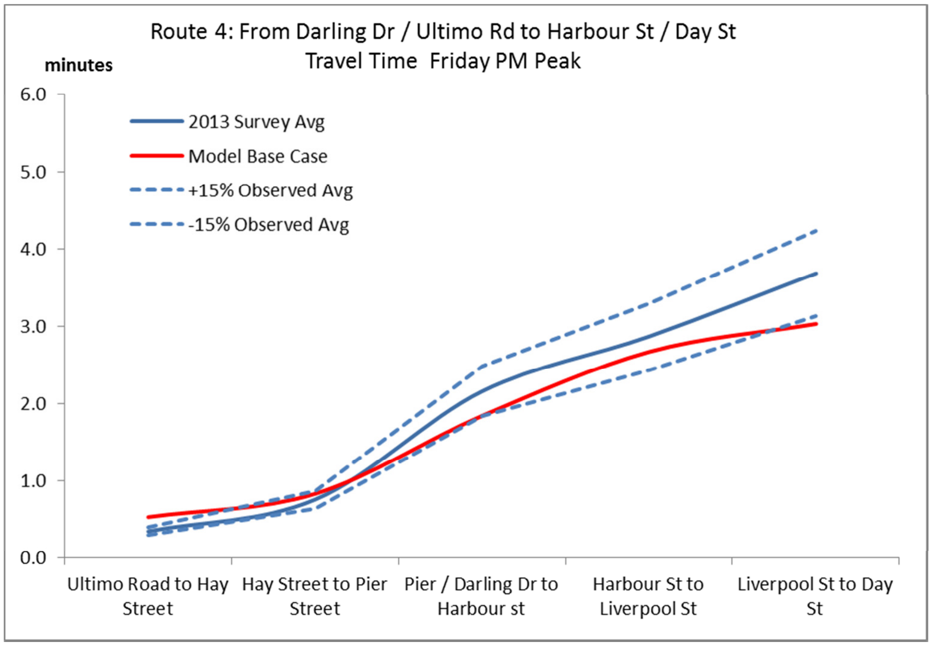


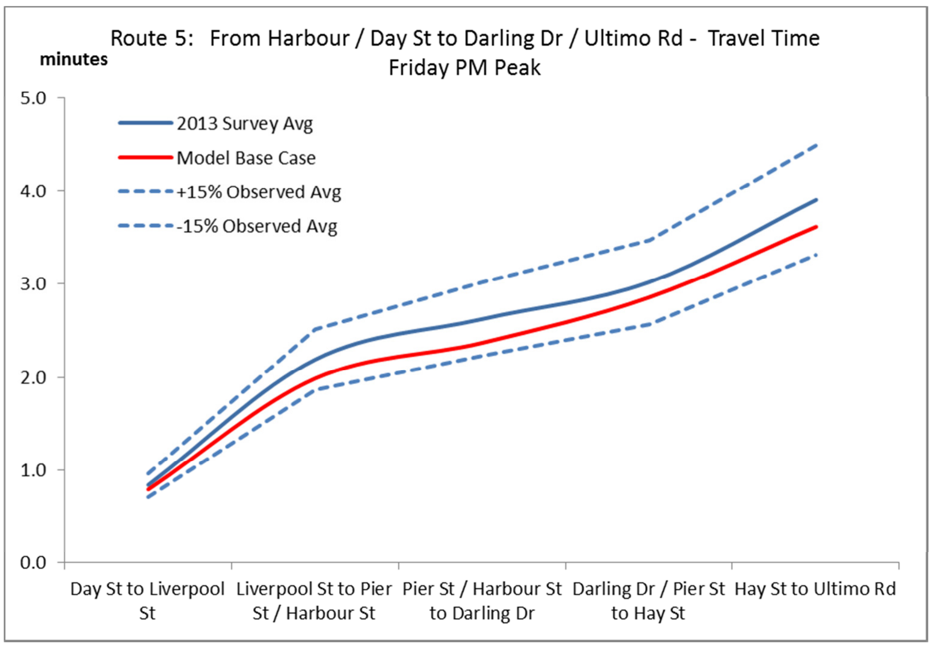


Figure 3-2 Friday PM Peak Model Travel Time Validation

Intersection Tuning Volume Validation

The June 2013 counts were used for model validation purpose. This is entirely a different set of data and was not used in the earlier model calibration. Figure 3-3 show a good comparison (R^2 value = 0.97) between observed and modelled intersection turn volumes at five intersections. The result demonstrates that the Friday PM Peak model was validated adequately against traffic counts undertaken in June 2013.

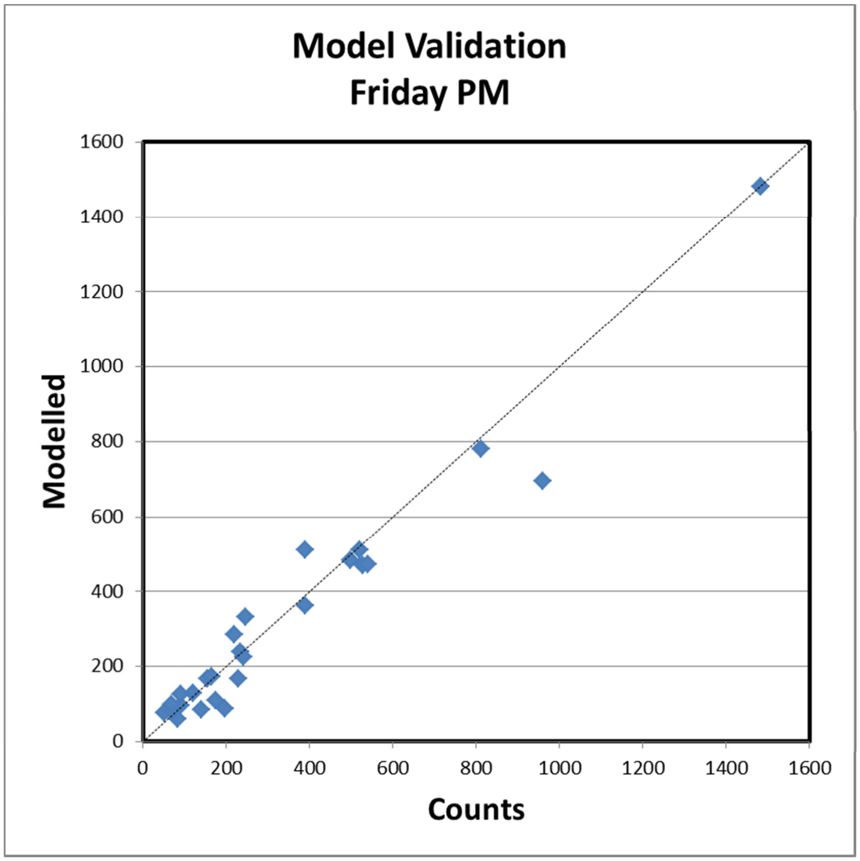


Figure 3-3 Friday PM Peak Model Intersection Counts Validation

Queue Length Comparison

As per the latest RMS modelling guide, counting or calculating queue length is a subjective matter since queued vehicles will often still be moving slowly. It is not always clear what criteria should be used to constitute a queue.

Bearing in mind on the above, observed and modelled queue length data were compared where relevant. The modelled queue lengths were compared with survey data. The survey data shows queue length for minimum, maximum and 95th percentile queue length. Table 3-3 below summarises queue length comparison between survey and model.

In general, the queue lengths from the model were found similar to the 95th percentile surveyed queue lengths.

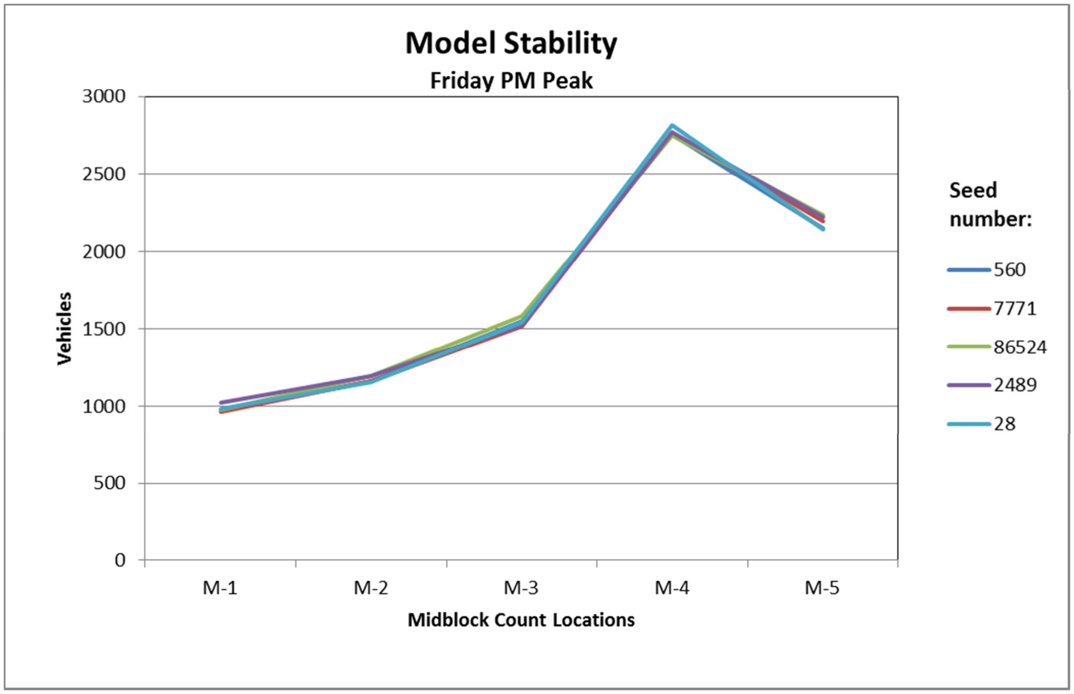
It is therefore concluded that Friday PM peak model has been validated for travel time, queue length and intersection turning volumes as per RMS guidelines.

Table 3-3 Friday PM Peak Model Validation – Queue Lengths

Intersection	Approach	Observed Queue Length (vehicles)			Modelled Queue (vehicles)
		Min	Max	95th Percentile	
Darling Drive / Pyrmont Bridge Road / Murray Street	East	3	11	10	6
	West	4	9	8	11
	North	2	9	9	7
	South	2	8	7	5
Darling Drive / Pier Street	North	0	3	1	9
	South	0	7	6	2
	East	0	9	8	3
Darling Drive / Ultimo Road	North	1	12	10	2
	West	0	4	3	8
	East	2	17	16	21
Harbour Street / Pier Street / Goulburn Street	North	5	15	15	24
	South	0	8	8	4
	East	2	18	18	10
	West	3	21	20	16
Harbour Street / Liverpool Street	North	0	12	8	12
	South	10	14	14	11
	East	7	10	10	12

Model Stability

Figure 3-4 below shows the variation of modelled traffic flows at five mid-block locations for five different seeds. The model was run for five 'seed' values as per RMS guideline. The five seeds values were 560, 28, 7771, 86524, and 2849. The results showed minor traffic variations for all seed values. This confirms that model is stable.



Note: Seed numbers (i.e. 560, 28, 771, 86524, 2849) provided by RMS

Figure 3-4 Model Stability Check – Friday PM Peak

3.3 Summary of Friday PM Calibration and Validation

The modelling results documented in this section suggest that the Friday PM peak period model was adequately calibrated and validated for existing 2012/13 traffic conditions. The Friday PM peak model is fit for the study purpose.

4 Saturday PM Peak Model

Similar calibration and validation process was undertaken for Saturday PM peak model. The weekend base year model represented 2012/13 traffic conditions.

Traffic demand in AIMSUN model for weekend was developed based on intersection turning movement counts data collected in October and March 2012.

The following sections document model calibration and validation results.

4.1 Calibration Results

Individual link flows and intersection turning volumes have been assessed based on the criteria adopted for this study. Table 4-1 and Table 4-2 summarise the modelling results for the Saturday PM peak (6:00-7:00pm).

The results from Table 4-1 and Table 4-2 demonstrated that Saturday PM peak model was calibrated for intersection turn flows and individual link flows as per RMS standards. Figure 4-1 shows a good comparison (R^2 value = 0.97) between observed and modelled intersection turn volumes.

Table 4-1 Saturday PM Peak - Intersection Counts

Model Calibration (intersection turning volumes)			
Total number of turn flows:	65 (11 intersections)		
Number of flows less than 700 vph	*54*		
Number of flows between 700 and 2700 vph	*11*		
Number of flows more than 2,700 vph	*NA*		
Meet the assessment criteria:	**Target**	**Achieved**	**Status**
Difference in link flow within 100 for flows <700 vph	85%	98%	Pass
Difference in link flow within 15% for flows 700-2,700 vph	85%	91%	Pass
Difference in link flow within 400 for flows >2,700 vph	85%	NA	Pass
GEH Statistic less than 5 of all individual modelled flow	85%	94%	Pass
R^2 Value (volume comparison)	>0.95	0.97	Pass

AIMUSN model code: Hyder SICEEP Aimsun Model_R4_ExistingLink: F:\AA004399\D-Calcs\Traffic Modelling\POST TENDER TRAFFIC STUDY\Modellings\AIMSUN\1-Models\Hyder SICEEP Aimsun Model_R4_Existing

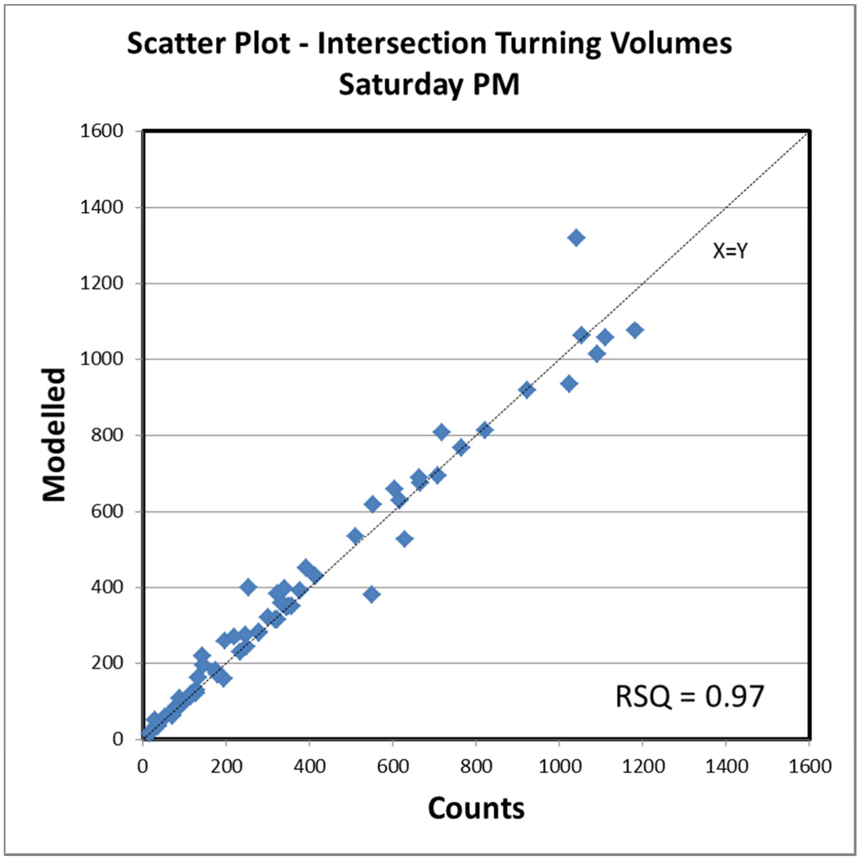


Figure 4-1 Intersection Turning Volume Comparison Saturday PM Peak

Table 4-2 Saturday PM Peak - Link Counts

Link Calibration			
Number of individual link flows (by direction):	10		
Number of flows less than 700 vph	*4*		
Number of flows between 700 and 2700 vph	*6*		
Number of flows more than 2,700 vph	*n/a*		
Average link flow	800 veh/h		
Meet the assessment criteria:	**Target**	**Achieved**	**Status**
Difference in link flow within 100 for flows <700 vph	85%	100%	Pass
Difference in link flow within 15% for flows 700-2,700 vph	85%	100%	Pass
Difference in link flow within 400 for flows >2,700 vph	85%	n/a	Pass
GEH Statistic less than 5 of all individual modelled flow	85%	100%	Pass

AIMUSN model code: Hyder SICEEP Aimsun Model_R4_ExistingLink: F:\AA004399\D-Calcs\Traffic Modelling\POST TENDER TRAFFIC STUDY\Modellings\AIMSUN\1-Models\Hyder SICEEP Aimsun Model_R4_Existing

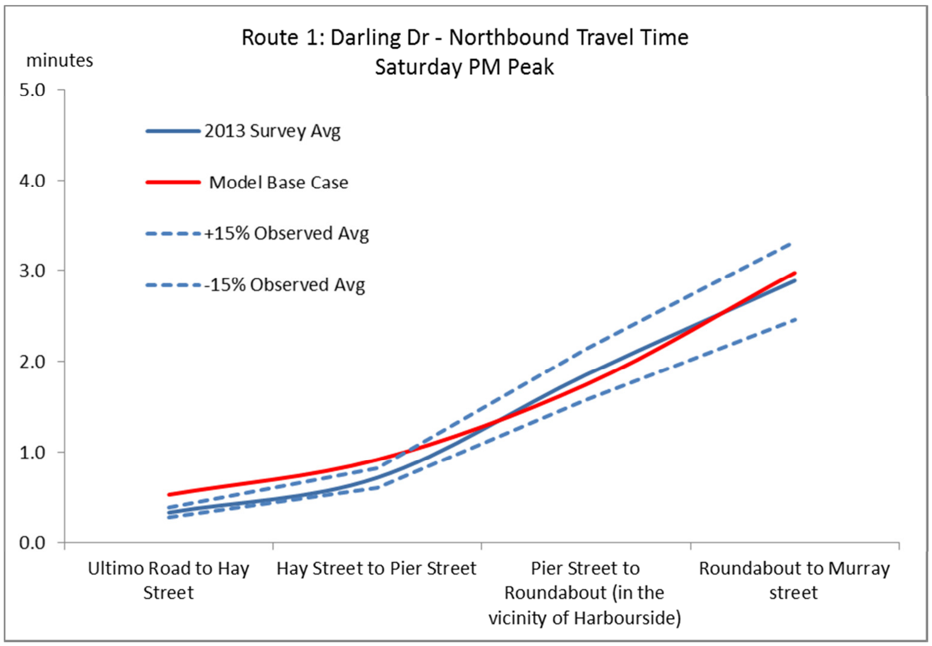
4.2 Model Validation

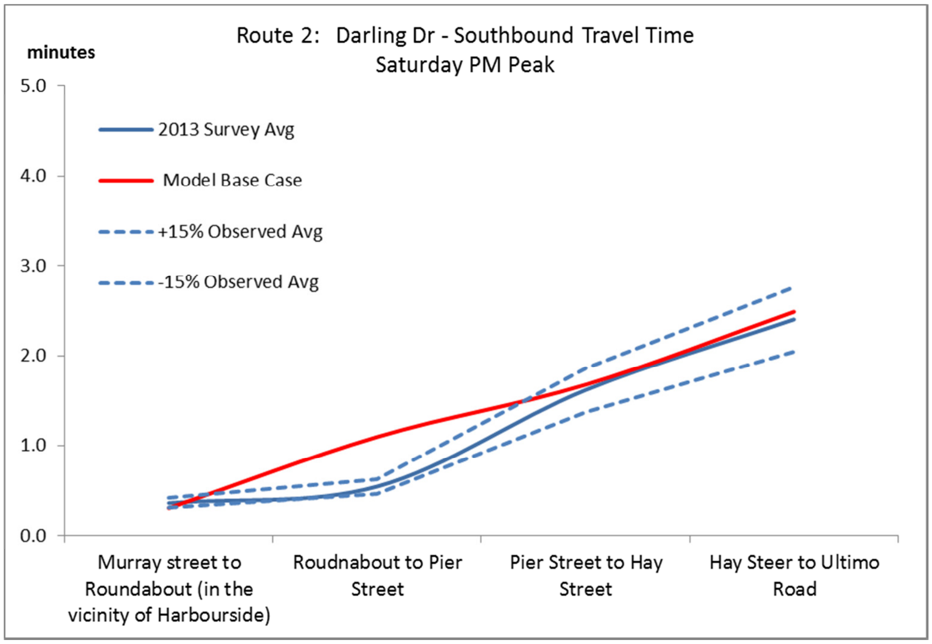
Model validation has been undertaken using a different set of intersection counts surveyed in June 2013. In conjunction with that model has also been validated for travel time and queue length data collected in June 2013.

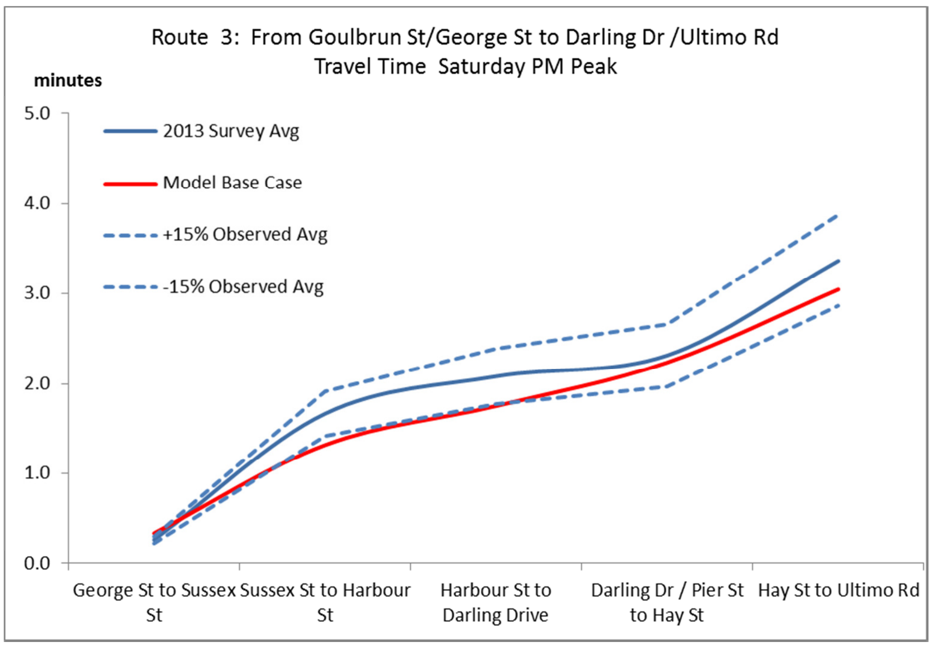
Travel Time Validation

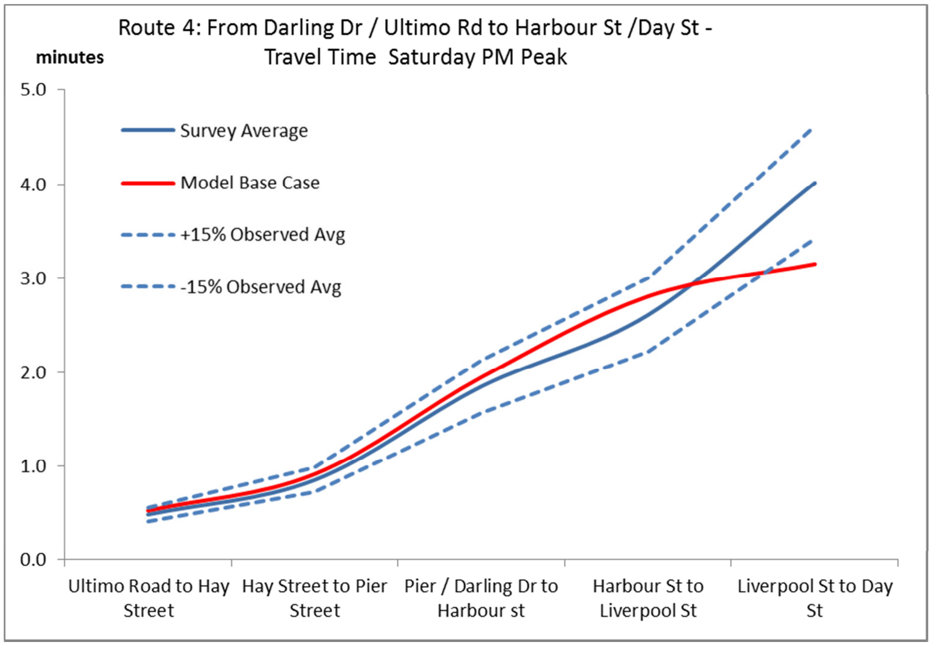
Saturday PM Peak observed and modelled travel times, as cumulative values, were compared for five key travel routes.

Figure 4-2 shows the travel time comparison between modelled and average survey travel time data .The model travel time (shown as red line) followed the same trend with the average survey travel time data. This demonstrated that Saturday PM peak model was validated adequately against the travel time.




Route 2: Darling Dr - Southbound Travel Time
Saturday PM Peak
minutes
5.0
4.0
3.0
2.0
1.0
0.0
2013 Survey Avg
Model Base Case
+15% Observed Avg
-15% Observed Avg
Murray street to Roundabout (in the vicinity of Harbourside)
Roudnabout to Pier Street
Pier Street to Hay Street
Hay Steer to Ultimo Road


Route 3: From Goulbrun St/George St to Darling Dr /Ultimo Rd
Travel Time Saturday PM Peak
minutes
5.0
4.0
3.0
2.0
1.0
0.0
2013 Survey Avg
Model Base Case
+15% Observed Avg
-15% Observed Avg
George St to Sussex St
Sussex St to Harbour St
Harbour St to Darling Drive
Darling Dr / Pier St to Hay St
Hay St to Ultimo Rd



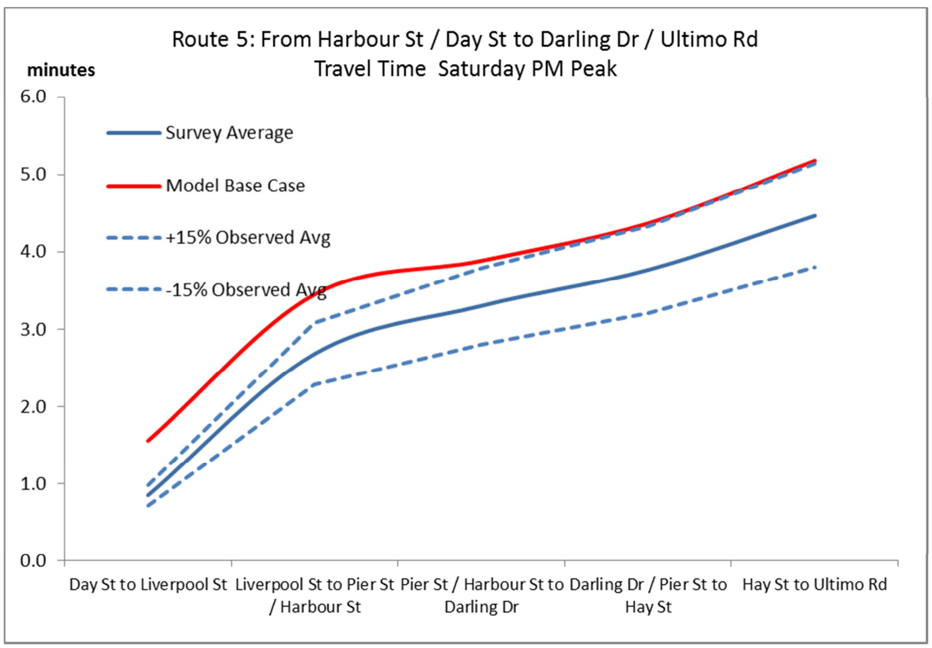


Figure 4-2 Saturday PM Peak Model Validation – Average Travel Times

Intersection Tuning Volume Validation

The June 2013 counts were used for model validation purpose. This is entirely a different set of data and was not used in the earlier model calibration. Figure 4-3 show a good comparison (R^2 value = 0.98) between observed and modelled intersection turn volumes at five intersections. The result demonstrates that the Saturday PM Peak model was validated adequately against traffic counts undertaken in June 2013.

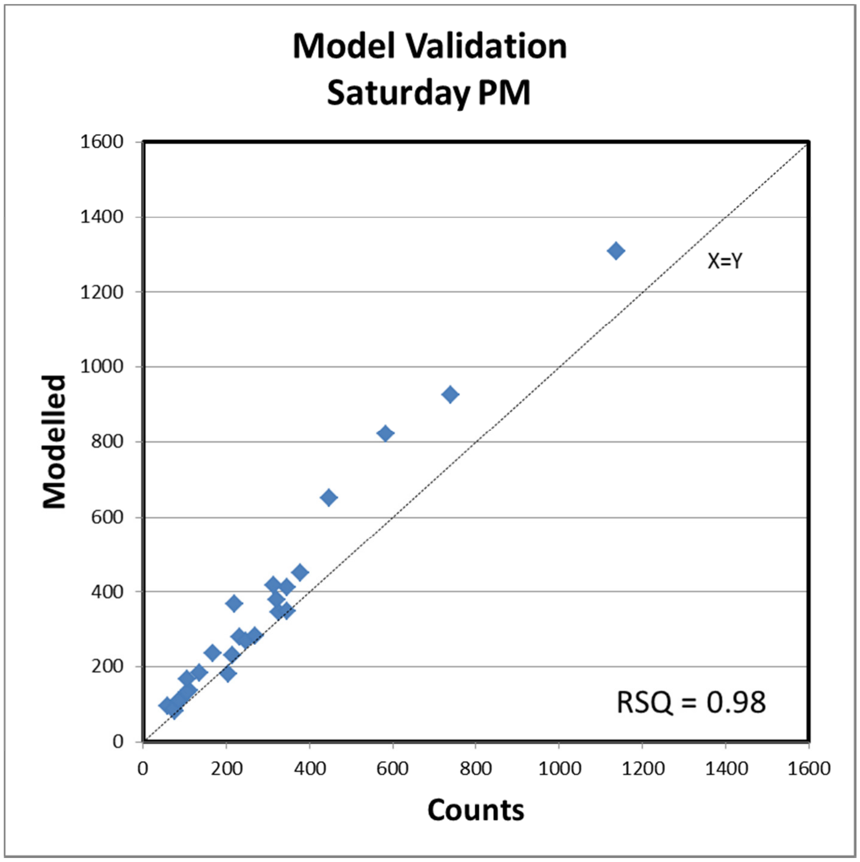


Figure 4-3 Saturday PM Peak Model Intersection Counts Validation

Queue Length Comparison

Observed and modelled queue length data were compared where relevant. The modelled queue lengths were compared with survey data. The survey data shows queue length for minimum, maximum and 95th percentile queue length. Table 4-3 below summarises queue length comparison between survey and model.

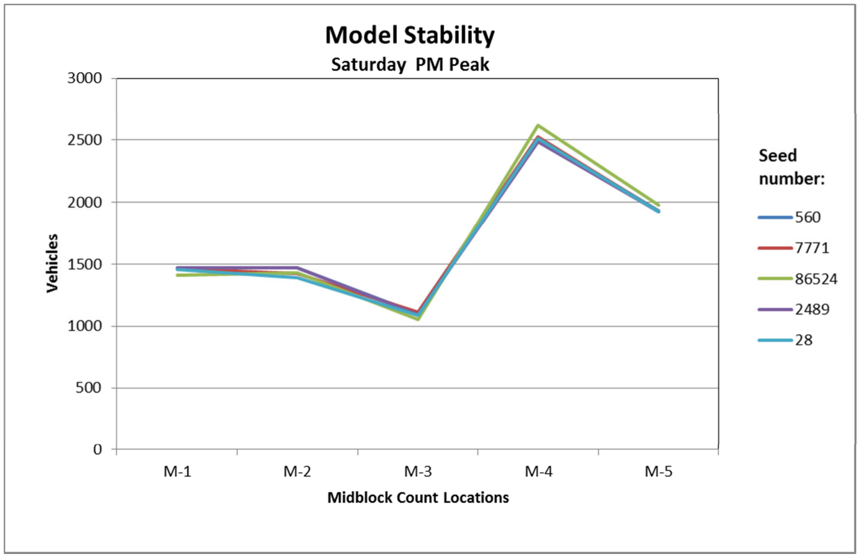
In general, the queue lengths from the model were found similar to the 95th percentile surveyed queue lengths

Table 4-3 Saturday PM Peak Model Validation – Queue Lengths

Intersection	Approach	Observed Queue Length (vehicles)			Modelled Queue (vehicles)
		Min	Max	95th Percentile	
Darling Drive / Pyrmont Bridge Road / Murray Street	East	8	12	12	13
	West	6	11	11	15
	North	1	9	8	7
	South	1	7	7	6
Darling Drive / Pier Street	North	0	2	1	2
	South	0	9	6	8
	East	0	6	4	3
Darling Drive / Ultimo Road	North	0	7	6	12
	West	0	3	2	4
	East	0	14	12	9
Harbour Street / Pier Street / Goulburn Street	North	2	15	15	22
	South	1	8	6	9
	East	0	8	7	4
	West	1	12	10	11
Harbour Street / Liverpool Street	North	2	8	8	19
	South	3	14	14	17
	East	0	10	9	11

Model Stability

Figure 4-4 below shows the variation of modelled traffic flows at five mid-block locations for five different seeds. The model was run for five 'seed' values as per RMS guideline. The five seeds values were 560, 28, 7771, 86524, and 2849. The results showed minor traffic variations for all seed values. This confirms that model is stable.



Note: Seed numbers (i.e. 560, 28, 771, 86524, 2849) provided by RMS

Figure 4-4 Model Stability Check – Saturday PM Peak

4.3 Summary of Saturday PM Calibration and Validation

The modelling results documented in this section suggest that the Saturday PM peak period model was adequately calibrated and validated for existing 2012/13 traffic conditions. The Saturday PM peak model is fit for the study purpose.

SYDNEY INTERNATIONAL CONVENTION, EXHIBITION AND ENTERTAINMENT PRECINCT (SICEEP)

TRANSPORT AND TRAFFIC ASSESSMENT

Technical Note 2 – Darling Drive Traffic Assessment

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Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP)

Technical Note 2 – Darling Drive Traffic Assessment

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Approver	Greg Ives
Report No	AA004399_TN2
Date	June 2013

REVISIONS

Revision	Date	Description	Prepared By	Approved By
A	20 June 13	Internal Review	MR, MB, KN	MR
B	20 June 13	Draft for Client's Review	MR	MR
C	21 June 13	Final Report	MR	MR

CONTENTS

APPENDICES

1 Introduction

1.1 Report Purpose

This technical report is an extension to the Traffic and Transport Assessment Report, March 2013, prepared by Hyder Consulting for the Sydney International Conventional, Exhibition and Entertainment Precinct (SICEEP) Project. This technical report has been prepared to address concerns on Darling Drive raised by Transport for NSW (TfNSW) and Roads and Maritime Services (RMS).

This technical report documents Hyder's findings on the traffic performance of Darling Drive. A detailed traffic modelling on Darling Drive was undertaken using micro-simulation software VISSIM. The detailed model of Darling Drive has considered interactions from pedestrians, cyclists, coaches, taxis, cars and trucks.

The modelling results in Technical Note 2 demonstrate that impact from SICEEP would not adversely impact the traffic performance of Darling Drive.

1.2 Reference Traffic Data and Model

For the purpose of detailed traffic modelling of Darling Drive, recent traffic counts and modelling data have been sourced from following sources:

- Recent AIMSUN modelling undertaken for wider road network as part of SICEEP.
- New traffic survey undertaken in June 2013 as part of SICEEP.

Detailed traffic data and analysis results can be found in Technical Note 1. The VISSIM model is a sub area of AIMSUN model and adopted similar traffic assumptions and input where required.

1.3 Study Objectives

The scope of this study is twofold, namely:

1. To assess and respond to the potential issues and concerns on Darling Drive particularly the section between Pier Street and Harbour side roundabouts.

2. To assess a variation of the SICEEP original scheme, where the Theatre car park access is now proposed off Darling Drive.

To address the study objectives, the following two network scenarios were modelled and assessed:

- "DA scheme", as presented as part of the original Development Application. In original DA scheme Theatre car park access was proposed off Exhibition Place Loop Road.;
- "Revised Theatre Access Scheme" – a slight modification to the original DA, with the relocation of the Theatre car park access to Darling Drive.

Both schemes were modelled for worst case traffic movements defined in Saturday PM peak.

1.4 Modelling Study Area

For the purpose of this assessment, the VISSIM model coverage includes Darling Drive, between Hay Street (south) and the northern roundabout with Harbourside. The distance between Pier Street and Harbourside roundabouts is approximately 650 metres. Figure 1-1 below shows Darling Drive detailed modelling study area.

Figure 1-1 Darling Drive Detailed Modelling Area

2 Model Augmentation

In the development of the Darling Drive VISSIM model, a strong link was maintained with the wider AIMSUN model. The Darling Drive model is essentially a sub-area of the AIMSUN model, with the model network refined to consider side frictions including pedestrians, cyclists, taxi's, buses and trucks as required. Importantly, the VISSIM model traffic demand was based on the AIMSUN calibrated model. A further VISSIM model calibration and validation was undertaken according to the RMS Traffic Modelling Guidelines. Appendix A documented relevant model validation results on Darling Drive. The validation result in Appendix A shows that existing VISSIM model is fit for the study purpose.

2.1 Scheme Network

For the purpose of this assessment, as noted previously, two model networks were developed for Darling Drive, namely:

- "DA scheme", as presented as part of the original Development Application. In original DA scheme, the Theatre car park access was proposed off Exhibition Place Loop Road.
- "Revised Theatre Access Scheme" – a slight modification to the original DA, with the relocation of the Theatre car park access off Darling Drive.

The schematic diagram of both schemes is shown in Figure 2-1 and Figure 2-2. The car park access and pedestrian crossings on Darling Drive are also shown in both figures.

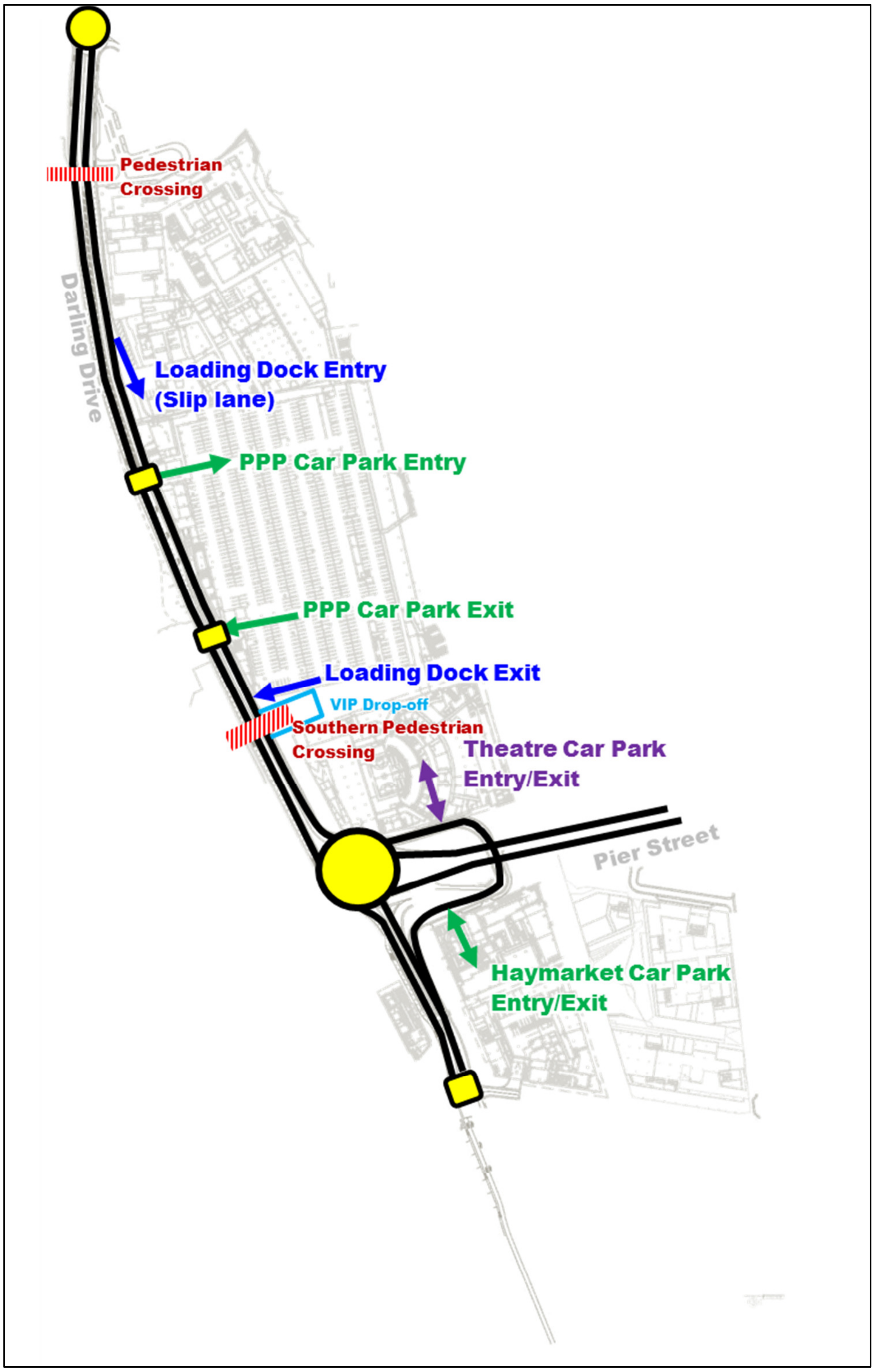


Figure 2-2 Schematic Diagram of DA Scheme

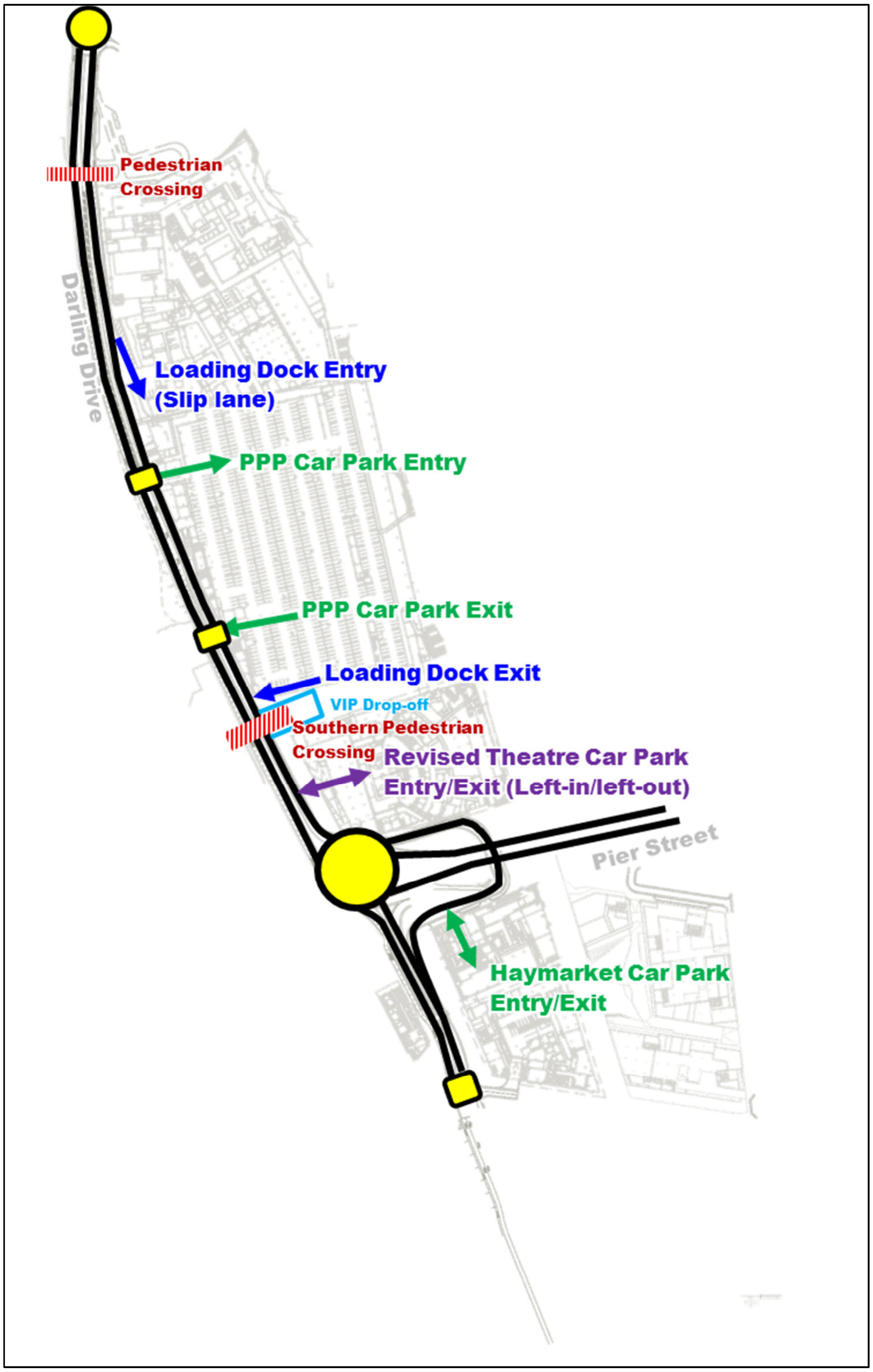


Figure 2-3 Schematic Diagram of Revised Theatre Access Scheme

2.2 Model Demand

The demand scenario adopted for this assessment is the “Saturday PM peak hour”, with “peak event” traffic demand estimates. The traffic forecast in VISSIM is based on the wider AIMSUN model.

3 Modelling Results

3.1 Existing Travel Speed on Darling Drive

The travel speed data for existing condition was sourced from 2013 June traffic survey. Table 3-1 below shows observed travel speed recorded on Darling Drive between Pier Street and Harbour side roundabouts for Saturday PM peak . The average travel speed on Darling Drive was found to be 35 km/h in the northbound direction. The average travel speed in the southbound direction was marginally higher at 36km/h.

On Darling Drive, the lowest travel speed was found at 14km/h in the northbound direction. In the southbound direction, the lowest travel speed was found at 21km/h.

Table 3-1 Existing Travel Speed on Darling Drive north of Pier Street

Direction	Distance (metres)	Observed Speed (km/h)	
		Minimum	Average
Northbound	650	14	35
Southbound		21	36

Source: June 2013 travel time surveys.

The data in Table 3-1 suggests that the existing travel speed on Darling Drive north of Pier Street varies between 14 km/h and 35 km/h in the northbound direction. The travel speed varies between 21 km/h and 36km/h in the southbound direction.

3.2 DA Scheme Performance

In general, the travel lanes on Darling Drive for the post development condition would be similar to the existing condition. Figure 3-1 shows a schematic comparison between existing and proposed post development condition for both northbound and southbound directions.

The key changes occur on the northbound side to Darling Drive and in principle include:

- Removal of monorail on northbound side, to allow provision of a dual segregated cycleway;
- Removal of truck lay-over area along northbound side, which is now provided on-site within the development property boundary

Existing friction points only occur along the southbound lane of Darling Drive. Consequently, the design principle includes:

- Maintaining configuration of existing Darling Drive layout as best as possible;
- Maintaining existing friction points as best as possible for car park entry and exits, existing pedestrian crossing locations and loading dock access locations;
- Proposed loading dock movements will generally occur out of normal traffic hours.

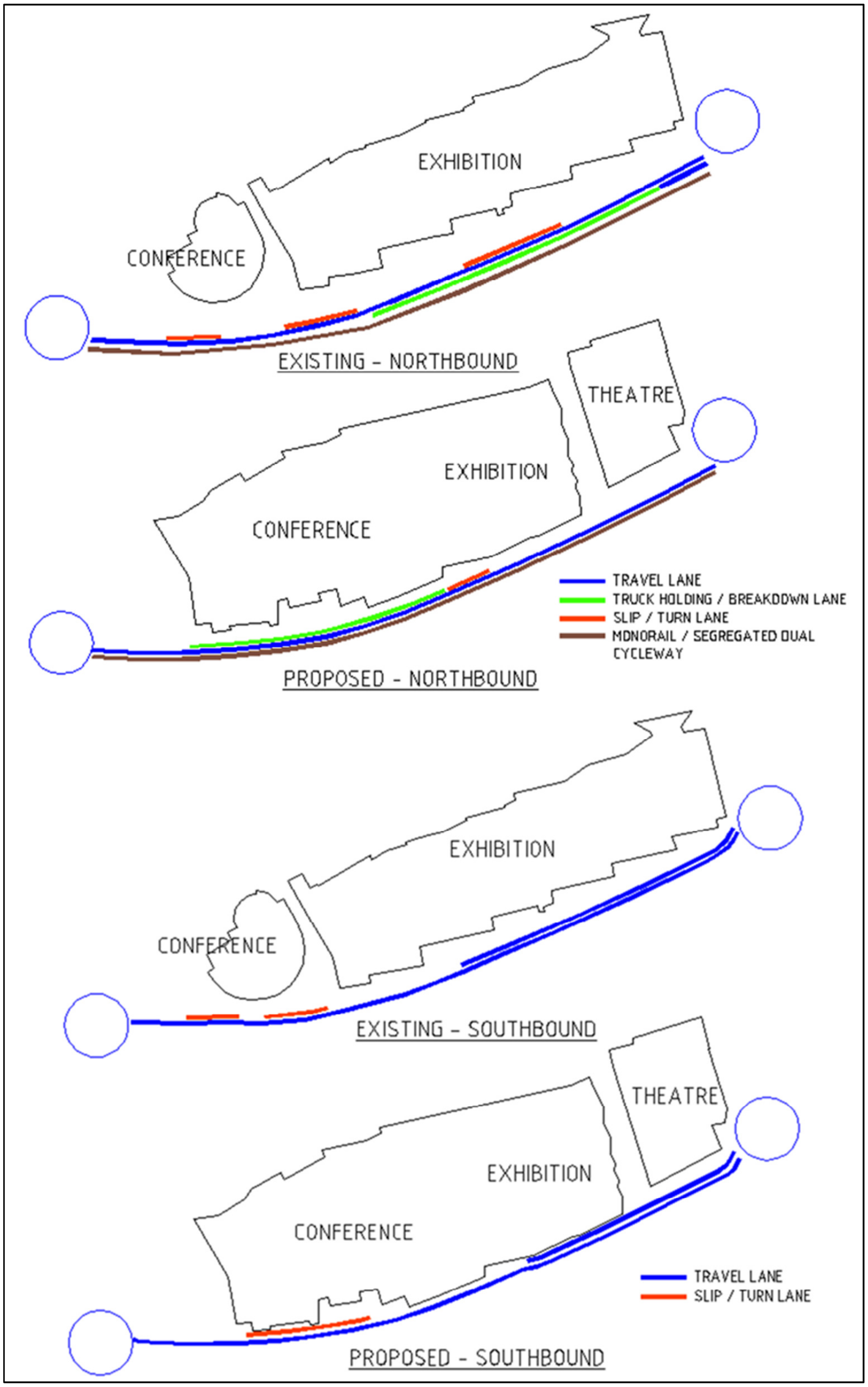


Figure 3-1 A Schematic comparison between Existing and Proposed Post Development Condition

Table 3-2 below shows forecast average speed on Darling Drive for DA scheme. For a comparison purpose, existing model speed is also shown.

Table 3-2 Forecast Travel Speed on Darling Drive for DA Scheme

Scenarios	Northbound	Southbound
Existing base model	33.6 km/h	34.9 km/h
DA Scheme	20.2 km/h	31.2 km/h

Note: travel speed for DA scheme is average for five seeds. Travel speed in northbound direction for DA scheme represents up to 250 pedestrian volumes in one hour.

The modelling suggests a minor decrease in average speed, from 34.9 km/h (existing) to 31.2 km/h in the southbound direction. The northbound average speed on Darling Drive (20.2 km/h) is within the range of speed being observed for existing condition (between 14 km/h and 35 km/h).

The northbound traffic performance on Darling Drive is influenced by the "southern zebra crossing", located around 100 metres to the north of Pier Street (see previous Figure 2-1). The modelling analysis has found that a two staged zebra crossing on Darling Drive would work for up to 250 pedestrian volumes in one hour. The model does not suggest queue on Darling Drive with Pier Street roundabout. Should pedestrian volumes at "southern zebra crossing" exceeds above 250, the modelling has identified the need for signalisation of this crossing.

It is recommended to monitor the performance of the pedestrian crossing for post development condition, for this development option.

3.3 Revised Theatre Access Scheme Performance

Similar to the DA scheme traffic modelling was undertaken for revised Theatre access scheme. The Theatre scheme modelling has assumed signalisation of the southern pedestrian crossing on Darling Drive.

Table 3-3 below shows forecast average speed on Darling Drive for revised Theatre access scheme. For a comparison purpose, existing model speed is also shown.

Table 3-3 Forecast Travel Speed on Darling Drive for Revised Theatre Access Scheme

Scenarios	Northbound	Southbound
Existing base model	33.6 km/h	34.9 km/h
Revised Theatre Access Scheme	17 km/h	31.2 km/h

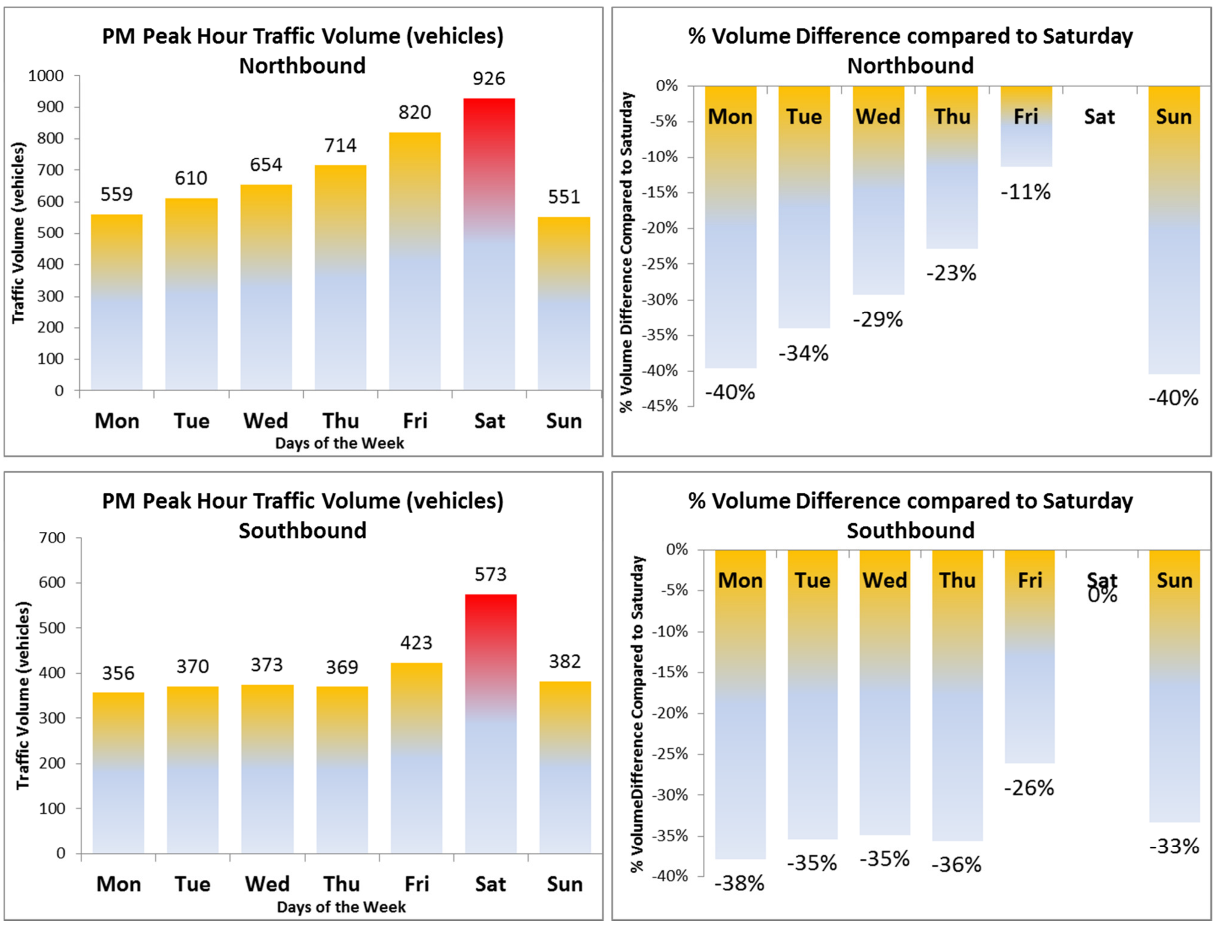
Note: travel speed for DA scheme is average for five seeds.

The relocation of Theatre car park access off Darling Drive would increase northbound traffic on Darling Drive by 10% compared to the DA scheme. This would have potential to marginally impact the northbound travel speed on Darling Drive. Model forecasts average travel speed at 17 km/h in the northbound direction. The northbound average speed on Darling Drive with revised Theatre access (17 km/h) is still within the range of speed being observed for existing condition (between 14 km/h and 35 km/h).

Under revised Theatre access scheme, the traffic model shows instances where traffic queue extends to the nearby roundabout with Pier Street for a brief period of time. However, the queue dissipates quickly and does not obstruct Darling Drive with Pier Street roundabout.

The above modelling results represent the worst case traffic movements on Darling Drive for event traffic condition. Further data analysis on Darling Drive for seven days period (Monday to Sunday) shows the following patterns (see Figure 3-2):

- Friday traffic volume on Darling Drive is about 11% lower than Saturday in the northbound direction.
- The Friday volume is about 26% lower than Saturday in the southbound direction.
- On average, Friday traffic is about 18% lower than Saturday traffic.
- Traffic on Darling Drive in weekday (Monday to Thursday) reduces significantly between 23% and 40% compared to Saturday traffic.



Source: March 2012 Counts

Figure 3-2 Traffic Volume on Darling Drive

The variation in traffic volumes on Darling Drive suggests that forecast travel speed by the model for post development condition will be much higher in weekday. The revised Theatre access scheme on Darling Drive would work for both weekday and weekend traffic conditions.

4 Key Study Findings

This technical report is an extension to the Traffic and Transport Assessment Report, March 2013, prepared by Hyder Consulting for the Sydney International Conventional, Exhibition and Entertainment Precinct (SICEEP) Project. This report forms the part of technical analysis undertaken for Preferred Project Report (PPR).

This technical report documents Hyder's findings on the traffic performance of Darling Drive particularly the section between Pier Street and Harbour side roundabouts for post development condition. The detailed micro-simulation model of Darling Drive has considered interactions from pedestrians, cyclists, coaches, taxis, cars and trucks. Two development schemes for Darling Drive were modelled as follows:

- "DA scheme", as presented as part of the original Development Application. In original DA scheme, the Theatre car park access was proposed off Exhibition Place Loop Road.
- "Revised Theatre Access Scheme" – a slight modification to the original DA, with the relocation of the Theatre car park access off Darling Drive.

In general, the travel lanes on Darling Drive for post development condition would be similar to existing condition.

Both schemes were modelled for worst case traffic volumes for "Saturday PM peak hour", with "peak event" traffic demand.

The 2013 Saturday PM peak traffic data shows that existing travel speed on Darling Drive north of Pier Street varies between 14 km/h and 35 km/h in the northbound direction. The travel speed varies between 21 km/h and 36km/h in the southbound direction.

The traffic modelling study has found that:

- The modelling analysis has found that two staged crossing on Darling Drive would work for up to 250 pedestrian volumes in one hour. The model does not suggest queue on Darling Drive with Pier Street roundabout. Should pedestrian volumes at "southern pedestrian crossing" exceed 250, the modelling has identified the need for signalisation of this crossing.
- The relocation of the Theatre car park access off Darling Drive would increase northbound traffic on Darling Drive by 10% compared to the DA scheme. This would have potential to marginally reduce the northbound travel speed on Darling Drive. Model forecasts average travel speed at 17 km/h in the northbound direction. The northbound average speed on Darling Drive with revised Theatre access (17 km/h) is within the range of speed being observed for existing condition (between 14 km/h and 35 km/h).
- Further data analysis on Darling Drive for seven days period (Monday to Sunday) shows that on average, Friday traffic is about 18% lower than Saturday traffic. Traffic on Darling Drive in weekday (Monday to Thursday) reduces significantly between 23% and 40% compared to Saturday traffic.

The revised Theatre access scheme on Darling Drive would work for both weekday and weekend traffic conditions.

APPENDIX A

VISSIM Model Validation

Technical Note 1 documented AIMSUN model calibration and validation according to the RMS Traffic Modelling Guideline. The detailed Darling Drive modelling (using VISSIM) is subarea of AIMSUN calibrated model. In VISSIM similar level of calibration has been achieved for turning volumes and mid-block counts on Darling Drive. Further model validation on Darling Drive was undertaken against 2013 travel time and queue length data particularly at Pier Street / Darling Drive roundabout. The key validation results are shown in Table A1 and Table A2.

Table A1: Travel time / Speed Validation on Darling Drive

TT / Speed Validation	Observed (Average)	Model (% difference)
NB Average Speed[1] (km/h)	31.6	33.6 (+6%)
SB Average Speed[1] (km/h)	33.5	34.9 (+4%)

1 Average speed along Darling Drive measured between Hay Street and northern roundabout with Harbour side.

2 Results shown based on a single random seed.

Table A2: Queue Length "Validation" (Pier Street / Darling Drive Roundabout)

Queue Validation[1]	Observed	Model
Average Queue (South Approach)	14 m	15 m
95th Queue (South Approach)	37 m	36 m
Average Queue (East Approach)	14 m	7 m
95th Queue (East Approach)	37 m	20 m
Average Queue (North Approach)	1 m	3 m
95th Queue (North Approach)	11 m	12 m

1 Queue statistics based on maximum queue observed each minute, summarised across 1 hour

The validation results in Table A1 and Table A2 show that model replicate close to existing condition. The VISSIM model is fit for the study purpose.

Hyder

SYDNEY INTERNATIONAL CONVENTION, EXHIBITION AND ENTERTAINMENT PRECINCT (SICEEP)

TRANSPORT AND TRAFFIC ASSESSMENT

Technical Note 3 – Modelling Results for Post Development Condition Based on AIMSUN

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Technical Note 3 – Modelling Results for Post Development Condition Based on AIMSUN

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Report No	AA004399_TN3	
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REVISIONS

Revision	Date	Description	Prepared By	Approved By
A	20 June 13	Internal Review	MR, KN	MR
B	20 June 13	Draft for Client's Review	MR	MR
C	21 June 13	Final Report	MR	MR

CONTENTS

1 Introduction

1.1 Report Purpose

This technical report is an extension to the Traffic and Transport Assessment Report, March 2013, prepared by Hyder Consulting for the Sydney International Conventional, Exhibition and Entertainment Precinct (SICEEP) Project. This technical report has been prepared to document modelling results for post development condition based on AIMSUN micro-simulation modelling.

This technical report documents Hyder's findings on the traffic performance analysis of road network for current and post development traffic conditions using updated AIMSUN model. The modelling results are based on calibrated and validated AIMSUN model required for the Traffic and Transport Assessment Addendum Report – SSD 5752.

The modelling results in Technical Note 3 do not change the conclusion drawn in March 2013 Traffic and Transport Assessment Report.

1.2 Reference Traffic Data and Model

For the purpose of traffic modelling investigation, recent traffic counts and modelling data have been sourced from following sources:

- AIMSUN modelling undertaken for wider road network as part of SICEEP.

Detailed traffic data and analysis results can be found in Technical Note 1.

1.3 Modelling Study Area

Hyder extended the AIMSUN model incorporating the full length of Darling Drive. The AIMSUN model was extended from Hay Street to Ultimo Road intersection.

The AIMSUN model coverage includes Darling Drive between Murray Street and Ultimo Road, Harbour Street between Day Street and Hay Street, Pier Street/Goulburn Street between Darling Drive and George Street, and Liverpool Street between Harbour Street and Sussex Street. Figure 1-1 below shows AIMSUN model study area.

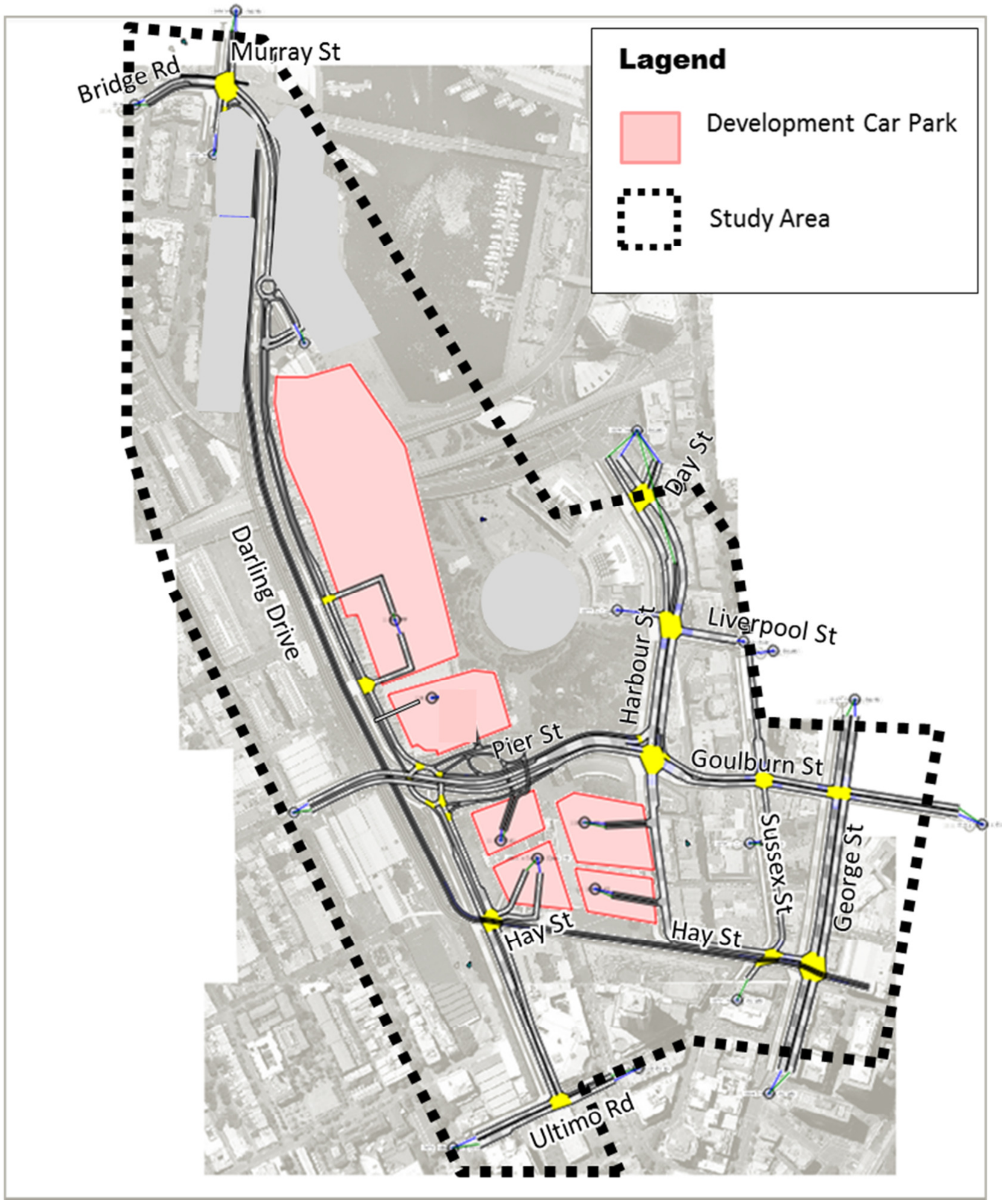

Figure 1-1 AIMSUN Model Study Area

2 Model Calibration and Validation

Hyder previously calibrated AIMSUN traffic model using the October 2012 counts. Further model calibration and validation was undertaken using new traffic data collected in June 2013. The June 2013 traffic data included travel time, intersection turning movement counts and queue length at key intersections. The AIMSUN model has been calibrated and validated according to the RMS's Traffic Modelling Guidelines (RMS 13.184). Detailed model calibration and validation results were documented in Technical Note 1.

3 Modelling Results

3.1 Existing Level of Service

The existing level of service (LoS) was reassessed using AIMSUN model. In Section 3.1.5 of the March 2012 Traffic and Transport Assessment Report documented existing network capacity and level of service (LoS) results.

The LoS analysis was repeated for existing 2013 traffic condition using calibrated and validated AIMSUN model at the following six key intersections:

- Darling Drive/Pyrmont Bridge Road/ Murray Street;
- Darling Drive / Pier Street;
- Darling Drive / Hay Street;
- Harbour Street / Pier Street / Goulburn Street;
- Harbour Street / Liverpool Street; and
- Darling Drive / Ultimo Road.

Table 3-1 summarises LoS results for existing 2013 traffic condition based on AIMSUN model.

The LoS is forecast between A and E for above six key intersections. In particular, poor level of service (LoS E) was forecast for Harbour Street/Liverpool Street for both Friday and Saturday PM peak hour. Traffic model suggested currently there is capacity problem at Harbour Street/Liverpool Street. The result is in line with previous modelling outcome.

Table 3-1 Existing Level of Service based on AIMSUN

Intersection	Control Type	Friday PM Peak		Saturday PM Peak	
		Overall Average Delay	LoS	Overall Average Delay	LoS
Darling Drive / Pyrmont Bridge Road / Murray Street	Signals	31	C	35	C
Darling Drive / Pier Street	Roundabout	10	A	11	A
Darling Drive / Hay Street	Signals	48	D	48	D
Harbour Street / Pier Street / Goulburn Street	Signals	50	D	53	D
Harbour Street / Liverpool Street	Signals	65	E	58	E
Darling Drive / Ultimo Road	Signals	21	B	24	B

Note: AIMSUN model code: Hyder SICEEP Aimsun Model_R4_Existing. File: F:\AA004399\D-Calcs\Traffic Modelling\POST TENDER TRAFFIC STUDY\Modellings\AIMSUN_For Reporting June 13\TN3_AIMSUN Modelling Result\inputs\AIMSUN Turn Table_Scenario Testing_Rev2_Friday_LoS.xlsx. F:\AA004399\D-Calcs\Traffic

Modelling\POST TENDER TRAFFIC STUDY\Modellings\AIMSUN_For Reporting June 13\TN3_AIMSUN Modelling Result\inputs\ AIMSUN Turn Table_Scenario Testing_Rev2_Saturday_LoS.xlsx

Further network operational analysis has been undertaken that identified operational issues currently being observed at four intersections as follows:

1. Darling Drive/Pyrmont Bridge Road/ Murray Street;
2. Harbour Street/Pier Street/Goulburn Street;
3. Harbour Street/Liverpool Street; and
4. Darling Drive/Pier Street

The traffic model has forecast poor level of service D to F to those movements showed in Figure 3-1.