Level of Service

5.2.3 Analysis

The modelling demonstrates the small increase in traffic has a negligible impact on the operation of nearby intersections. No upgrades or improvements are required at these locations to facilitate the development of the Sandstone Precinct.

5.3 Public Transport

5.3.1 Light Rail

The Environmental Impact Statement (EIS) for the CBD and South East Light Rail Project was approved by the DP&E in June 2014. The EIS outlines the proposed construction for a new light rail service in Sydney, connecting Circular Quay and the CBD with Surry Hills, Kingsford and Randwick.

The project includes construction of a new light rail stop Circular Quay on Alfred Street between Pitt Street and Loftus Street as shown in Figure 23.

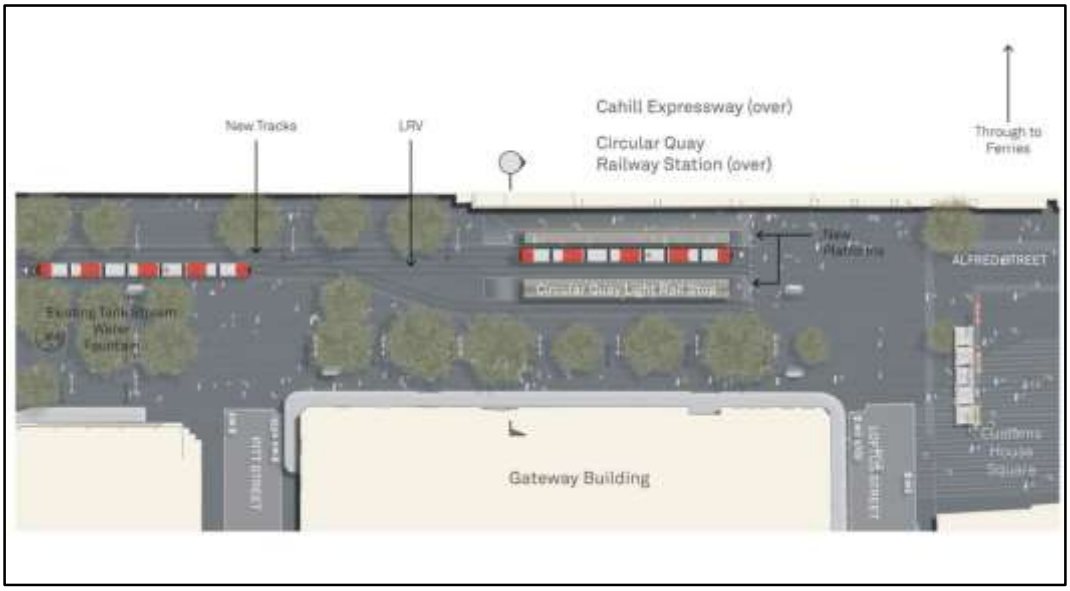

Figure 23 Circular Quay Light Rail Stop

Source: CSELR EIS Technical Paper 10 - Visual and Landscape Assessment

This new light rail stop at Circular Quay will improve accessibility to the Sandstone Precinct by providing an excellent public transport connection. Associated benefits of the light rail proposal for the Sandstone Precinct include:

- Closure of Loftus Street to vehicular traffic north of Reiby Place towards Circular Quay to provide an improved pedestrian environment;
- Introduction of integrated customer information and wayfinding;
- Connections to adjacent public transport modes including ferry, bus and heavy rail; and
- Integration of light rail platforms into the Circular Quay precinct.

5.3.2 Heavy Rail

It could be expected that a high number of hotel guests at the Sandstone Precinct will be arriving directly from Sydney Airport. Circular Quay Station is located on the Airport rail line and less than a 5 minute walk from the Sandstone Precinct - with no transfer required from either the International or Domestic Terminal stations. A train journey between the International Airport and Circular Quay station is 22 minutes – making this a viable mode of transport for many guests.

5.3.3 Bus

The proposal will have no impact on bus operations with all existing stops, routes, and layover areas remaining available.

5.4 Walking

The introduction of light rail through the CBD will provide opportunities for an improved pedestrian environment in the Sandstone Precinct. With the removal of the bus layover areas on Loftus Street, the section of road between Reiby Place and Alfred Street is to become a pedestrianised precinct, free of moving traffic. This will improve accessibility for hotel patrons travelling between the Sandstone Precinct and Circular Quay transport interchange.

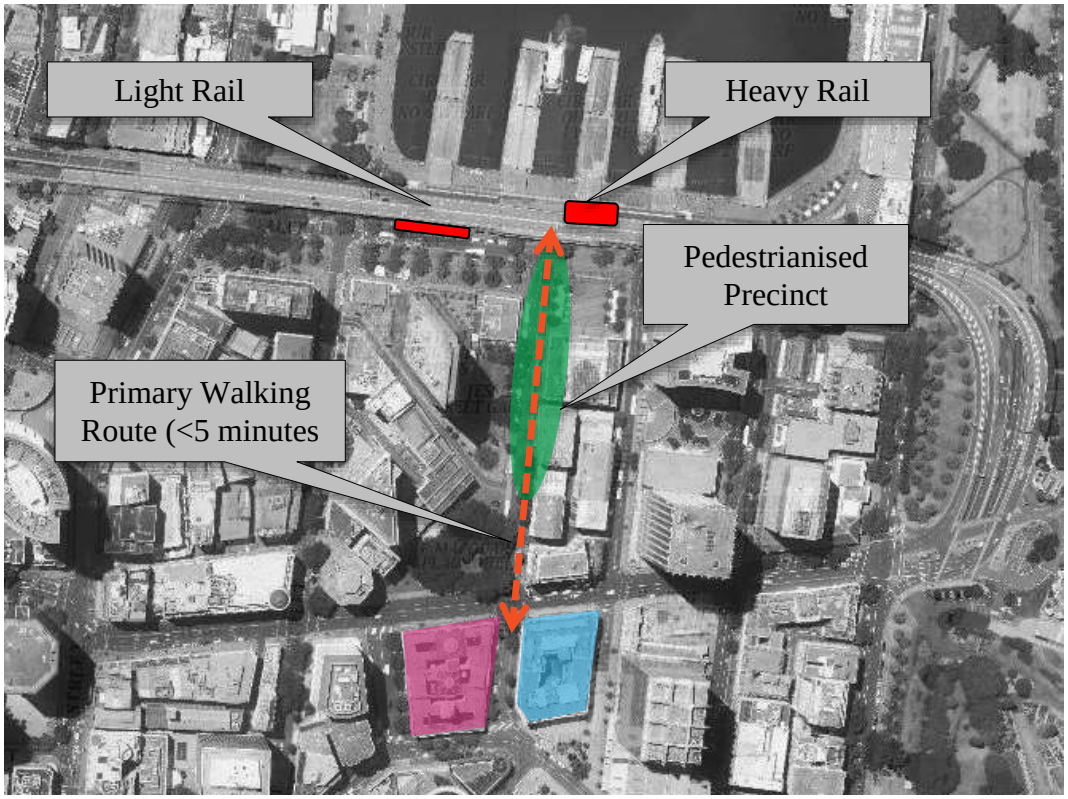

Figure 24 Future Walking Environment – Circular Quay Precinct

The Lands and Education Building that form the Sandstone Precinct currently accommodate a significant number of commercial workers. The number of pedestrian movements generated by the future hotel use of the buildings during the critical commuter peak hours is not expected to exceed current levels of activity.

5.5 Cycling

The proposed bi-directional cycleway on Pitt Street as part of the Sydney City Centre Access Strategy will form the main north-south spine through the CBD for cyclists into the area. Following the closure of Alfred Street to general traffic and the removal of buses on Loftus Street, there will be an opportunity to create a good quality shared environment for pedestrians and cyclists.

6 Travel Plan

The implementation of a Travel Plan would contribute to reducing traffic demands and encourage other forms of transport to the Sandstone Precinct. The Premier's Council for Active Living (PCAL) describes the three key objectives for a travel plan as follows:

- To reduce the need to travel
- To improve non-car travel methods
- To ensure the most efficient use of car parking spaces

Framework objectives and measures for the preparation of a travel plan for the Sandstone Precinct include the following:

- Easily accessible transport information for hotel guests prior to their arrival and during their stay;
- Increase of travel choices for employees, with an emphasis on improving access by sustainable modes of transport;
- Encouragement of high mode share to sustainable modes from private vehicle usage;
- Raising awareness of sustainable transport amongst staff and guests with travel guides.

7 Conclusions

Arup has prepared this Traffic Impact Assessment on behalf of Pontiac Land Group in support of a Stage 2 Stage Significant Development Application (SSDA) to secure approval for a development of the subject site at 23-33 Bridge Street and 35-39 Bridge Street, Sydney ('Sandstone Precinct').

The precinct has good public transport availability, served by the high quality Circular Quay public transport interchange – which provides an environment where passengers may easily transfer between bus, rail and ferry modes. The future introduction of a light rail station at Circular Quay will further improve public transport accessibility to the precinct.

A series of pedestrian footpaths and dedicated crossing facilities provide good connectivity between the building entries and these public transport stops.

The proposal involves a minor increase in peak hour traffic of 27 vehicles, which is considered negligible in the context of existing traffic volumes in the northern CBD. Traffic modelling confirms the operation of key intersections serving the precinct remains unchanged as a result of the proposal.

Car parking will not be provided on-site. Instead a number of publically available off-street car parks located in close proximity to the site will be utilised for guest parking. It could be expected that the hotel operator would enter into an agreement with a nearby commercial car park to provide a guest parking arrangement.

It is concluded that the transport impacts arising from the proposed development application are acceptable and can be appropriately managed.

Appendix A

Traffic Modelling Outputs

MOVEMENT SUMMARY

Site: AM Base

VV0243_6H
Signals - Actuated Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

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
East: Bridge St E											
4	L2	211	29.0	0.862	31.9	LOS C	9.8	80.5	0.97	0.85	24.5
5	T1	523	3.2	0.862	27.0	LOS C	13.1	94.5	0.97	0.85	25.0
Approach		734	10.6	0.862	28.4	LOS C	13.1	94.5	0.97	0.85	24.8
North: Pitt St N											
7	L2	99	6.4	0.267	24.9	LOS C	2.5	18.5	0.79	0.73	26.6
8	T1	164	21.8	0.169	19.5	LOS B	2.0	16.3	0.76	0.60	27.9
9	R2	58	14.5	0.169	24.2	LOS C	1.5	11.5	0.76	0.69	26.9
Approach		321	15.7	0.267	22.0	LOS C	2.5	18.5	0.77	0.66	27.3
West: Bridge St W											
11	T1	773	18.8	0.723	9.3	LOS A	12.6	102.5	0.59	0.53	32.8
12	R2	341	7.7	0.914	36.0	LOS D	9.9	73.8	1.00	1.07	23.2
Approach		1114	15.4	0.914	17.5	LOS B	12.6	102.5	0.72	0.70	29.1
All Vehicles		2168	13.8	0.914	21.9	LOS C	13.1	102.5	0.81	0.74	27.3

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	803	27.7	LOS C	1.4	1.4	0.94	0.94
P2	East Full Crossing	1052	28.0	LOS C	1.8	1.8	0.95	0.95
P3	North Full Crossing	1165	28.1	LOS C	2.1	2.1	0.95	0.95
P4	West Full Crossing	1061	28.0	LOS C	1.9	1.9	0.95	0.95
All Pedestrians		4081	28.0	LOS C			0.95	0.95

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: AM Future

VV0243_6H
Signals - Actuated Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

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
East: Bridge St E											
4	L2	211	29.0	0.862	31.9	LOS C	9.8	80.5	0.97	0.85	24.5
5	T1	523	3.2	0.862	27.0	LOS C	13.1	94.5	0.97	0.85	25.0
Approach		734	10.6	0.862	28.4	LOS C	13.1	94.5	0.97	0.85	24.8
North: Pitt St N											
7	L2	99	6.4	0.267	24.9	LOS C	2.5	18.5	0.79	0.73	26.6
8	T1	164	21.8	0.169	19.5	LOS B	2.0	16.3	0.76	0.60	27.9
9	R2	58	14.5	0.169	24.2	LOS C	1.5	11.5	0.76	0.69	26.9
Approach		321	15.7	0.267	22.0	LOS C	2.5	18.5	0.77	0.66	27.3
West: Bridge St W											
11	T1	783	18.5	0.732	9.4	LOS A	12.9	105.0	0.60	0.54	32.8
12	R2	341	7.7	0.914	36.0	LOS D	9.9	73.8	1.00	1.07	23.2
Approach		1124	15.3	0.914	17.4	LOS B	12.9	105.0	0.72	0.70	29.1
All Vehicles		2179	13.8	0.914	21.8	LOS C	13.1	105.0	0.81	0.74	27.3

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	803	27.7	LOS C	1.4	1.4	0.94	0.94
P2	East Full Crossing	1052	28.0	LOS C	1.8	1.8	0.95	0.95
P3	North Full Crossing	1165	28.1	LOS C	2.1	2.1	0.95	0.95
P4	West Full Crossing	1061	28.0	LOS C	1.9	1.9	0.95	0.95
All Pedestrians		4081	28.0	LOS C			0.95	0.95

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: PM Base

VV0243_6H
Signals - Actuated Cycle Time = 58 seconds (Optimum Cycle Time - Minimum Delay)

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
East: Bridge St E											
4	L2	96	41.8	0.843	28.5	LOS C	9.9	76.6	0.96	0.83	25.9
5	T1	680	1.2	0.843	23.9	LOS C	11.3	80.2	0.96	0.83	26.0
Approach		776	6.2	0.843	24.5	LOS C	11.3	80.2	0.96	0.83	26.0
North: Pitt St N											
7	L2	163	0.6	0.377	21.9	LOS C	3.7	26.0	0.79	0.76	27.8
8	T1	268	10.6	0.233	16.2	LOS B	2.8	21.6	0.75	0.60	29.3
9	R2	167	1.3	0.389	21.9	LOS C	3.8	27.0	0.79	0.76	27.7
Approach		599	5.3	0.389	19.4	LOS B	3.8	27.0	0.77	0.69	28.4
West: Bridge St W											
11	T1	803	10.2	0.802	11.7	LOS B	14.6	111.2	0.74	0.65	31.4
12	R2	216	6.3	0.809	31.7	LOS C	5.7	41.8	0.98	0.95	24.4
Approach		1019	9.4	0.809	15.9	LOS B	14.6	111.2	0.79	0.71	29.6
All Vehicles		2394	7.3	0.843	19.6	LOS B	14.6	111.2	0.84	0.74	28.1

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	622	23.9	LOS C	0.9	0.9	0.92	0.92
P2	East Full Crossing	923	24.2	LOS C	1.4	1.4	0.93	0.93
P3	North Full Crossing	740	24.1	LOS C	1.1	1.1	0.93	0.93
P4	West Full Crossing	806	24.1	LOS C	1.2	1.2	0.93	0.93
All Pedestrians		3092	24.1	LOS C			0.93	0.93

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: PM Future

VV0243_6H
Signals - Actuated Cycle Time = 58 seconds (Optimum Cycle Time - Minimum Delay)

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
East: Bridge St E											
4	L2	96	41.8	0.853	28.7	LOS C	10.2	78.4	0.97	0.84	25.8
5	T1	691	1.2	0.853	24.1	LOS C	11.6	81.9	0.97	0.84	26.0
Approach		786	6.2	0.853	24.7	LOS C	11.6	81.9	0.97	0.84	25.9
North: Pitt St N											
7	L2	163	0.6	0.377	21.9	LOS C	3.7	26.0	0.79	0.76	27.8
8	T1	268	10.6	0.233	16.2	LOS B	2.8	21.6	0.75	0.60	29.3
9	R2	167	1.3	0.389	21.9	LOS C	3.8	27.0	0.79	0.76	27.7
Approach		599	5.3	0.389	19.4	LOS B	3.8	27.0	0.77	0.69	28.4
West: Bridge St W											
11	T1	803	10.2	0.802	11.7	LOS B	14.6	111.2	0.74	0.65	31.4
12	R2	216	6.3	0.811	31.8	LOS C	5.7	41.8	0.98	0.95	24.4
Approach		1019	9.4	0.811	15.9	LOS B	14.6	111.2	0.79	0.71	29.6
All Vehicles		2404	7.3	0.853	19.7	LOS B	14.6	111.2	0.84	0.75	28.0

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	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	622	23.9	LOS C	0.9	0.9	0.92	0.92
P2	East Full Crossing	923	24.2	LOS C	1.4	1.4	0.93	0.93
P3	North Full Crossing	740	24.1	LOS C	1.1	1.1	0.93	0.93
P4	West Full Crossing	806	24.1	LOS C	1.2	1.2	0.93	0.93
All Pedestrians		3092	24.1	LOS C			0.93	0.93

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: AM Base

Gresham Priority
Stop (Two-Way)

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: Gresham St											
1	L2	133	7.9	0.285	14.9	LOS B	1.2	8.7	0.66	1.00	31.4
3	R2	12	63.6	1.000	503.8	LOS F	2.8	30.3	1.00	1.21	3.6
Approach		144	12.4	1.000	54.2	LOS F	2.8	30.3	0.69	1.02	19.4
East: Bridge St E											
4	L2	28	11.1	0.173	4.7	LOS A	0.0	0.0	0.00	0.00	39.7
5	T1	614	10.8	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	39.8
Approach		642	10.8	0.173	0.2	NA	0.0	0.0	0.00	0.00	39.8
West: Bridge St W											
11	T1	796	17.9	0.306	2.6	LOS A	3.4	26.7	0.22	0.08	37.5
12	R2	78	9.5	0.306	13.4	LOS B	3.4	26.7	0.83	0.28	32.1
Approach		874	17.1	0.306	3.6	NA	3.4	26.7	0.28	0.09	36.9
All Vehicles		1660	14.3	1.000	6.7	NA	3.4	30.3	0.21	0.14	35.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: AM Future

Gresham Priority
Stop (Two-Way)

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: Gresham St											
1	L2	133	7.9	0.290	15.1	LOS C	1.2	8.9	0.67	1.00	31.3
3	R2	12	63.6	1.000	502.7	LOS F	2.8	30.2	1.00	1.21	3.6
Approach		144	12.4	1.000	54.3	LOS F	2.8	30.2	0.69	1.02	19.4
East: Bridge St E											
4	L2	28	11.1	0.175	4.7	LOS A	0.0	0.0	0.00	0.00	39.7
5	T1	624	10.6	0.175	0.0	LOS A	0.0	0.0	0.00	0.00	39.8
Approach		653	10.6	0.175	0.2	NA	0.0	0.0	0.00	0.00	39.8
West: Bridge St W											
11	T1	796	17.9	0.307	2.7	LOS A	3.4	26.8	0.22	0.08	37.5
12	R2	78	9.5	0.307	13.7	LOS B	3.4	26.8	0.83	0.29	32.0
Approach		874	17.1	0.307	3.6	NA	3.4	26.8	0.28	0.10	36.9
All Vehicles		1671	14.2	1.000	6.7	NA	3.4	30.2	0.20	0.14	35.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: PM Base

Gresham Priority
Stop (Two-Way)

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: Gresham St											
1	L2	202	7.8	0.405	15.5	LOS C	2.0	14.9	0.67	1.06	31.2
3	R2	5	20.0	1.000	1144.0	LOS F	2.8	22.6	1.00	1.10	1.7
Approach		207	8.1	1.000	44.1	LOS E	2.8	22.6	0.68	1.07	21.5
East: Bridge St E											
4	L2	18	11.8	0.162	5.2	LOS A	0.0	0.0	0.00	0.00	39.8
5	T1	604	5.6	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	39.9
Approach		622	5.8	0.162	0.2	NA	0.0	0.0	0.00	0.00	39.9
West: Bridge St W											
11	T1	914	9.1	0.290	2.8	LOS A	3.9	28.9	0.30	0.06	37.3
12	R2	57	1.9	0.290	11.5	LOS B	3.9	28.9	0.81	0.15	33.3
Approach		971	8.7	0.290	3.3	NA	3.9	28.9	0.33	0.06	37.0
All Vehicles		1800	7.6	1.000	6.9	NA	3.9	28.9	0.25	0.16	35.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: PM Future

Gresham Priority
Stop (Two-Way)

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: Gresham St											
1	L2	202	7.8	0.405	15.5	LOS C	2.0	14.9	0.67	1.06	31.2
3	R2	5	20.0	1.000	1137.7	LOS F	2.7	22.5	1.00	1.10	1.7
Approach		207	8.1	1.000	43.9	LOS E	2.7	22.5	0.68	1.07	21.6
East: Bridge St E											
4	L2	18	11.8	0.162	5.2	LOS A	0.0	0.0	0.00	0.00	39.8
5	T1	604	5.6	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	39.9
Approach		622	5.8	0.162	0.2	NA	0.0	0.0	0.00	0.00	39.9
West: Bridge St W											
11	T1	932	8.9	0.295	2.9	LOS A	4.0	29.9	0.30	0.05	37.2
12	R2	57	1.9	0.295	11.6	LOS B	4.0	29.9	0.82	0.15	33.3
Approach		988	8.5	0.295	3.4	NA	4.0	29.9	0.33	0.06	37.0
All Vehicles		1818	7.5	1.000	6.9	NA	4.0	29.9	0.26	0.15	35.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: AM Base

VV0321_7E
Signals - Actuated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

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: Loftus St S											
1	L2	49	14.9	0.181	22.4	LOS C	1.6	12.5	0.75	0.68	27.9
2	T1	99	6.4	0.181	17.8	LOS B	2.0	15.2	0.76	0.63	28.3
3	R2	13	41.7	0.181	22.2	LOS C	2.0	15.2	0.76	0.61	28.5
Approach		161	11.8	0.181	19.6	LOS B	2.0	15.2	0.75	0.64	28.2
East: Bridge St E											
4	L2	72	4.4	0.650	14.2	LOS B	11.0	83.2	0.62	0.58	32.4
5	T1	584	10.1	0.650	9.9	LOS A	11.0	83.2	0.63	0.59	32.3
6	R2	167	8.2	0.650	19.1	LOS B	3.3	25.1	0.92	0.78	29.0
Approach		823	9.2	0.650	12.1	LOS B	11.0	83.2	0.69	0.63	31.6
West: Bridge St W											
10	L2	168	55.6	0.919	31.6	LOS C	11.2	99.2	0.99	0.93	24.7
11	T1	587	9.5	0.919	26.8	LOS C	14.0	105.5	0.99	0.93	25.0
12	R2	51	2.1	0.919	31.1	LOS C	14.0	105.5	1.00	0.94	25.1
Approach		806	18.7	0.919	28.1	LOS C	14.0	105.5	0.99	0.93	24.9
All Vehicles		1791	13.7	0.919	20.0	LOS B	14.0	105.5	0.83	0.77	27.9

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	407	24.7	LOS C	0.6	0.6	0.92	0.92
P2	East Full Crossing	407	24.7	LOS C	0.6	0.6	0.92	0.92
P3	North Full Crossing	556	24.9	LOS C	0.9	0.9	0.92	0.92
P4	West Full Crossing	631	25.0	LOS C	1.0	1.0	0.92	0.92
All Pedestrians		2001	24.8	LOS C			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.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: AM Future

VV0321_7E
Signals - Actuated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

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: Loftus St S											
1	L2	49	14.9	0.181	22.4	LOS C	1.6	12.5	0.75	0.68	27.9
2	T1	99	6.4	0.181	17.8	LOS B	2.0	15.2	0.76	0.63	28.3
3	R2	13	41.7	0.181	22.2	LOS C	2.0	15.2	0.76	0.61	28.5
Approach		161	11.8	0.181	19.6	LOS B	2.0	15.2	0.75	0.64	28.2
East: Bridge St E											
4	L2	89	3.5	0.665	14.3	LOS B	11.4	86.3	0.63	0.60	32.3
5	T1	584	10.1	0.665	10.0	LOS B	11.4	86.3	0.65	0.61	32.1
6	R2	167	8.2	0.665	19.2	LOS B	3.5	26.0	0.93	0.78	29.0
Approach		841	9.0	0.665	12.3	LOS B	11.4	86.3	0.70	0.64	31.5
West: Bridge St W											
10	L2	168	55.6	0.931	32.5	LOS C	11.7	103.4	1.00	0.96	24.4
11	T1	587	9.5	0.931	27.7	LOS C	14.5	109.0	1.00	0.96	24.7
12	R2	61	1.7	0.931	32.0	LOS C	14.5	109.0	1.00	0.96	24.8
Approach		817	18.4	0.931	29.0	LOS C	14.5	109.0	1.00	0.96	24.6
All Vehicles		1819	13.5	0.931	20.5	LOS C	14.5	109.0	0.84	0.78	27.7

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	407	24.7	LOS C	0.6	0.6	0.92	0.92
P2	East Full Crossing	407	24.7	LOS C	0.6	0.6	0.92	0.92
P3	North Full Crossing	556	24.9	LOS C	0.9	0.9	0.92	0.92
P4	West Full Crossing	631	25.0	LOS C	1.0	1.0	0.92	0.92
All Pedestrians		2001	24.8	LOS C			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.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: PM Base

VV0321_7E
Signals - Actuated Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

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: Loftus St S											
1	L2	82	3.8	0.233	28.2	LOS C	2.3	16.6	0.81	0.73	25.5
2	T1	77	2.7	0.183	23.1	LOS C	2.3	16.5	0.79	0.63	26.5
3	R2	6	33.3	0.183	27.7	LOS C	2.3	16.5	0.79	0.63	26.5
Approach		165	4.5	0.233	25.8	LOS C	2.3	16.6	0.80	0.68	26.0
East: Bridge St E											
4	L2	69	1.5	0.423	10.5	LOS B	5.8	42.2	0.37	0.38	34.7
5	T1	540	6.0	0.423	7.1	LOS A	5.8	42.2	0.44	0.44	34.0
6	R2	62	11.9	0.423	14.8	LOS B	3.0	22.2	0.66	0.60	31.7
Approach		672	6.1	0.423	8.2	LOS A	5.8	42.2	0.45	0.45	33.8
West: Bridge St W											
10	L2	145	52.9	0.656	21.9	LOS C	11.2	90.6	0.75	0.69	28.5
11	T1	754	0.8	0.656	17.4	LOS B	11.7	82.9	0.75	0.68	28.6
12	R2	22	4.8	0.656	22.7	LOS C	11.7	82.9	0.75	0.67	28.7
Approach		921	9.1	0.656	18.3	LOS B	11.7	90.6	0.75	0.68	28.6
All Vehicles		1758	7.5	0.656	15.1	LOS B	11.7	90.6	0.64	0.59	30.1

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	365	29.7	LOS C	0.7	0.7	0.93	0.93
P2	East Full Crossing	385	29.7	LOS C	0.7	0.7	0.93	0.93
P3	North Full Crossing	256	29.6	LOS C	0.5	0.5	0.92	0.92
P4	West Full Crossing	296	29.6	LOS C	0.5	0.5	0.93	0.93
All Pedestrians		1302	29.7	LOS C			0.93	0.93

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.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: PM Future

VV0321_7E
Signals - Actuated Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

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: Loftus St S											
1	L2	93	3.4	0.262	28.4	LOS C	2.6	18.8	0.81	0.74	25.4
2	T1	77	2.7	0.237	23.5	LOS C	2.8	20.3	0.81	0.67	26.2
3	R2	24	8.7	0.237	28.0	LOS C	2.8	20.3	0.81	0.67	26.2
Approach		194	3.8	0.262	26.4	LOS C	2.8	20.3	0.81	0.70	25.8
East: Bridge St E											
4	L2	69	1.5	0.423	10.5	LOS B	5.8	42.2	0.37	0.38	34.7
5	T1	540	6.0	0.423	7.1	LOS A	5.8	42.2	0.44	0.44	34.0
6	R2	62	11.9	0.423	14.8	LOS B	3.0	22.2	0.66	0.60	31.7
Approach		672	6.1	0.423	8.2	LOS A	5.8	42.2	0.45	0.45	33.8
West: Bridge St W											
10	L2	145	52.9	0.656	21.9	LOS C	11.2	90.6	0.75	0.69	28.5
11	T1	754	0.8	0.656	17.4	LOS B	11.7	82.9	0.75	0.68	28.6
12	R2	22	4.8	0.656	22.7	LOS C	11.7	82.9	0.75	0.67	28.7
Approach		921	9.1	0.656	18.3	LOS B	11.7	90.6	0.75	0.68	28.6
All Vehicles		1786	7.4	0.656	15.3	LOS B	11.7	90.6	0.64	0.59	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	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	365	29.7	LOS C	0.7	0.7	0.93	0.93
P2	East Full Crossing	385	29.7	LOS C	0.7	0.7	0.93	0.93
P3	North Full Crossing	256	29.6	LOS C	0.5	0.5	0.92	0.92
P4	West Full Crossing	296	29.6	LOS C	0.5	0.5	0.93	0.93
All Pedestrians		1302	29.7	LOS C			0.93	0.93

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.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: AM Base

VV0227_13H
Signals - Actuated Cycle Time = 56 seconds (Optimum Cycle Time - Minimum Delay)

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: Young St S											
1	L2	17	12.5	0.043	19.4	LOS B	0.3	2.5	0.69	0.64	28.8
2	T1	3	33.3	0.044	15.7	LOS B	0.3	2.6	0.71	0.62	28.6
3	R2	13	16.7	0.044	20.2	LOS C	0.3	2.6	0.71	0.62	28.6
Approach		33	16.1	0.044	19.3	LOS B	0.3	2.6	0.70	0.63	28.7
East: Bridge St E											
4	L2	49	4.3	0.697	15.6	LOS B	12.0	89.3	0.71	0.64	31.6
5	T1	774	8.0	0.697	11.7	LOS B	12.0	89.3	0.74	0.67	31.2
6	R2	99	43.6	0.697	18.0	LOS B	5.2	42.8	0.86	0.75	30.0
Approach		922	11.6	0.697	12.6	LOS B	12.0	89.3	0.75	0.67	31.1
North: Young St N											
7	L2	48	43.5	0.333	21.7	LOS C	2.1	19.7	0.78	0.70	28.0
8	T1	6	16.7	0.333	17.2	LOS B	2.1	19.7	0.78	0.70	28.0
9	R2	41	33.3	0.333	21.2	LOS C	2.1	19.7	0.78	0.70	28.0
Approach		96	37.4	0.333	21.2	LOS C	2.1	19.7	0.78	0.70	28.0
West: Bridge St W											
10	L2	39	10.8	0.685	26.7	LOS C	7.9	59.9	0.89	0.76	26.7
11	T1	542	10.3	0.685	22.3	LOS C	7.9	59.9	0.89	0.76	26.7
12	R2	19	5.6	0.685	26.7	LOS C	7.0	53.2	0.89	0.76	26.7
Approach		600	10.2	0.685	22.7	LOS C	7.9	59.9	0.89	0.76	26.7
All Vehicles		1651	12.7	0.697	16.9	LOS B	12.0	89.3	0.80	0.70	29.1

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	288	22.6	LOS C	0.4	0.4	0.90	0.90
P2	East Full Crossing	665	23.0	LOS C	1.0	1.0	0.92	0.92
P3	North Full Crossing	340	22.6	LOS C	0.5	0.5	0.91	0.91
P4	West Full Crossing	466	22.8	LOS C	0.7	0.7	0.91	0.91
All Pedestrians		1760	22.8	LOS C			0.91	0.91

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: AM Future

VV0227_13H
Signals - Actuated Cycle Time = 56 seconds (Optimum Cycle Time - Minimum Delay)

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: Young St S											
1	L2	17	12.5	0.043	19.4	LOS B	0.3	2.5	0.69	0.64	28.8
2	T1	3	33.3	0.044	15.7	LOS B	0.3	2.6	0.71	0.62	28.6
3	R2	13	16.7	0.044	20.2	LOS C	0.3	2.6	0.71	0.62	28.6
Approach		33	16.1	0.044	19.3	LOS B	0.3	2.6	0.70	0.63	28.7
East: Bridge St E											
4	L2	49	4.3	0.707	15.6	LOS B	12.3	91.5	0.71	0.65	31.6
5	T1	792	7.8	0.707	11.9	LOS B	12.3	91.5	0.75	0.67	31.2
6	R2	99	43.6	0.707	18.3	LOS B	5.4	44.0	0.86	0.76	29.8
Approach		940	11.4	0.707	12.7	LOS B	12.3	91.5	0.76	0.68	31.0
North: Young St N											
7	L2	48	43.5	0.333	21.7	LOS C	2.1	19.7	0.78	0.70	28.0
8	T1	6	16.7	0.333	17.2	LOS B	2.1	19.7	0.78	0.70	28.0
9	R2	41	33.3	0.333	21.2	LOS C	2.1	19.7	0.78	0.70	28.0
Approach		96	37.4	0.333	21.2	LOS C	2.1	19.7	0.78	0.70	28.0
West: Bridge St W											
10	L2	39	10.8	0.685	26.7	LOS C	7.9	59.9	0.89	0.76	26.7
11	T1	542	10.3	0.685	22.3	LOS C	7.9	59.9	0.89	0.76	26.7
12	R2	19	5.6	0.685	26.7	LOS C	7.0	53.1	0.89	0.76	26.7
Approach		600	10.2	0.685	22.7	LOS C	7.9	59.9	0.89	0.76	26.7
All Vehicles		1668	12.6	0.707	16.9	LOS B	12.3	91.5	0.81	0.71	29.1

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	288	22.6	LOS C	0.4	0.4	0.90	0.90
P2	East Full Crossing	665	23.0	LOS C	1.0	1.0	0.92	0.92
P3	North Full Crossing	340	22.6	LOS C	0.5	0.5	0.91	0.91
P4	West Full Crossing	466	22.8	LOS C	0.7	0.7	0.91	0.91
All Pedestrians		1760	22.8	LOS C			0.91	0.91

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: PM Base

VV0227_13H
Signals - Actuated Cycle Time = 56 seconds (Optimum Cycle Time - Minimum Delay)

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: Young St S											
1	L2	60	0.0	0.141	20.0	LOS C	1.2	8.4	0.72	0.71	28.5
2	T1	3	0.0	0.077	16.0	LOS B	0.6	4.2	0.72	0.67	28.5
3	R2	26	0.0	0.077	20.4	LOS C	0.6	4.2	0.72	0.67	28.5
Approach		89	0.0	0.141	20.0	LOS C	1.2	8.4	0.72	0.69	28.5
East: Bridge St E											
4	L2	15	0.0	0.469	14.0	LOS B	6.7	48.1	0.56	0.50	32.7
5	T1	575	3.5	0.469	10.3	LOS B	6.7	48.1	0.62	0.54	32.2
6	R2	56	69.8	0.469	17.0	LOS B	3.4	28.0	0.79	0.67	30.6
Approach		645	9.1	0.469	11.0	LOS B	6.7	48.1	0.63	0.55	32.0
North: Young St N											
7	L2	60	50.9	0.400	22.3	LOS C	2.3	23.6	0.80	0.71	27.7
8	T1	1	0.0	0.400	17.8	LOS B	2.3	23.6	0.80	0.71	27.7
9	R2	41	51.3	0.400	21.8	LOS C	2.3	23.6	0.80	0.71	27.7
Approach		102	50.5	0.400	22.0	LOS C	2.3	23.6	0.80	0.71	27.7
West: Bridge St W											
10	L2	16	13.3	0.774	27.2	LOS C	10.1	71.4	0.93	0.79	26.5
11	T1	732	0.7	0.774	22.8	LOS C	10.1	71.4	0.93	0.79	26.5
12	R2	6	0.0	0.774	27.2	LOS C	9.2	64.9	0.93	0.79	26.5
Approach		754	1.0	0.774	22.9	LOS C	10.1	71.4	0.93	0.79	26.5
All Vehicles		1591	7.4	0.774	17.9	LOS B	10.1	71.4	0.79	0.68	28.7

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	158	22.5	LOS C	0.2	0.2	0.90	0.90
P2	East Full Crossing	520	22.8	LOS C	0.8	0.8	0.91	0.91
P3	North Full Crossing	279	22.6	LOS C	0.4	0.4	0.90	0.90
P4	West Full Crossing	519	22.8	LOS C	0.8	0.8	0.91	0.91
All Pedestrians		1476	22.7	LOS C			0.91	0.91

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: PM Future

VV0227_13H
Signals - Actuated Cycle Time = 56 seconds (Optimum Cycle Time - Minimum Delay)

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: Young St S											
1	L2	60	0.0	0.141	20.0	LOS C	1.2	8.4	0.72	0.71	28.5
2	T1	3	0.0	0.077	16.0	LOS B	0.6	4.2	0.72	0.67	28.5
3	R2	26	0.0	0.077	20.4	LOS C	0.6	4.2	0.72	0.67	28.5
Approach		89	0.0	0.141	20.0	LOS C	1.2	8.4	0.72	0.69	28.5
East: Bridge St E											
4	L2	15	0.0	0.469	14.0	LOS B	6.7	48.1	0.56	0.50	32.7
5	T1	575	3.5	0.469	10.3	LOS B	6.7	48.1	0.62	0.54	32.2
6	R2	56	69.8	0.469	17.0	LOS B	3.3	27.9	0.79	0.67	30.6
Approach		645	9.1	0.469	11.0	LOS B	6.7	48.1	0.63	0.55	32.0
North: Young St N											
7	L2	60	50.9	0.400	22.3	LOS C	2.3	23.6	0.80	0.71	27.7
8	T1	1	0.0	0.400	17.8	LOS B	2.3	23.6	0.80	0.71	27.7
9	R2	41	51.3	0.400	21.8	LOS C	2.3	23.6	0.80	0.71	27.7
Approach		102	50.5	0.400	22.0	LOS C	2.3	23.6	0.80	0.71	27.7
West: Bridge St W											
10	L2	16	13.3	0.792	27.4	LOS C	10.4	73.7	0.94	0.80	26.5
11	T1	749	0.7	0.792	22.9	LOS C	10.4	73.7	0.94	0.80	26.4
12	R2	6	0.0	0.792	27.3	LOS C	9.5	67.0	0.94	0.80	26.4
Approach		772	1.0	0.792	23.0	LOS C	10.4	73.7	0.94	0.80	26.4
All Vehicles		1608	7.3	0.792	18.0	LOS B	10.4	73.7	0.79	0.69	28.7

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	158	22.5	LOS C	0.2	0.2	0.90	0.90
P2	East Full Crossing	520	22.8	LOS C	0.8	0.8	0.91	0.91
P3	North Full Crossing	279	22.6	LOS C	0.4	0.4	0.90	0.90
P4	West Full Crossing	519	22.8	LOS C	0.8	0.8	0.91	0.91
All Pedestrians		1476	22.7	LOS C			0.91	0.91

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.