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22 April 2016

Senior Strategic Planner
Holroyd City Council
16 Memorial Avenue
MERRYLANDS NSW 2160

Attention: Natalie Stanowski
Sent via email: natalie.stanowski@holroyd.nsw.gov.au

Dear Natalie

RE : WENTWORTHVILLE CENTRE PLANNING AND PLACE MARKING STRATEGY
RESPONSE TO TFNSW COMMENTS

Bitzios Consulting has been commissioned by Holroyd Council to respond to feedback provided by TfNSW on the Wentworthville Town Centre Traffic and Transport Strategy report. This letter provides our responses to the relevant items raised. In addition, a second "Part" has been added to the Traffic and Transport Strategy report to update the traffic modelling, key findings and concept plans for the traffic and transport proposal in the centre, in response to the comments raised by TfNSW.

TfNSW provided its comments in a letter received by Council on 16 February 2016. The detailed comments were attached to that letter in Tab A and relevant items in Tab A are responded to below.

1.0 ITEM VI

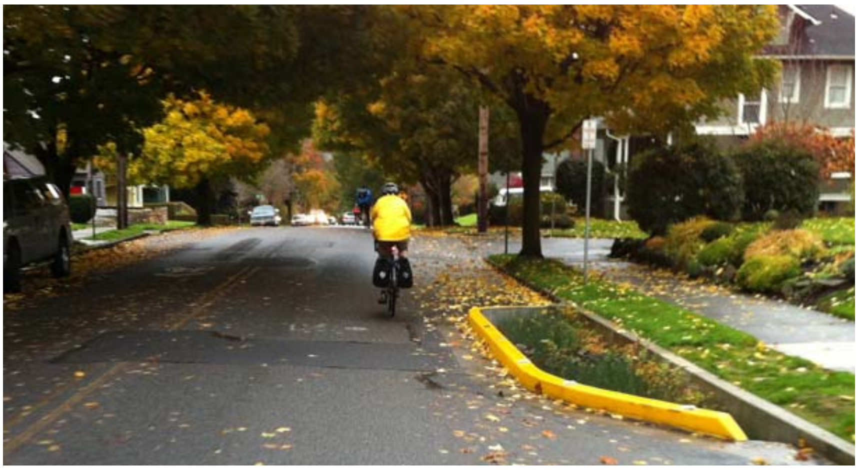
Proposed traffic calming measures on Dunmore street should be designed to minimise bus passenger discomfort. Dunmore Street is the main east-west bus corridor through the centre.

We acknowledge the need to minimise discomfort to bus passengers and expect that traffic calming measures on Dunmore Street would not be in the form of raised platforms. Rather, we would expect central medians, pedestrian refuges and kerb extensions to be used as per the examples below.

- Central median example: A central median will reduce the travel lane width, this will achieve a slower speed but still allow buses access with minimal discomfort to passengers.

- **Pedestrian refuge example:** Similar to a central median, a pedestrian refuge will provide a safe crossing point along the High Pedestrian Activity Area (HPAA) whilst providing traffic calming with minimal discomfort for bus passengers.

- **Kerb extensions example:** Kerb extensions provide a similar effect as a central median to constrain the driving environment to reduce speeds but involves less diversion and would provide a reduced level of discomfort for bus passengers compared to the introduction of a central median.



2.0 ITEM VII

Additional traffic generated from the proposed land use uplift will increase bus travel times at intersections within the subject area and its approach roads. Bus priority measures such as bus lanes or bus queue jumps should be considered where necessary. Consideration should also be given to other measures to mitigate any forecast increase in bus travel times within the study area and its vicinity, such as the removal of on-street parking during the commuter peak periods.

To demonstrate that the development will not have a significant impact on bus travel times, the average travel times from the 2015 base Paramics models and the Scenario 2 Bypass and Half-bypass models have been extracted for comparison, as shown below (in minutes):

	7:00AM - 9:00AM Peak				4:00PM – 6:00PM Peak			
	2036 Bypass	2036 Half-Bypass	2036 Base	2015 Base	2036 Bypass	2036 Half-Bypass	2036 Base	2015 Base
Average Travel Times	2:35	2:50	*4:29*	*2:30*	2:59	3:03	*2:35*	*2:41*

The results show that if the “Scenario 2” level of development is to go ahead without any improvements (2036 Base case), the AM average bus travel times will increase by 2 minutes from the existing average which will have a reasonable impact bus services. With the half bypass there is an expected maximum delay of 22 seconds and with the full bypass 18 seconds, compared to now. These delay increases are arguably less than what would otherwise be expected to occur due to background traffic growth effects.

3.0 ITEM XV

Roads and Maritime reiterates the advice provided in the previous letter dated 11 January 2016 with regard to the review of the micro-simulation modelling commissioned by Council. As advised in the previous correspondence, to be in a position to undertake evidence based testing of any proposed traffic improvement strategies, including the by-pass options, it is imperative to have a base case models that reflect on-site road conditions, such as correct lane assignments and signal phasing, In this regard, the models, including the base case models, should be updated to be coded correctly to reflect site conditions and once updated, should be independently audited and then referred to Roads and Maritime for review.

As per TfNSW and RMS's feedback the base model was modified to include the following changes:

- the signal configuration of the Cumberland Highway intersection to match (exactly) the existing configuration; and
- Dunmore Street lanes approaching Cumberland Road has had the two lane approach extended eastwards to reflect the clearway in place in the PM peak period model.

The models were subsequently checked to ensure that they were still within calibration and validation tolerances.

4.0 ITEM XVI

The proposed traffic signals at Station Street and Pritchard Street require approval of Roads and Maritime services under Section 87 of the Roads Act, 1993. Concern is raised that the proposed traffic signals at this intersection are located in proximity (i.e. approximately 100 metres) to the existing signalised intersection at Dunmore Street and Station Street. In accordance with industry practice (Roads and Maritime - Section 2 of the Traffic Signal Design Manual) signalised intersections should be spaced a minimum of 130 metres apart to maximise traffic efficiency and to avoid unintended and possible misinterpreted sighting of the adjacent signalised intersection.

The proposed signalised intersection will be within a highly urbanised town centre environment where drivers should be in an alerted state, sufficient to be aware of differences in signals placed appropriately 100m apart. Notwithstanding this, a warrants assessment has been completed for both the "full" and "half bypass" options as described below. Figure 4.1 shows the full bypass traffic volumes over two, two hour periods (from the Year 2031 Paramics Modelling).

4.1. Full Bypass Signalised Intersection Warrants Assessment

Figure 4.1 outlines the full bypass traffic volume over two, two hour periods (from the year 2031 Paramics modelling).

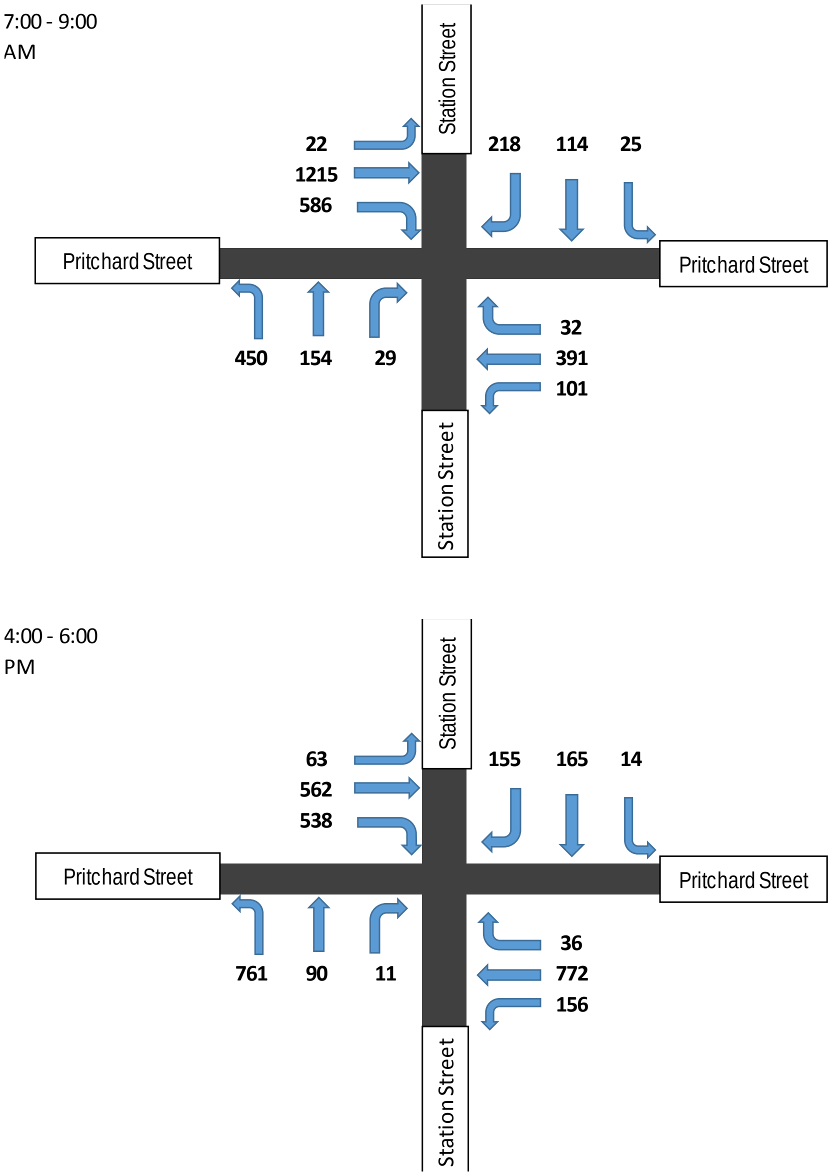


Figure 4.1: Turn Counts at the Proposed Signalised Intersection – Full Bypass (2031)

The volumes on Pritchard Street are expected to meet the warrants for signals in 2031, whilst the volumes on Station Street (south) are lower than the 600 vph per duration (for 4 hours of the day). Given the orientation of the intersection, the heavy turning volumes and expected growth in pedestrian movements across the intersection due to land use intensification within its catchment, traffic signals would provide significant benefits for traffic safety and efficiency. The only other option for this new 4-way intersection, a roundabout, would have excessive land take requirements, would not cater overall to heavy turning movements and would be far less effective in managing pedestrian and cyclists through the intersection.

4.2. Half Bypass Signalised Intersection Warrant Assessment

Figure 4.2 provides the full bypass traffic volumes over two, two hour periods.

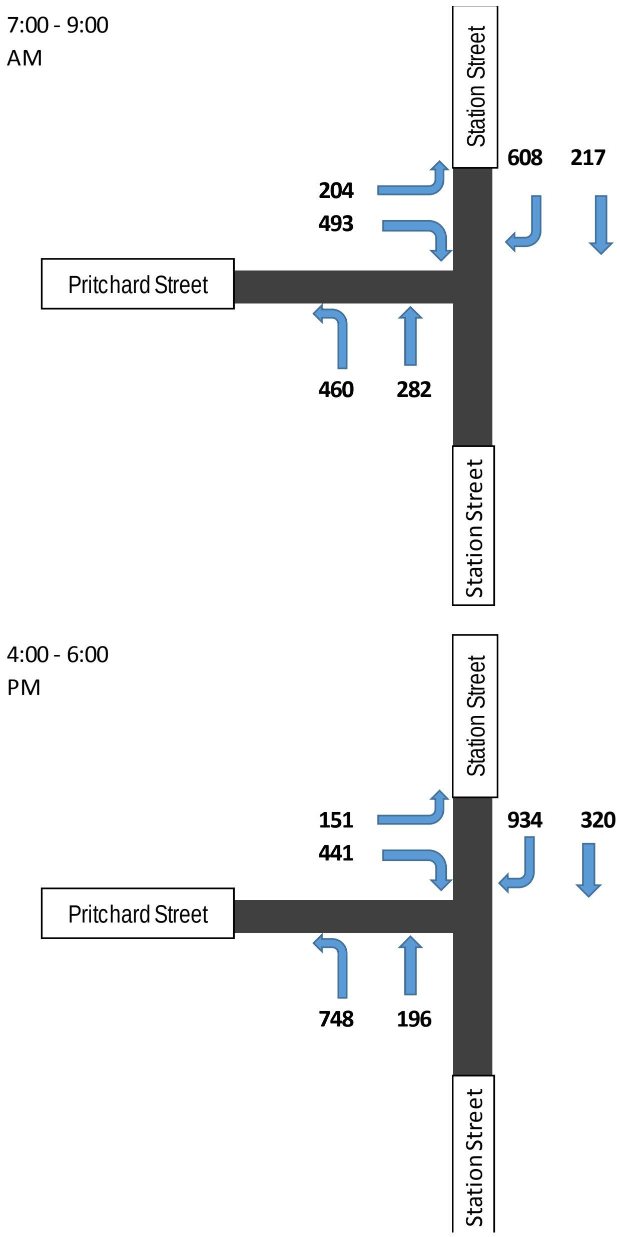


Figure 4.2: Turn Counts at the Proposed Signalised Intersection – Half Bypass (2031)

The volumes on Pritchard Street and on Station Street do not meet the warrants for signalisation of the intersection based on the RMS threshold of 600 vph per direction per approach for 4 hours. Notwithstanding this, the intersection is unable to be re-aligned (due to property-take requirements) to favour priority movements between Station Street north and Pritchard Street and there is insufficient land available for a roundabout in this location. Furthermore, expected increases in pedestrians and cyclists and heavy turning flows suggest a priority intersection would be neither safe nor efficient. To investigate this further, a SIDRA intersection analysis was undertaken on the intersection assuming the existing priority controls remain. The intersection layout is shown in Figure 4.3 and the summary results in Table 4.1

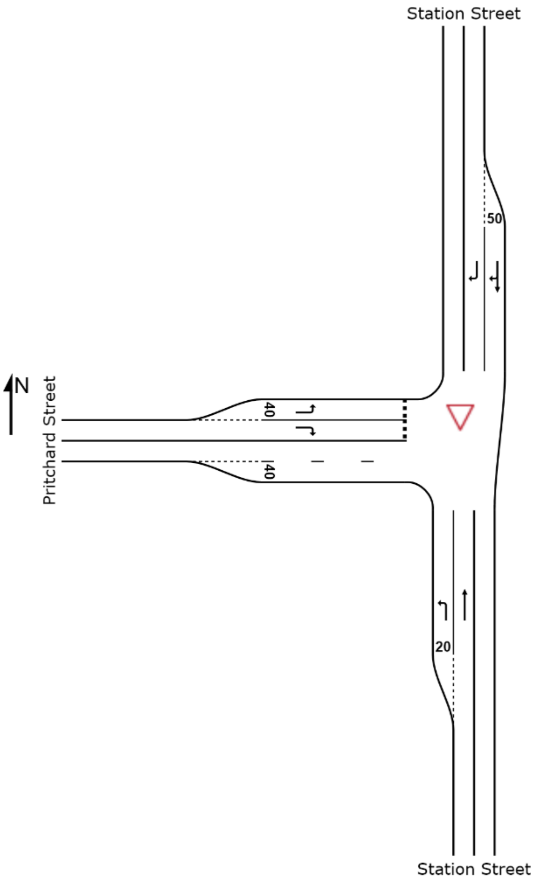


Figure 4.3: SIDRA Layout

Table 4.1 outlines the results of the SIDRA model assessment.

Table 4.1: Pritchard Street / Garfield Street SIDRA Results

Approach	AM			PM		
	DOS (v/c)	Average Delay (s)	Queue (m)	DOS (v/c)	Average Delay (s)	Queue (m)
Station Street (South)	0.27	3	0	0.43	4	0
Station Street (North)	0.96	2.7	19	0.60	5	22
Pritchard Street (West)	5.1	267	277	5.53	3,090	1,857

The results of the SIDRA modelling clearly show that should Pritchard Street be encouraged as the major traffic bypass route, then its priority controlled intersection with Station Street needs to be upgraded. Signalisation of this intersection is the most effective form of upgrade. The full SIDRA results analysis are provided in Attachment A.

4.3. Operational Observations of the Adjacent Signal Sets

Observations from the Paramics modelling of the Full Bypass show that both signalised intersections do not cause queuing into each other on Station Street. Furthermore, the queues on Station Street are shown to clear in one cycle and no excessive delays are noticed. Figure 4.4 shows the clearance of a typical (maximum) queue in the model.

Full Bypass 8:06 AM	Full Bypass 8:07 AM

Figure 4.4: Typical Queue Clearing - Full Bypass

Section 2 of the RMS' Traffic Signal Design Manual specifies that a signalised intersection should be spaced a minimum of 130 metres apart to maximise traffic efficiency and avoid unintended and possible misinterpreted sight of the following signalised intersection. Figure 4.5 shows both the sight distance between the proposed intersection and the existing signals at Station/Dunmore. This figure shows that the building/accessing line acts to alert the driver that they are in a town centre environment and to be more observant of their immediate surroundings rather than their "long-range" sights lines.

Source: GoogleMaps

Figure 4.5: Sight from Proposed Signals to Existing Signals

5.0 ITEM XVII

Movements at the western end of the High Pedestrian Activity Area (HPAA) on Dunmore Street shall be restricted to left in/left out only and ideally be achieved by installing a raised concrete median island in the centre of the bypass in front of the western mouth to the HPPA. Note that other comments previously raised regarding a left turn into the Kingsway (which has been removed) and the speed of this curve from Garfield Street into Pritchard Street have also been addressed under this item

As per TfNSW and RMS feedback the Dunmore Street/Garfield Street intersection was reconfigured as left in/left out only and the speeds on key curves were reduced to more realistically approximate actual/likely turning speeds.

Both the full bypass and half bypass models have been updated on this basis and re-run with the results provided in Part B of the updated Traffic Strategy Modelling Report (Version 003).

6.0 ITEM VIII

It is recommended that Council undertake a swept path analysis for all movements at the intersection of Garfield Street and Pritchard Street for the largest design vehicle to ensure that the geometry and curvature of the intersection complies with Austroads.

The proposed "Keep Clear" line marking at this intersection would need to fully conform and satisfy the criteria in the Roads and Maritime Delineation Manual Section 9.

Swept path analyses have been undertaken for the Garfield Street / Pritchard Street intersection with a Refuse Collection Vehicle (RCV) as the design vehicle. The assessment has shown that "chevron marking" is required to allow the movement of the RCV from the western end of Pritchard Street to turn north into Garfield Street, as shown in Figure 6.1. This is the only change required to this intersection concept to ensure that the design vehicle can be accommodated. Also, should the concept progress to detail design, we acknowledge that the "Keep Clear" area would need to be marked in accordance with RMS guidelines.

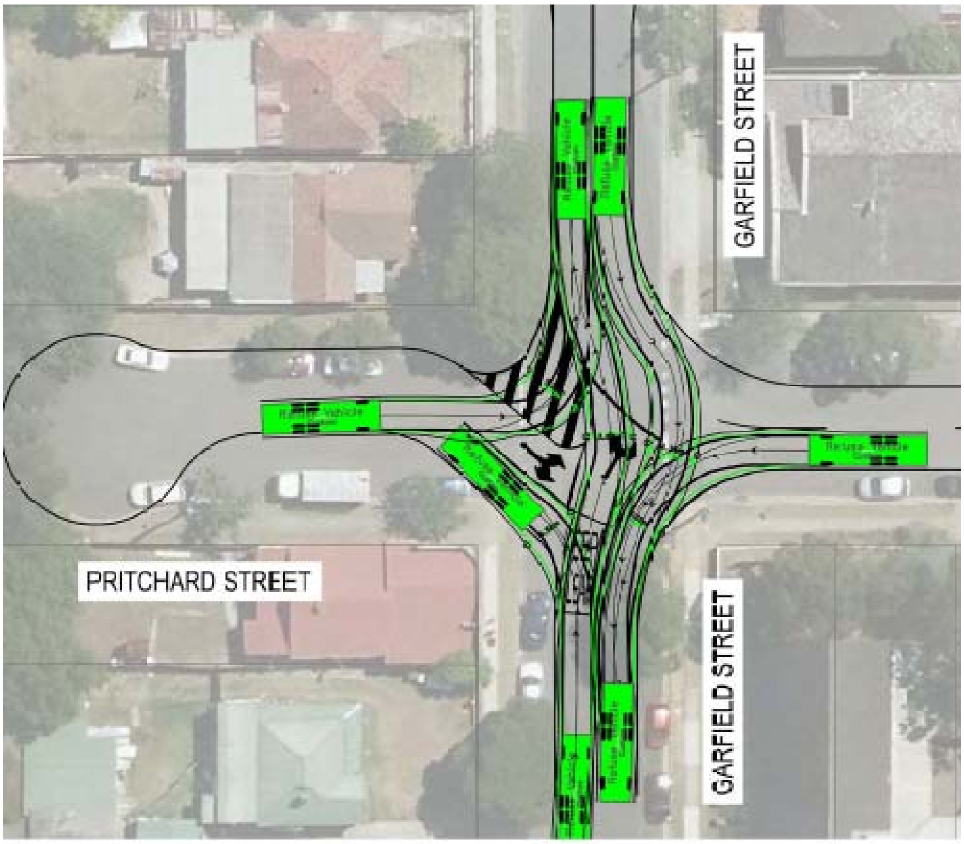


Figure 6.1: Garfield Street / Pritchard Street Swept Path Analysis

7.0 ITEM VIII

It is noted that Council proposes a 40km/hr High Pedestrian Activity Area (HPAA) on Dunmore Street between Garfield Road and Station Street. As Council would be aware, this HPPA would need to be designed and implemented in accordance with Transport for NSW HPAA Guidelines.

The 40km/h HPAA on Dunmore Street between Garfield Road and Station Street will be designed in accordance with NSW HPAA Guidelines should the concept progress to detail design and implementation.

Please do not hesitate to contact me with any questions regarding the above advice.

Yours faithfully

D. Bitzios

Damien Bitzios
Director
BITZIOS CONSULTING

ATTACHMENT 1

SIDRA RESULTS

MOVEMENT SUMMARY

Site: Pritchard Street / Station Street Half Bypass AM

New Site
Giveway / Yield (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: Station Street											
1	L2	484	5.0	0.270	4.6	LOS A	0.0	0.0	0.00	0.53	46.5
2	T1	297	5.0	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		781	5.0	0.270	2.9	NA	0.0	0.0	0.00	0.33	47.4
North: Station Street											
8	T1	228	0.0	0.261	4.0	LOS A	1.8	12.6	0.53	0.23	44.1
9	R2	640	0.0	0.956	34.9	LOS D	18.8	131.3	0.91	2.04	27.8
Approach		868	0.0	0.956	26.8	NA	18.8	131.3	0.81	1.56	30.8
West: Pritchard Street											
10	L2	215	5.0	0.225	6.3	LOS A	0.9	6.5	0.42	0.64	43.0
12	R2	519	5.0	5.096	3739.6	LOS F	276.5	2018.5	1.00	6.26	1.0
Approach		734	5.0	5.096	2646.9	LOS F	276.5	2018.5	0.83	4.62	1.2
All Vehicles		2383	3.2	5.096	825.6	NA	276.5	2018.5	0.55	2.10	3.2

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.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

MOVEMENT SUMMARY

Site: Pritchard Street / Station Street Half Bypass PM

New Site
Giveway / Yield (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: Station Street											
1	L2	787	5.0	0.439	4.7	LOS A	0.0	0.0	0.00	0.53	46.5
2	T1	206	5.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		994	5.0	0.439	3.7	NA	0.0	0.0	0.00	0.42	46.9
North: Station Street											
8	T1	640	0.0	0.328	0.0	LOS A	0.0	0.0	0.00	0.00	49.9
9	R2	228	0.0	0.597	19.7	LOS C	3.1	22.0	0.87	1.13	34.0
Approach		868	0.0	0.597	5.2	NA	3.1	22.0	0.23	0.30	44.5
West: Pritchard Street											
10	L2	159	5.0	0.150	5.6	LOS A	0.6	4.2	0.32	0.57	43.3
12	R2	464	5.0	5.538	4146.4	LOS F	254.3	1856.6	1.00	5.52	0.9
Approach		623	5.0	5.538	3090.3	LOS F	254.3	1856.6	0.83	4.25	1.0
All Vehicles		2485	3.3	5.538	778.1	NA	254.3	1856.6	0.29	1.34	3.5

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.
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.