



TRAFFIC • PARKING • ACOUSTICS

Concrete Batching Plant
236 Abbotsford Road, Bowen Hills
Traffic Engineering Report

PLANS AND DOCUMENTS
referred to in the PDA APPROVAL

17 JUN 2014

MEDQ

Hanson Construction Materials Pty Ltd

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ABN 65 010 868 621

Level 1/129 Logan Road, Woolloongabba

PO Box 1310 Coorparoo BC QLD 4151

T: (07) 3327 9500 F: (07) 3327 9501 E: ttmbris@ttmgroup.com.au

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		Name	Signature		
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1. Introduction

1.1. Background

TTM Consulting has been engaged by Hanson Construction Materials Pty Ltd to prepare a traffic engineering report investigating a proposed Concrete Batching plant. It is understood that a Development Application will be lodged with the Department of State Development, Infrastructure and Planning, under the Bowen Hills Urban Development Authority (UDA).

1.2. Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Parking supply required to cater for development demand
- Identification of likely traffic volumes and traffic distribution from the development
- Identification of likely traffic impact of development on the public road network
- Access configuration to provide efficient and safe manoeuvring between the site and the public road network
- Suitability of access for trucks and internal facilities to provide for pedestrian and cyclist operation
- Access to suitable level of public transport

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- Brisbane City Council Planning Scheme, specifically:
 - Transport, Access, Parking and Servicing Code
 - Transport, Access, Parking and Servicing Planning Scheme Policy
 - Bowen Hills District Neighbourhood Plan
- Bowen Hills UDA Development Scheme
- Australian Standard 2890
- Queensland Complete Streets

1.3. Site Location

The site is located at 236 Abbotsford Road, Bowen Hills near the intersection of Abbotsford Road / Gebbie Street, as shown in Figure 1.1. The property description is Lot 22 RP46694, Lots 16 to 21 RP48712, Lots 33 to 37 RP 55484, and Lot 314 SP268648. The site has road frontages to Abbotsford Road and Gebbie Street.



Figure 1.1: Site location

1.4. Current Site Use

The site premises was utilised as a Bus Depot previously, and currently it is not in operation. Uses that occurred within the former operation of the site that will be retained with the proposed use, includes:

- Retention of main buildings
- Vehicle access at the same location
- Onsite facilities, including fuel storage, bunds and dispenser, to be retained
- Retention of hard stand primarily at current levels

2. The Proposed Development

2.1. Development Profile

The proposal is to establish concrete batching plant on land formerly operating as the Abbotsford Road Bus Depot. The proposed development profile consists of the following:

- Three concrete loading bays
- Aggregate Loading Facility
- Wash-down facility
- Diesel fuelling point
- Local office facilities

It is anticipated that 24 hour access will be required for the site. However general hours of operation are 5am to 10pm, Monday to Saturday.

2.2. Access

Access is currently from Gebbie Street via a 10m wide access road to the north and direct access to the Burrows Street/Abbotsford Road intersection via a 6m wide crossover.

2.3. Parking

The development proposal includes

- Parking for 37 cars, including 1 PWD suitable space
- Formal on-site parking for over 24 concrete trucks, plus additional hardstand areas

3. Existing Transport Infrastructure

3.1. The Road Network

All roads in the immediate vicinity of the site are administered by BCC. The hierarchy and characteristics of roads in the immediate vicinity of the site are shown below in Figure 3.1.

Figure 3.1: Local Road Hierarchy

Road	Speed Limit	Lanes	Classification	Management
Abbotsford Road	60kph	6 (undivided)	Arterial Road	BCC
Sandgate Road	60kph	4 (undivided)	Arterial Road	BCC
Inner City Bypass	70kph	4 (divided)	District Route	BCC
Gebbie Street	40kph	2 (undivided)	Access Road	BCC

Abbotsford Road has an 18m wide carriageway at the site frontage, clear of parking on each side of the road. This road extends to north connecting Sandgate Road. The Inner City Bypass runs perpendicular to Abbotsford Road to the south of the development.

3.2. Road Planning

According to the Bowen Hills UDA Development Scheme, the site falls under Breakfast Creek Precinct 9, the light industry with medium impact employment zone. The intent of this precinct in the short term is to retain the industry activities which provide services to the inner city and business support for the activities in nearby areas.

There is opportunity within the precinct for small scale offices. Opportunity will be taken to provide for public access along Breakfast Creek as redevelopment occurs. Longer term, there is potential to combine this precinct with the Queensland Rail land to the west, possibly providing for mixed use, showrooms and other forms of commercial development. Figure 3.2 shows the extent of the precinct in context of Bowen Hills UDA Master Plan.

The following are some of the proposed infrastructure improvements according to The UDA Development Scheme:

- New road west of the railway corridor linking Hudd Street through to Abbotsford Road at Edmondstone Street;
- Widening of Cambell Street east of Mayne Road through to Abbotsford Road and public realm improvements;
- Intersection modifications to the junction of Campbell Street and Abbotsford Road / Markwell Street to allow for additional right turn lane when accessing Markwell Street heading south;

- Intersection modifications at the junction of Abbotsford Road, Edmondstone Street and the new road west of the railway corridor, allowing for a dedicated turn left lane into Abbotsford Road; and
- Intersection signalisation at the junction of Hudd Street and the new road west of the railway corridor linking through to Abbotsford Road at Edmondstone Street.

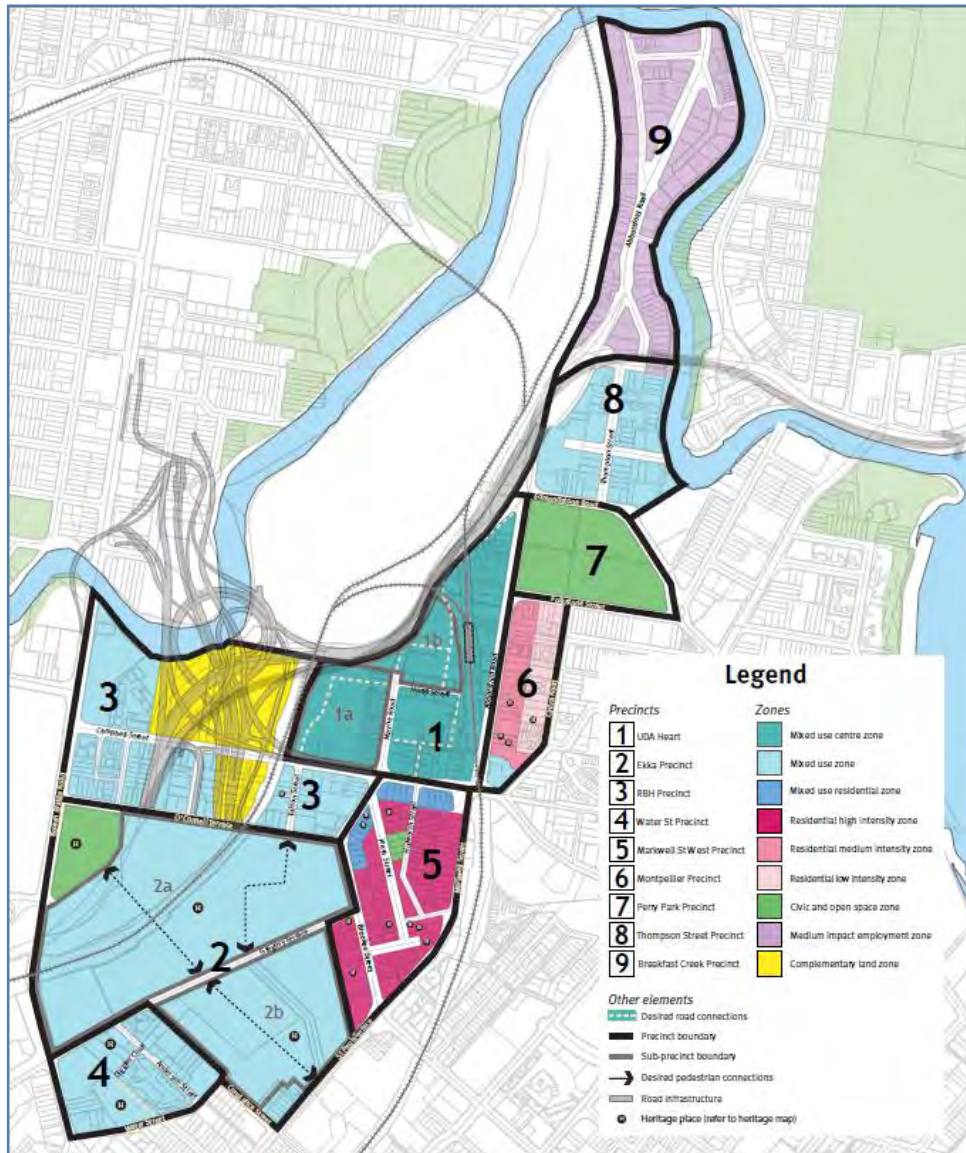


Figure 3.2: Bowen Hills Urban Development Master Plan - Precinct Map

3.3. Public Transport and Pedestrian Facilities

Brisbane Bus service provider Translink bus stop is located in front of the site on Abbotsford Road. All services from Chermside and Eagle Junction are accessible from the site. The services operate with the frequency of every 15 minutes in the peak time and in the off peak time, the services are operating with the frequency of every 30 minutes. Pedestrian footpaths currently exist on either side of Abbostford Road, there are no dedicated bicycle lanes in the vicinity of the precinct.

4. Car Parking Arrangements

4.1. Council Parking Supply Requirement

There are no suitable parking rates for concrete batching plants identified in the Brisbane City Council TAPS Policy and/or the Bowen Hills UDA Development Scheme.

4.2. Estimated Practical Parking Demands

As there are no parking rates specified in TAPS Policy, an appropriate rate is identified based on expected workforce and associated vehicle access requirements. It is estimated that, on an average there will be approximately 40 persons will be working at the plant at any given time. This will consist of 3 administration roles within the site and the remainder as truck drivers.

The car park will generally cater for 100% of staff parking. In rare events, if staff parking exceeds the 36 space provision, drivers will be able to park in the designated truck parking bays that have been vacated for the day. This effectively adds 24 additional parking spaces available during the day.

4.3. Car Park Layout

Table 4.2 identifies the characteristics of the proposed parking area with respect to the Council requirements. The last column identifies the compliance of each design aspect. Where compliance with Council is not achieved, further information is provided below.

Table 4.1: Proposed Car Parking Layout

Design Aspect	Council Requirement	Proposed Provision	Compliance
Parking space length: Standard bay	5.4m (min)	5.4m	Council Compliant
Parking space width: - Staff - Visitor	2.6m (min) 2.6m (min)	2.6m 2.6m	Council Compliant Council Compliant
Aisle Width: Parking aisle	6.2m (min)	6.5m (min)	Council Compliant
Maximum Gradient: - Parking bay - Parking aisle	1:15 (6.7%) 1:20 (5.0%)	1:20 (max) 1:20 (max)	Council Compliant Council Compliant
Parking Aisle Extension	2m beyond last bay or 8m wide aisle	8m wide aisle	Council Compliant

The proposed car park layout fully complies with Council requirements. Therefore the car parking arrangement is considered suitable for the proposed development.

5. Existing Traffic Volumes

TTM Data conducted an intersection movement survey at Abbotsford Road / Gebbie Street intersection between 7:00-9:00am and 4:00-6:00pm on Tuesday the 18th March 2014. The peak hours were found to be 7.00-8.00am and 16.45-17.45 pm. The results of the survey are shown below in Figure 5.1 & Figure 5.2. The survey results indicate that the AM/PM peak hour traffic volumes on Gebbie Street near the subject site are in the order of 19 vph and 40 vph respectively.

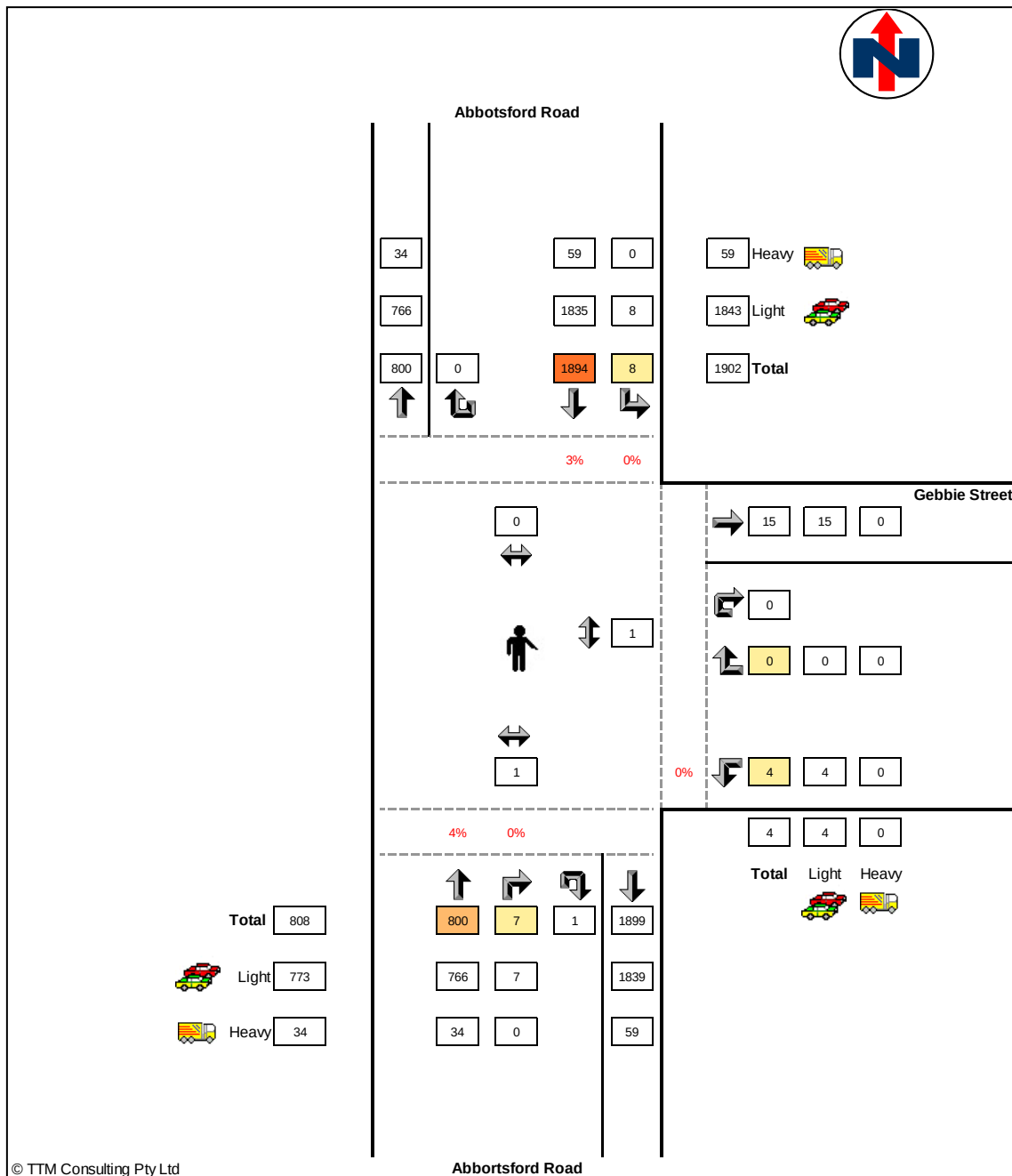


Figure 5.1: 2014 AM peak hour traffic volumes - Abbotsford Road / Gebbie Street

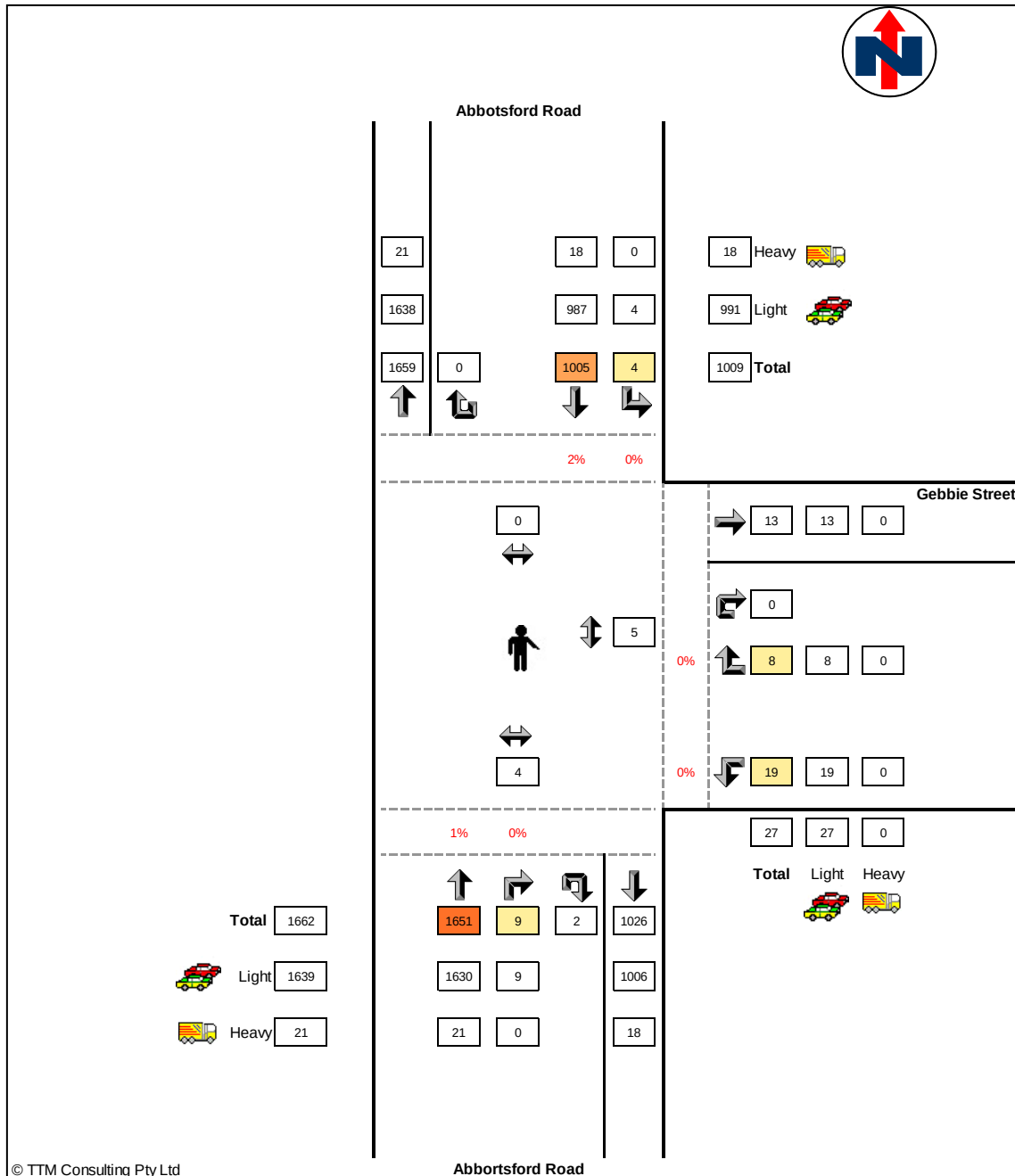


Figure 5.2: 2014 PM peak hour traffic volumes - Abbotsford Road / Gebbie Street

5.1. Daily Traffic

The daily traffic volumes on Gebbie Street would be approximately 300 vehicles per day, based on the above average peak hours representing approximately 10% of the total daily traffic.

6. Estimated Future Transport Demands

Acceptable Solution A1 of the Brisbane Transport, Access, Parking and Servicing Code requires that an impact assessment is performed for any development that meets any of the following triggers:

- more than 500 low turnover (employee) parking spaces or 200 high turnover (customer or visitor) parking spaces
- access to any roads other than minor roads
- a driveway within 100m of a signalized intersection

The proposed development is located within 100m of an intersection in the north and directly accesses a major road in the south, therefore it is considered necessary to undertake a traffic impact assessment for this site.

TTM has analysed the base case and opening day impact of the development generated traffic (project case) on the subject intersection to provide a robust assessment of the development impact.

6.1. Estimated Development Traffic Generation

The Department of Main Roads 'Road Planning and Design Manual' recommends using specific generation rates, for planning purposes, for different development types. However, there are no rates specified for this type of development.

As a result TTM has estimated the traffic generation for the proposed development based on the current operation of the plant located at West End. The West End plant currently operates with two concrete loading bays. The proposed development will introduce sufficient infrastructure to cater for a third loading bay.

Peak Hour

To identify peak hour volumes, TTM has assessed all delivery and concrete vehicle movements that operate at an existing Hanson facility, which is similar scale to the proposed operation. As every truck at the operating the operating site must be logged, Hanson has provided a 100% record of each movement throughout 2013.

The existing peak hour traffic generation for the 2 operating loading bays at the studied site is 34vph. This is equivalent to the 85th percentile traffic generation for trucks over the 2013 assessment period. The median peak hour is approximately 25vph and the average operation of the course of a 17 hour day is 15 trucks per hour.

The peak was found to occur mid-morning (9am to 10am) and included concrete trucks and a number of materials deliveries. However, it is also noted that the truck volume is relatively consistent from 6am to 11am.

The proposed site will operate three concrete loading bays. As such, peak hour traffic generation for the addition of one loading bay is assumed to be 50% of the existing traffic, adding 17 vehicles per hour which equates to approximately total of 51vph. This is a record of the number of trucks only, each with an inbound and outbound movement. As such, the total site traffic generation is 102 vehicles per hour (51 in and 51 out).

These 51 trucks per hour have been determined based on the time at which delivery vehicles arrive or when concrete trucks commence loading. It follows that the two way operation of these trucks represents 100% of the development traffic over a peak hour. Delivery vehicles will generally arrive and depart within the same hour. Concrete trucks however have a loading and delivery cycle that exceeds 1 hour. Therefore, in the AM peak, it is possible for either,

- A concrete truck to return to site from an earlier delivery, reload and depart
- A driver to arrive in a private vehicle, load a truck and depart.

In either of these cases, the one concrete load generates a maximum of two vehicle movements. Therefore, access to the car park is included in the peak traffic generation and has therefore been split out in Figure 6.2 as accessing the southern site driveway.

Daily

The average daily traffic generation for the existing two loading bay plant is approximately 540 vehicles per day, allowing for 230 trucks arriving and departing as well as 40 staff arriving and departing.

Daily traffic generation for a site operating three loading bays is therefore estimated at 810vpd.

6.2. Estimated Development Traffic Distribution

The distribution of development generation traffic is based on the following:

- 50% of development traffic is inbound in the AM Peak, with the remaining 50% outbound
- 50% of development traffic is inbound in the PM Peak, with the remaining 50% outbound

The estimated distribution of development generated traffic is shown in Figure.6.1. Based on current distribution patterns in the area it is considered that an approximate distribution of 50% of trips would originate / terminate to the north and 50% would originate / terminate to the south of the site. This is based on advice from the client that the spread of customers is likely to be distributed evenly from the site.

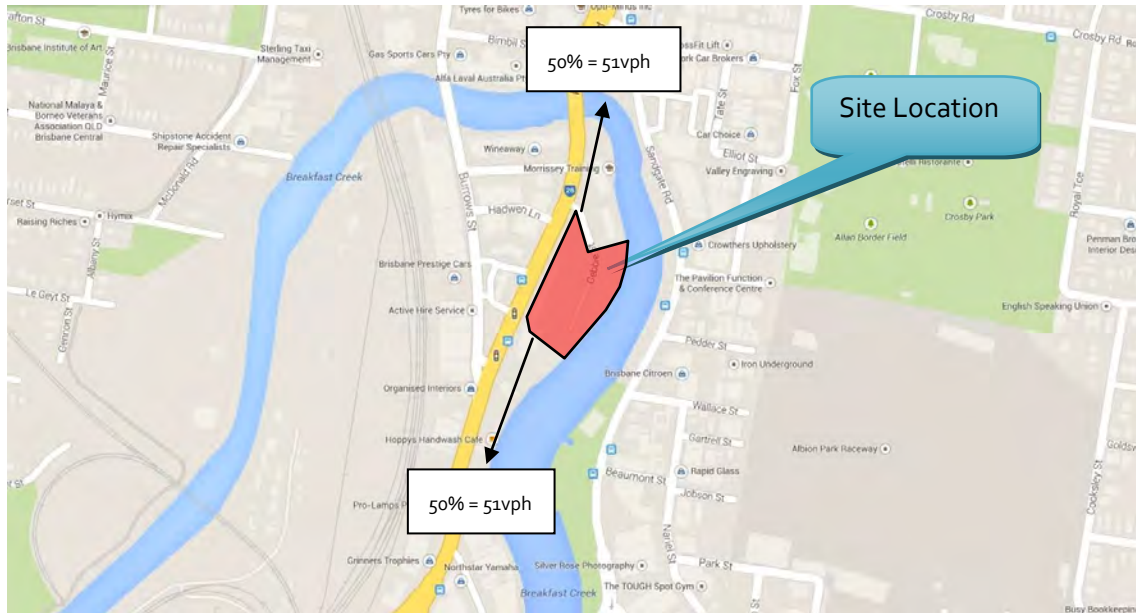


Figure 6.1: Estimated Traffic Distribution

The following Figure 6.2 shows the development traffic volume increase at the subject intersection.

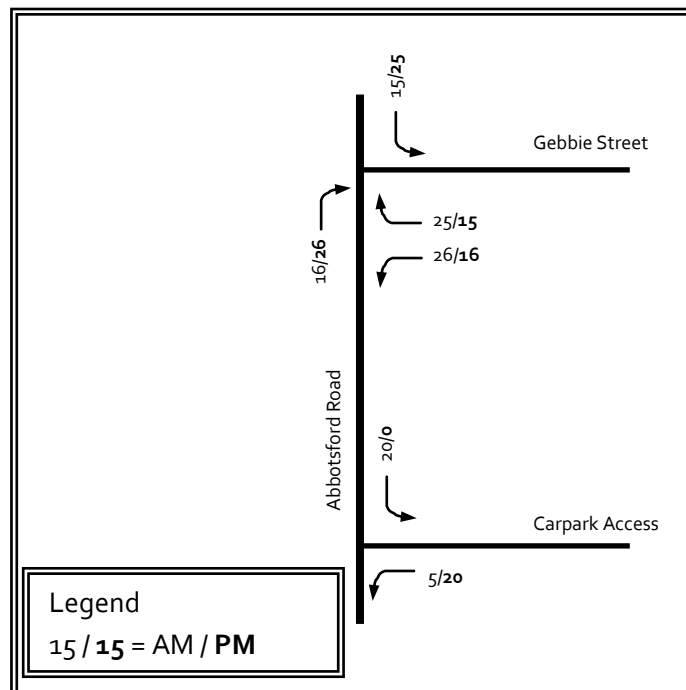


Figure 6.2: Development Peak Hour Traffic Volumes - Abbotsford Road / Gebbie Street

Figure 6.3 shows the background plus development traffic at the subject intersection.

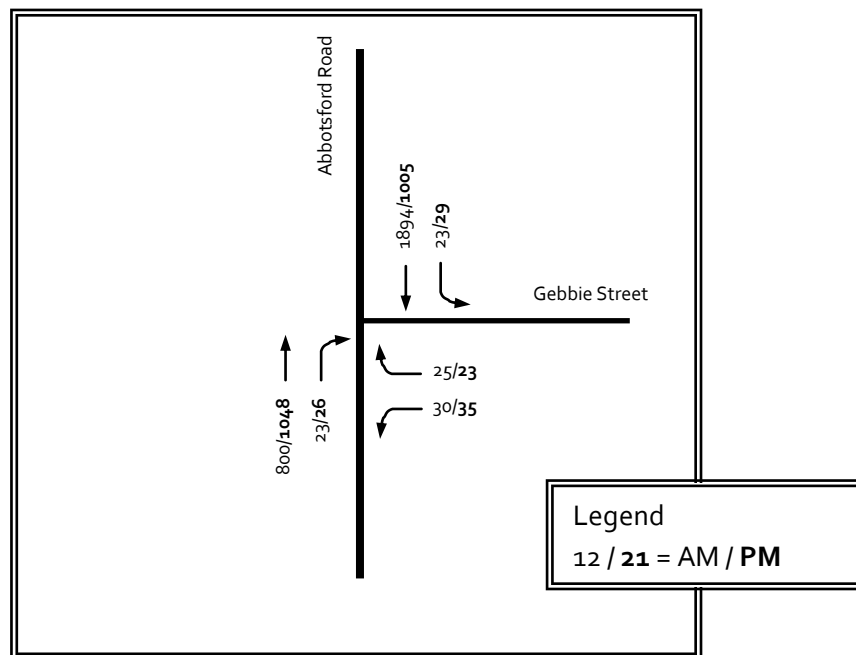


Figure 6.3: Background (2014) plus Development Peak Hour Traffic Volumes - Abbotsford Road / Gebbie Street

7. Road Network Performance

The SIDRA intersection 5.1 software programme has been used to perform the above mentioned intersection analysis. The peak hour traffic volumes at the intersection, with and without development traffic has been analysed. The following Figure 7.1 shows the intersection configuration from the SIDRA analysis.

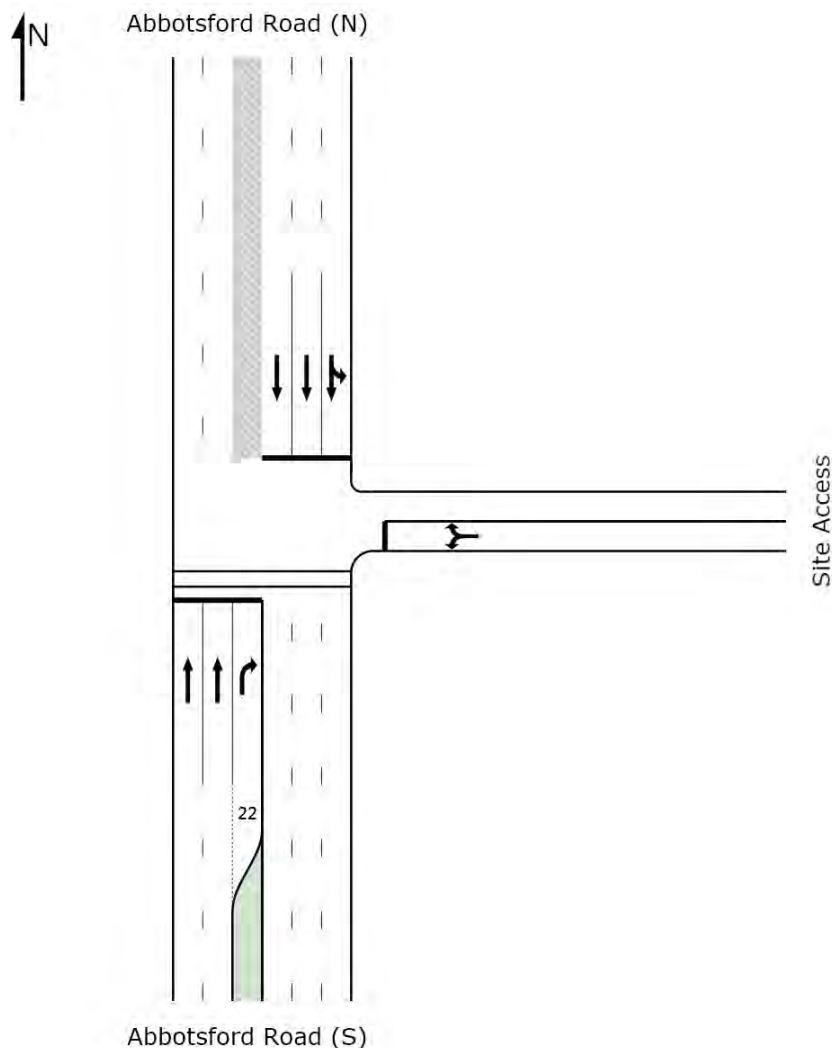


Figure.7.1: Abbotsford Road / Gebbie Street Intersection Configuration (SIDRA analysis)

The intersection has been assessed as 3 phases, as follows:

- All movements from south (through and right)
- Through movements on Abbotsford Road, including filtered right turn from south
- All movements from Gebbie Street

This is consistent with the current phasing at the intersection. TTM has also retained the current 100 second cycle time as the future cycle time for the intersection.

7.1. Analysis of Abbotsford Road / Gebbie Street Intersection

The analysis of the AM & PM peak for current traffic volumes indicate that the intersection is operating at 61% and 64% of its capacity respectively indicating Level of Service (LoS) D. The critical movements at the intersection are the Gebbie Street (site access) approach movements with an average of 35 and 37 seconds delay respectively. The maximum delay for the right turn traffic from Abbotsford Road south approach is recorded as 19 seconds in AM peak.

With the development traffic volumes, the intersection is operating at 62% and 64% of its capacity in the AM & PM peak respectively indicating LoS D. The delays for critical movements are recorded as 43 and 41 seconds in AM & PM peak respectively, whereas the maximum delay recorded for right turn into Gebbie Street is 23 seconds in AM peak. This indicates that the intersection operates with similar results in both with and without development traffic demands.

As such, the minor addition of the development traffic, in terms of vehicle movements per hour, is not expected to impact intersection operation significantly.

Table 7.1 provides a summary of the SIDRA outputs;

Table 7.1: Summary of SIDRA Outputs

Case	Degree of Saturation	Average Delay (Sec)	Level of Service (worst movement)	95th Percentile Critical Queue (m)		
				South*	East	North
AM Base Case	61%	14.3	D	59.8/0.9	1.2	151.5
AM Project Case	62%	15.0	D	59.8/4.8	26.2	154.8
PM Base Case	64%	12.1	D	166.2/1.1	6.8	64.3
PM Project case	64%	12.7	D	166.2/6.9	22.1	67.8

Note: the queue length for the southern approach is provided for the maximum queue and the right turn queue.

7.1.1. Analysis Conclusions

The intersection of Abbotsford Road / Gebbie Street is operating at close to 64% of its capacity in PM peak period for both Base and Project case. This does not change between cases as it is the through movement on Abbotsford Road with peak capacity. The overall delay increase is in the order of 0.7 seconds when compared between with and without development cases for both AM and PM peak periods.

The turn movement from Gebbie Street approach is experiencing similar delays and operating with LoS D in both with and without development scenario. This implies that the addition of development generated traffic is not expected to have any adverse impacts on the intersection operation.

The maximum queue for right turn traffic from south approach is approximately 7m for with development case in both AM & PM peak periods, practically this equates to less than one

vehicle queue. Therefore the analysis indicates that the existing length of the right turn lane (22m) is considered sufficient to cater for the proposed development generated traffic.

Therefore it is concluded that the development traffic would not significantly impact the intersection operation.

In addition to the above, TTM has also assessed a worst case scenario for the AM peak, where the development traffic is 100% generated from the south. In this instance, the only change with respect to the intersection operation is a 2m increase in queue length on the right turn into Gebbie Street. This is still substantially less than one vehicle.

Overall in this case the overall intersection operation improves as the number of vehicles on the northern approach reduces, which is to highest degree of saturation approach.

The SIDRA analysis results are attached as Appendix C.

8. Site Access Arrangements

8.1. Council Requirements

With regard to site access, Council guidelines require the following:

- a low/medium turnover car park with a capacity between 26 and 250 vehicles and access from a minor road to incorporate a 6m wide Type B2 driveway crossover.
- a driveway on a major road to be not less than:
 - 20m from a minor intersection
 - 30m from a major intersection
 - 15m from an adjacent driveway
 - Clear of queuing at signals
- sight distance (for access to parking spaces between 25 and 250 from a 60kph major road) to ideally be 110m, and a minimum of 90m.
- an exit queue capacity of 3 vehicle (i.e. 18m) is required for car parks with a capacity of 41 cars.
- the first 6m of driveway inside the site boundary to be no steeper than 1in20.

8.2. Proposed Access Arrangements and Their Adequacy

8.2.1. Gebbie Street Access

The Gebbie Street access will be a truck access only, catering for all inbound truck movements to the site and the majority of truck exits.

Currently Gebbie Street serves as the access to the existing occupancies to the north of Gebbie Street and the proposed development to the south. The proposal is to retain access from Gebbie Street. However, the configuration is to be amended.

Formerly the access was separated into ingress and egress at separate points. The ingress required incoming vehicles to undertake an s-shaped manoeuvre to enter the site.

To eliminate this, and to address acoustic and visual amenity issues, the access will be converted to a single crossover catering for inbound and outbound traffic. This is shown in TTM drawing 14BRT0098-SK03 (included in Appendix B). It is identified that a single 9.5m wide access will allow for trucks to enter and depart the site. This width is adequate as the movement of these vehicles is generally in a straight line, with limited turning required through the access driveway.

There is a secondary egress to Gebbie Street, adjacent to the diesel fuel area. This will be utilised occasionally by cement trucks to exit once refuelled. These vehicles are typically

smaller than the buses that previously undertook this manoeuvre. As such, no assessment of this egress point is considered necessary.

8.2.2. Gebbie Street Intersection

TTM drawing 14BRT0098-SK02 (included in Appendix B) identifies minor kerb widening that is required at this intersection to cater for 19m articulated vehicles. In the past the design vehicle has been a rigid bus. Larger vehicles require a slightly amended kerb alignment to allow two-way movement.

This is also accompanied by a set-back of the Stop Line for right turns into Gebbie Street. It is noted that right turns to and left turns from Gebbie Street can not occur concurrently due to overlap of turn paths. However, this is consistent with the analysed signal sequences at the intersection.

8.2.3. Abbotsford Road Access

This access will provide all light vehicle access and limited heavy vehicle egress, typically aggregate delivery vehicles several times per day.

It is proposed that the existing traffic island is amended as shown in TTM drawing 14BRT0098-SK02 (included in Appendix B). This will reduce the overall width of the access, limiting it to cars only and also limit access to left-in/left-out. However it is noted that this Left-in movement would also include a through movement from Burrows Street.

It is also likely that "No Right Turn" signs will be required on the site access, both with respect to vehicles exiting the site and those entering from the south.

The TTM design identifies that a 19m AV can depart the site and with queued at the stop line will provide adequate space for car to enter.

8.2.4. Conclusion

Overall the access configuration will generally separate light and heavy traffic, while utilising existing access locations, with proven sight lines and queuing for the former use as a higher turnover bus depot.

As such, the proposed access configuration is expected to adequately service the proposed development.

9. Service Vehicle Arrangements

9.1. Council Requirements

For a development of this nature, Council requires that on-site refuse collection is catered for.

9.2. Proposed Service Vehicle Arrangements & Their Adequacy

The service vehicle requirements for the proposed development are significantly in excess of the Council requirements. The design vehicle for the site is a 19m articulated vehicle. This will access the site in the form of both semi-trailers and truck and dog combinations.

However, the most common truck will be concrete delivery vehicles. The capacity of the site will be approximately 250 loads per day. This will account for over 500 of the estimated 800 vehicle movements per day. The development includes approximately 24 dedicated truck parking bays. Additionally there is ample hard stand area to cater for significant additional truck standing, which may be utilised as overnight storage. This increases to the onsite parking capacity for trucks to over 40 .

TTM drawing 14BRT0098-SK01 (included in Appendix B) identifies all turn movements for design vehicles through the site. In all cases, semi-trailers are considered a more critical movement than truck and dog and as such it is semi-trailers identified as the design vehicle.

This drawing does identify that to achieve the required exit manoeuvre through the car park, several parking spaces are to be removed. TTM has identified that these can be accommodated along the southern and eastern boundary to maintain the designated supply. However, given that the development will accommodate overflow car parking in truck parking areas, these spaces could be removed without any significant impact.

The development proposes a refuse bin storage and collection near the entrance, adjacent to the access driveway. The refuse truck can easily access the bin storage area at the development by a forward in and forward out manoeuvre from the site. Therefore the proposed service vehicle arrangements are considered suitable for the development.

The following figure shows the refuse bin storage area at the site.

It is however noted that the on-site refuse collection is not considered a requirement. The operation as a concrete plant will produce virtually no industrial waste. The primary source of refuse will be the office, which is expected to employ three people, and the drivers. It is therefore anticipated that wheelie bins. Therefore refuse may be removed via kerb-side collection.

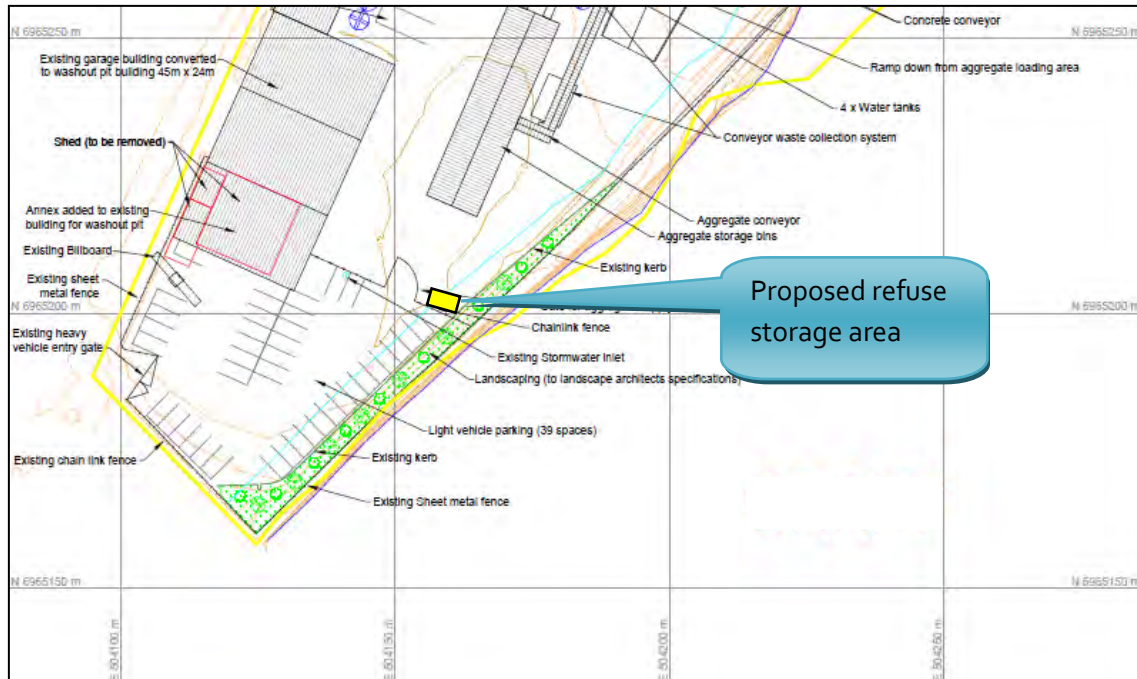


Figure.9.1: Refuse bin storage area at the proposed development site

10. Public Transport, Pedestrian and Bicycle Facilities

Pedestrian footpaths currently exist on either side of Abbotsford Road. There are no dedicated bicycle lanes in the immediate vicinity of the precinct. The pedestrian and bicycle facilities in the vicinity of the site are expected to be enhanced over the coming years, significantly improving access to public transport nodes. The development provides the enhanced access by proposing upgraded footpath facilities and reduced traffic conflict. The frontage footpath is generally to be provided as a Boulevard Treatment in accordance with the Bowen Hills UDA Planning Scheme.

The development will provide adequate pedestrian access on Abbotsford Road and Gebbie Street frontages.

The following figure shows the cycle routes available in the near vicinity. These are generally remote from the site as there is no proposal to connect these paths to the site.



Figure 10.1: Dedicated and shared bicycle friendly paths in the vicinity of the site

Brisbane Bus service provider Translink bus stop is located in front of the site on Abbotsford Road. All services from Chermside and Eagle Junction are accessible from the site. The services operate with the frequency of every 15 minutes in the peak time and in the off peak time, the services are operating with the frequency of every 30 minutes.

11. Recommendations

11.1. Impact on Surrounding Road Network

The development is expected to generate less than 2% of total peak hour trips on Abbotsford Road and the SIDRA analysis indicate that the intersection operation would not vary significantly with the development traffic at the subject intersection. As such, the development traffic will have no significant impact on the operation of the surrounding road network.

The only external amendments are related to the increased size of the design vehicle. These are in the form of minor kerb amendments

11.2. Development Access

TTM acknowledge that the former use of the development site was Brisbane Bus Depot, and the access was sufficient to cater for the bus entry and exit. The proposed development will utilise the same access points. However they will be slightly reconfigured, due to the vehicle types to be accommodated.

Therefore, the current access locations are considered appropriate for the proposed development.

11.3. Car Parking Arrangements

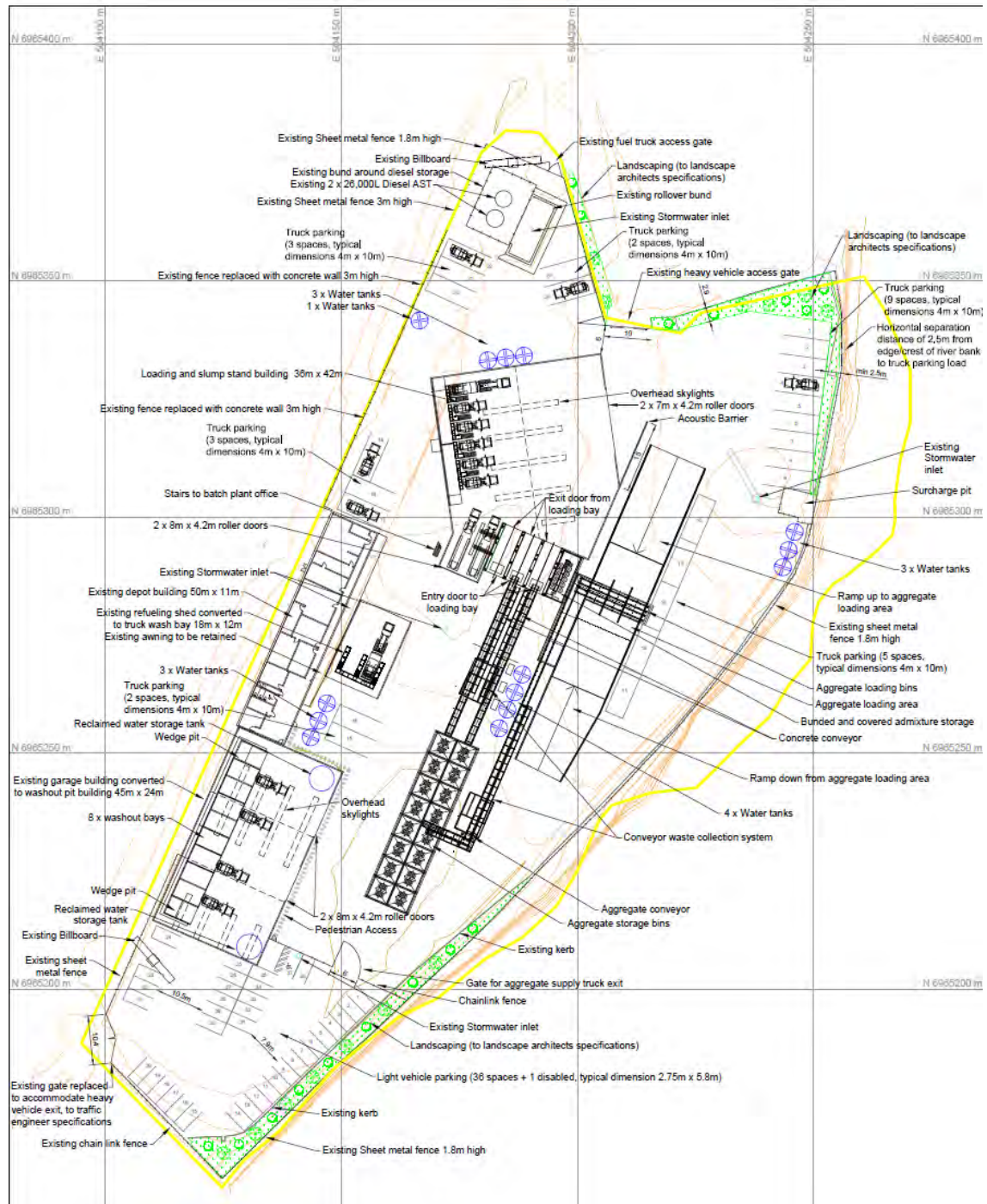
As there were no rates specified in TAPS Policy for the proposed type of development, an appropriate rate is identified based on expected workforce and associated vehicle access requirements. The development provides 36 parking spaces, which would be sufficient to cater for the development. Furthermore, overflow parking is provided in the form of shared use between driver's private vehicles and truck parking.

Therefore, the configuration of the parking area and the number of bays provided is considered appropriate for the proposed development.

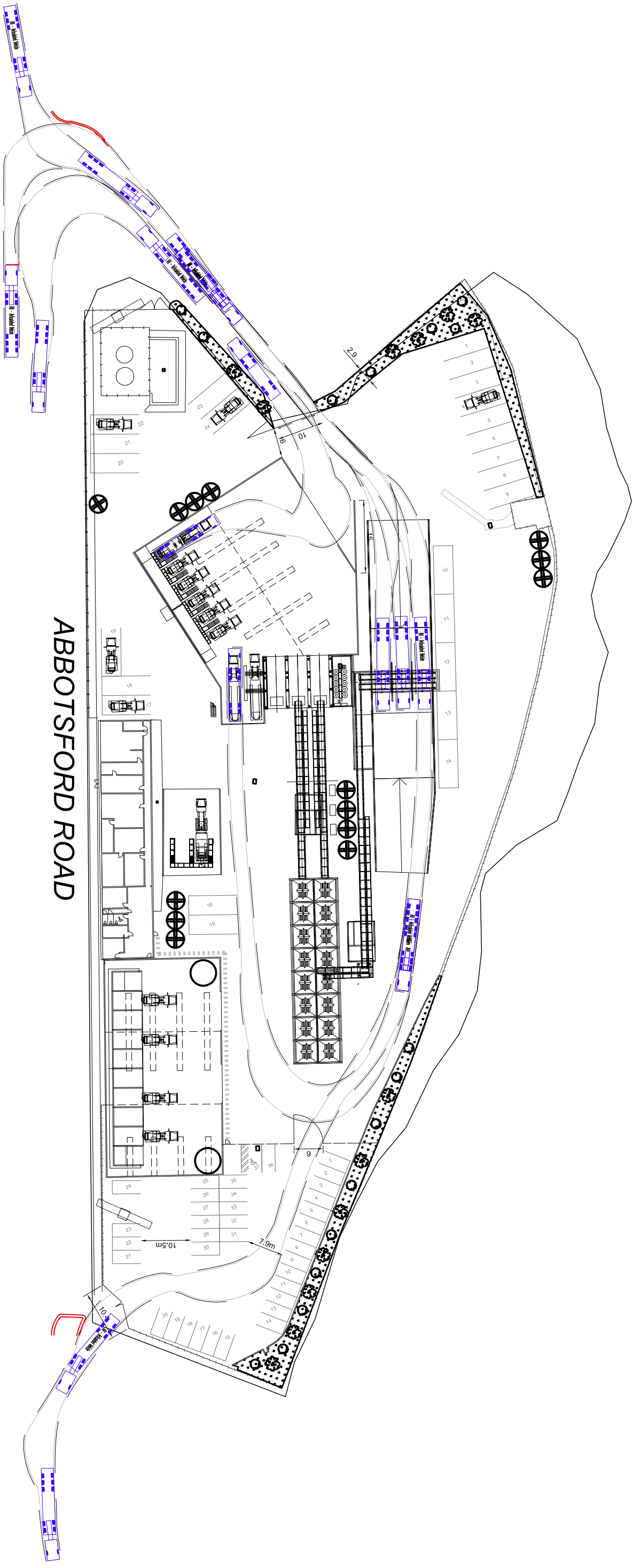
11.4. Service Vehicle Arrangements

The proposed service vehicle arrangements exceed the Council requirements and are therefore considered suitable for the development site.

Appendix A Development Layout



Appendix B Turn Movement Diagrams



ABBOTSFORD ROAD

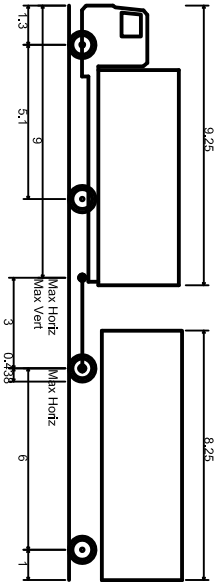
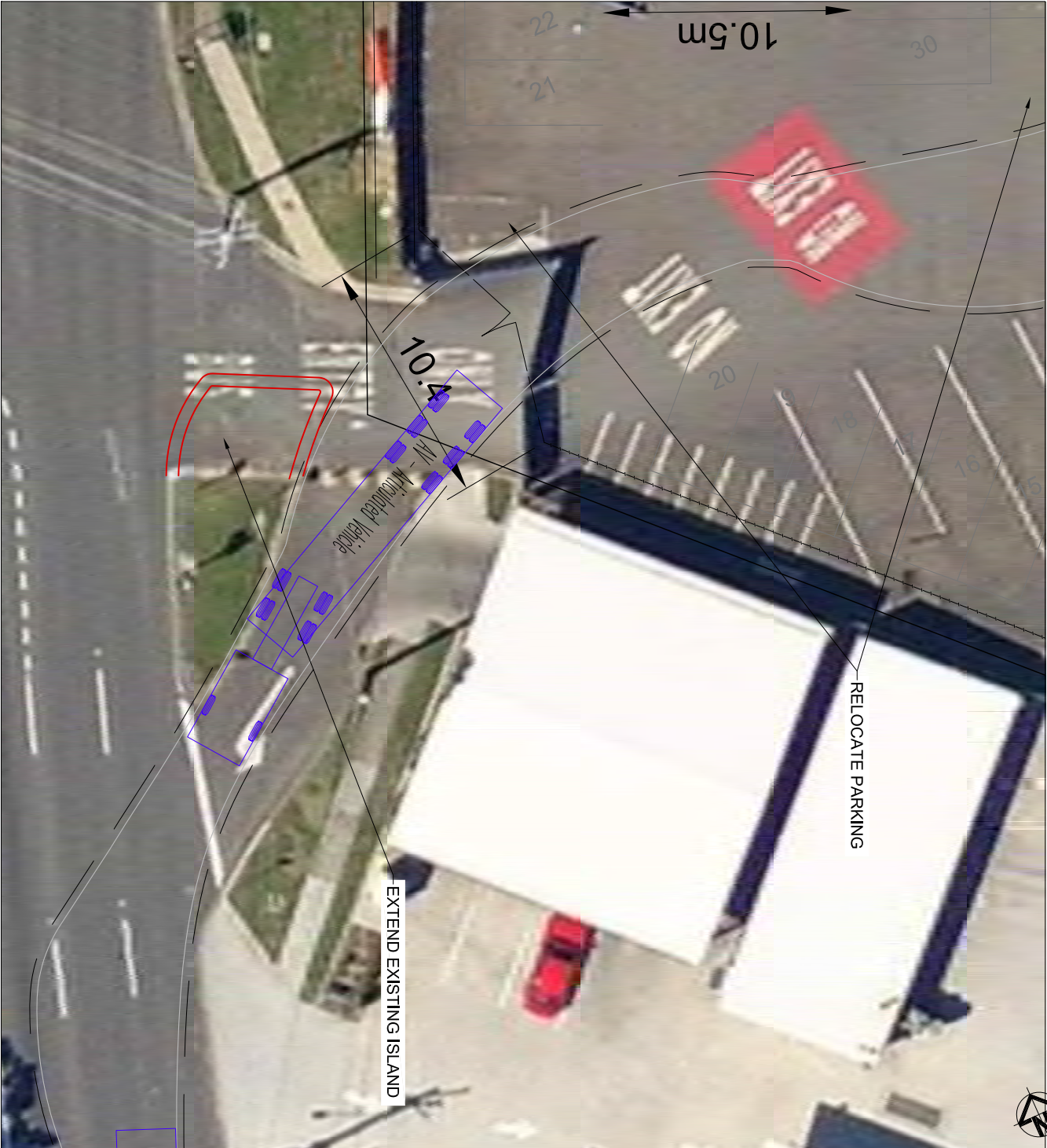
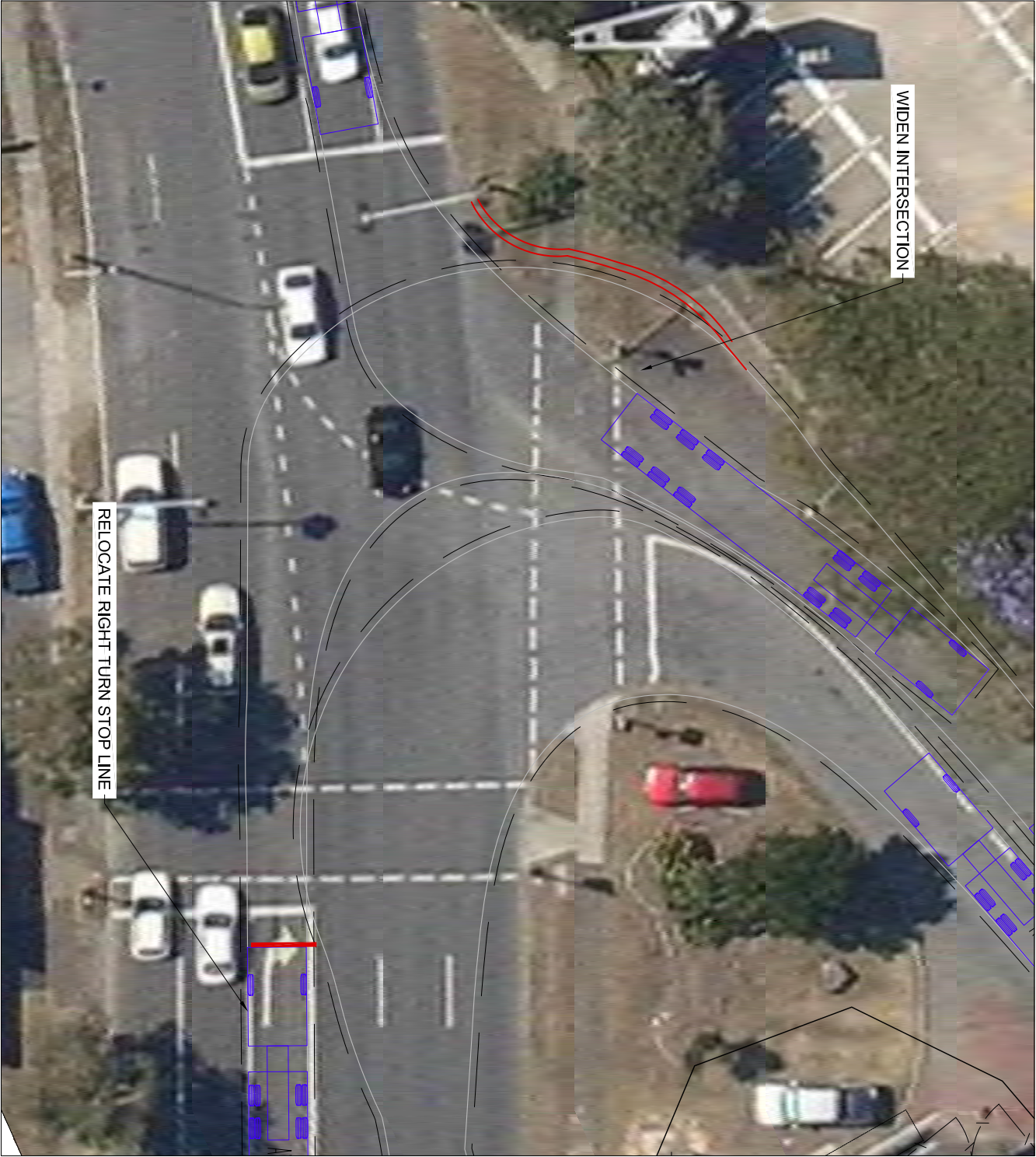
ttm
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E: ttm@ttmgroup.com.au W: www.ttmgroup.com.au

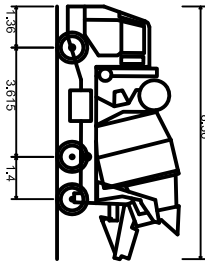
ABBOTSFORD ROAD, BOWEN HILLS
SWEEP PATH ANALYSIS

TTM REFERENCE
14BRT0098-SK01
DRAWN
RG
CHECKED
SC
DATE
11 APRIL 2014

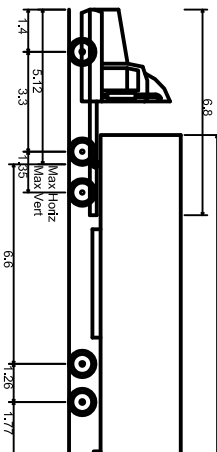
NOT TO SCALE



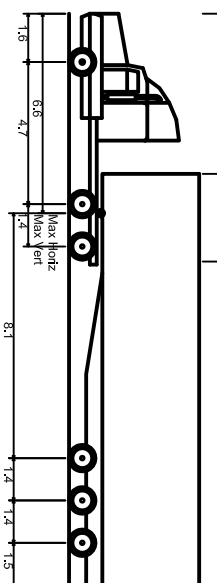
Drawbar Truck Modified (19.0m)
Overall Length 19.000m
Overall Width 2.500m
Overall Body Height 3.738m
Min Body Ground Clearance 0.427m
Track Width 2.500m
Lock to Lock Time 6.00s
Curb to Curb Turning Radius 9.500m



Concrete Mixer
Overall Length 8.360m
Overall Width 2.390m
Overall Body Height 4.027m
Min Body Ground Clearance 0.358m
Max Track Width 2.413m
Lock to Lock Time 6.00s
Curb to Curb Turning Radius 8.210m



14.7m AV
Overall Length 14.750m
Overall Width 2.500m
Overall Body Height 3.695m
Min Body Ground Clearance 0.417m
Track Width 2.500m
Lock to Lock Time 6.00s
Wall to Wall Turning Radius 8.000m



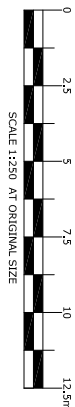
AV - Articulated Vehicle
Overall Length 19.000m
Overall Width 2.500m
Overall Body Height 4.301m
Min Body Ground Clearance 0.418m
Track Width 2.500m
Lock to Lock Time 6.00s
Curb to Curb Turning Radius 12.500m

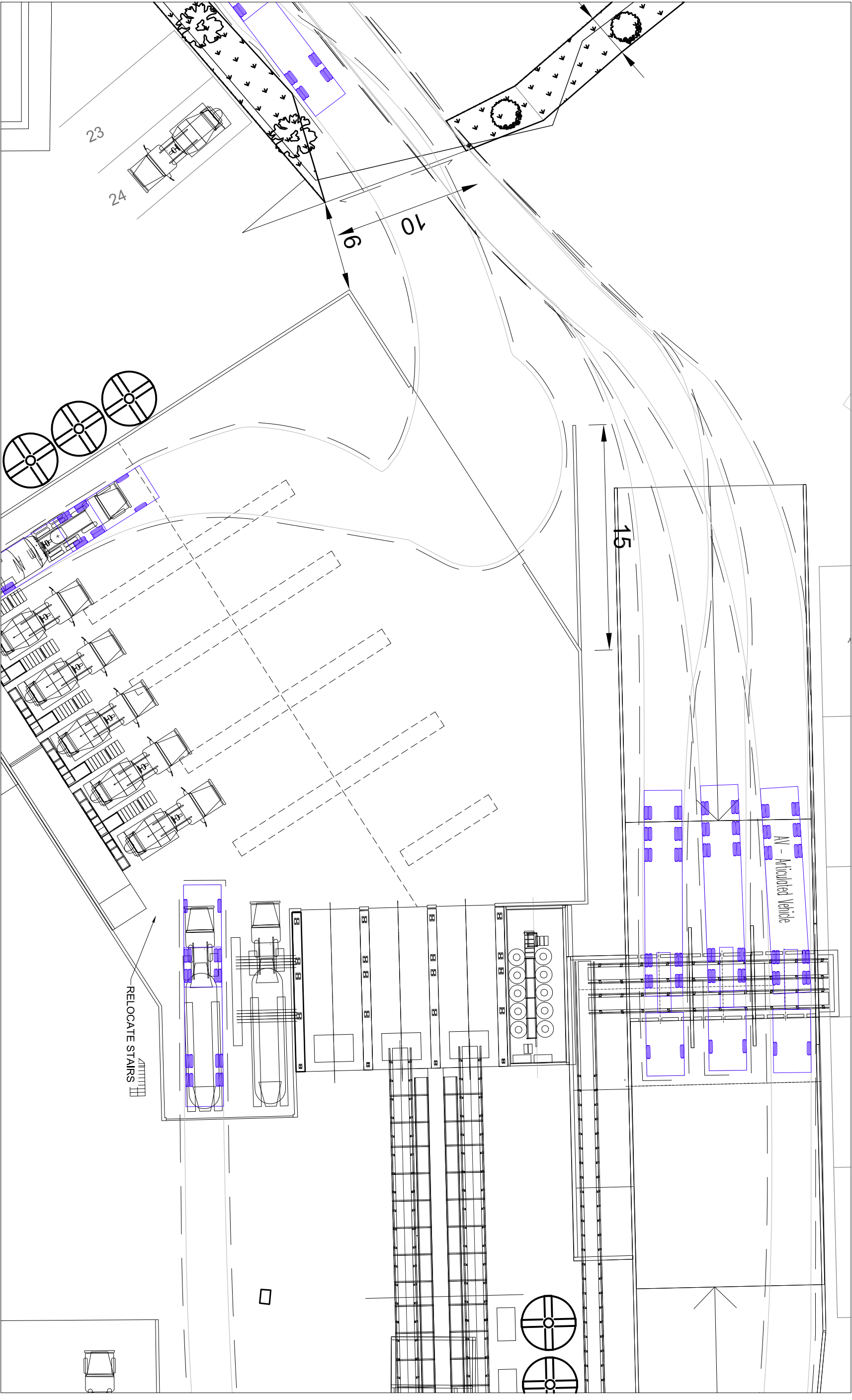


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T: (07) 3327 9500 F: (07) 3327 9501
E: ttmhfs@ttmgroup.com.au W: www.ttmgroup.com.au

ABBOTSFORD ROAD, BOWEN HILLS
SWEEP PATH ANALYSIS

TTM REFERENCE
14BRT0098-SK02
DRAWN RG
CHECKED SC
DATE 11 APRIL 2014

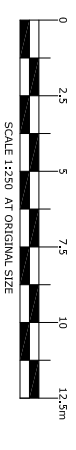




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T: (07) 3327 9500 F: (07) 3327 9501
E: ttm@ttmgroup.com.au W: www.ttmgroup.com.au

ABBOTSFORD ROAD, BOWEN HILLS
SWEEP PATH ANALYSIS

TTM REFERENCE
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DRAWN
RG
CHECKED
SC
DATE
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Appendix C Sidra Outputs

MOVEMENT SUMMARY

Site: 2014 AM Base Case

Abbotsford Road, Site Access
2014 AM Base Case
Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbotsford Road (S)											
2	T	800	4.0	0.319	7.7	LOS A	8.3	59.8	0.46	0.41	47.7
3	R	7	0.0	0.039	19.3	LOS B	0.1	0.9	0.65	0.68	39.2
Approach		807	4.0	0.319	7.8	LOS A	8.3	59.8	0.46	0.41	47.6
East: Site Access											
4	L	4	0.0	0.010	35.7	LOS D	0.2	1.2	0.74	0.67	30.2
6	R	1	0.0	0.010	35.7	LOS D	0.2	1.2	0.74	0.66	30.2
Approach		5	0.0	0.010	35.7	LOS D	0.2	1.2	0.74	0.67	30.2
North: Abbotsford Road (N)											
7	L	8	0.0	0.614	25.1	LOS C	21.1	151.4	0.74	0.95	37.4
8	T	1894	3.0	0.614	16.9	LOS B	21.1	151.5	0.74	0.67	39.0
Approach		1902	3.0	0.614	16.9	LOS B	21.1	151.5	0.74	0.67	39.0
All Vehicles		2714	3.3	0.614	14.3	LOS B	21.1	151.5	0.66	0.59	41.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		53	44.2	LOS E			0.94	0.94

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.

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MOVEMENT SUMMARY

Site: 2014 AM Project Case

Abbotsford Road_Site Access

2014 AM Project Case

Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow 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: Abbotsford Road (S)											
2	T	800	4.0	0.319	7.7	LOS A	8.3	59.8	0.46	0.41	47.7
3	R	23	65.0	0.193	23.6	LOS C	0.4	4.8	0.71	0.73	37.9
Approach		823	5.7	0.319	8.2	LOS A	8.3	59.8	0.47	0.42	47.4
East: Site Access											
4	L	30	76.0	0.189	42.8	LOS D	2.1	26.2	0.81	0.76	28.5
6	R	25	100.0	0.189	43.6	LOS D	2.1	26.2	0.81	0.76	29.1
Approach		55	86.9	0.189	43.1	LOS D	2.1	26.2	0.81	0.76	28.8
North: Abbotsford Road (N)											
7	L	23	62.0	0.622	27.5	LOS C	21.2	154.8	0.75	0.97	37.3
8	T	1894	3.0	0.622	17.0	LOS B	21.5	154.8	0.75	0.67	38.9
Approach		1917	3.7	0.622	17.1	LOS B	21.5	154.8	0.75	0.68	38.9
All Vehicles		2795	5.9	0.622	15.0	LOS B	21.5	154.8	0.67	0.60	40.7

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 used.

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	Across S approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		53	44.2	LOS E			0.94	0.94

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.

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MOVEMENT SUMMARY

Site: 2014 PM Base Case

Abbotsford Road_Site Access
2014 PM Base Case
Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbotsford Road (S)											
2	T	1651	1.0	0.646	10.7	LOS B	23.5	166.2	0.64	0.59	44.2
3	R	9	0.0	0.032	16.0	LOS B	0.2	1.1	0.51	0.67	41.6
Approach		1660	1.0	0.646	10.7	LOS B	23.5	166.2	0.64	0.59	44.2
East: Site Access											
4	L	19	0.0	0.056	37.2	LOS D	1.0	6.8	0.77	0.72	29.6
6	R	8	0.0	0.056	37.1	LOS D	1.0	6.8	0.77	0.72	29.6
Approach		27	0.0	0.056	37.2	LOS D	1.0	6.8	0.77	0.72	29.6
North: Abbotsford Road (N)											
7	L	4	0.0	0.324	21.8	LOS C	9.0	64.3	0.60	0.95	39.2
8	T	1005	2.0	0.324	13.6	LOS B	9.0	64.3	0.60	0.52	41.9
Approach		1009	2.0	0.324	13.7	LOS B	9.0	64.3	0.60	0.52	41.9
All Vehicles		2696	1.4	0.646	12.1	LOS B	23.5	166.2	0.63	0.56	43.1

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 used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		53	44.2	LOS E			0.94	0.94

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.

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MOVEMENT SUMMARY

Site: 2014 PM Project Case

Abbotsford Road_Site Access

2014 PM Project Case

Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbotsford Road (S)											
2	T	1651	1.0	0.646	10.7	LOS B	23.5	166.2	0.64	0.59	44.2
3	R	35	59.0	0.215	19.1	LOS B	0.7	6.9	0.55	0.72	40.9
Approach		1686	2.2	0.646	10.9	LOS B	23.5	166.2	0.64	0.59	44.2
East: Site Access											
4	L	35	41.0	0.165	41.0	LOS D	2.2	22.1	0.81	0.76	28.7
6	R	23	62.0	0.165	41.7	LOS D	2.2	22.1	0.81	0.76	28.7
Approach		58	49.3	0.165	41.3	LOS D	2.2	22.1	0.81	0.76	28.7
North: Abbotsford Road (N)											
7	L	29	76.0	0.337	24.8	LOS C	9.0	67.8	0.60	0.98	39.0
8	T	1005	2.0	0.337	13.8	LOS B	9.5	67.8	0.60	0.52	41.7
Approach		1034	4.1	0.337	14.1	LOS B	9.5	67.8	0.60	0.54	41.6
All Vehicles		2778	3.9	0.646	12.7	LOS B	23.5	166.2	0.63	0.57	42.7

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 used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		53	44.2	LOS E			0.94	0.94

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.

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