RMA/2018/2029 Proposed Papanui Pak'nSave Supermarket

JOINT EXPERT WITNESS STATEMENT – TRANSPORT

Conferencing Date:

10 September 2019

The conferencing took place at the Anderson Lloyd office in Christchurch with video link to Ian Clark in Auckland starting at 12 noon and finishing at 2:15pm.

Experts Present:

Name	Company	Party Represented
Dave Smith	Abley	Foodstuffs (Applicant)
Jared White	Abley	Foodstuffs (Applicant)
Richard Holland (left at 1:55pm)	Christchurch City Council	Christchurch City Council
Mark Gregory	Christchurch City Council	Christchurch City Council
Bill Sissons	Advanced Traffic	Christchurch City Council
Ian Clark	Flow	NZ Transport Agency

Other people present:

- Paul Durdin, Abley

The experts present, who have signed this joint statement, agree that they are familiar with and have complied with the Environment Court Code of Conduct of Expert Witnesses. In particular, by signing this statement the expert witness agrees that they individually:

- have conferred only on matters within their field of expertise
- have not acted as advocates for the parties who engage them
- during the conferencing have exercised independent and professional judgement and have not acted on any instructions or directions from the parties that have engaged them or any other person
- have signed this expert witness statement without assistance from any counsel
- have not excluded any material that they believe is essential to the decision-making
- have made a genuine effort to achieve agreement on the relevant facts and issues.

Issues agreed

The following matters have been agreed in relation to the further modelling required to progress the assessment of effects of the proposed Pak'nSave supermarket on the receiving transport environment.

1. Permitted baseline and signals at Northcote Road/Lydia Street

The agreed baseline for modelling is the existing logistics operation run by Toll Holdings with the current priority-controlled arrangement at the Northcote / Lydia intersection i.e. without signals.

2. 2021 Do Minimum Baseline

At 2021, the agreed Do Minimum Baseline retains the existing cycle time of 85 seconds (note cycle times are currently restricted by CTOC to 85 seconds as part of the operation of the entire Main North Road corridor from Harewood Road to Prestons Road) for both morning and evening peak period, removes filter right turns from the Main North Road north and south approaches (+ a scenario to evaluate the removal of all filter turns including the right turn from Northcote Road) and uses flows modified to reflect the expected change in demands following opening of the Northern Arterial as indicated from the CAST model. The filter right turn from QEII Drive is to be removed in all scenarios as per the current operation and model.

Acceptance criteria for any lane configuration changes when the 'with development' modelling is undertaken need to be no worse for both AM and PM peaks than the 2021 Base 85s Non-Filter NS (that is no filter right turns on the Main North Road north and south approaches) scenario shown at the meeting.

3. 2031 Do Minimum Baseline

Agreed that 4-laning of Northcote Road without any further modifications to the Main North / Northcote / QEII intersection forms part of this scenario. In all other respects the layout and operation of the intersection is unchanged from 2021 baseline. Any filter turns removed from the intersection at 2021 will not be reinstated in the 2031 baseline even if intersection performance deteriorates in the baseline.

4. Proposed mitigation at Main North Road/QEII/Northcote intersection

Changes to the lane configuration and phasing need to be tested in s-Paramics for the AM and PM peak periods, with a sensitivity test of the interpeak using Sidra Intersection 8 software based on corresponding CAST intersection demands. A cycle time of 85 seconds is to be maintained in all periods.

5. Impact of CAST Re-routed Traffic

This issue follows up on concerns raised about 'induced traffic'; however, all parties agree this should more correctly be referred to as re-routed traffic and corresponds to any traffic that re-routes through the Main North Road intersections due to a 'step change' in the efficiency performance as a result of the proposed change in lane configuration and phasing. The definition of a 'step change' was not discussed. This will be discussed at the next meeting (refer 6e).

If the s-Paramics 'with development' modelling (from item 4 above) show a step change in intersection performance (either better or worse than the corresponding baseline model), then CAST will be used to quantify the level of re-routing that could be expected as a result of the change in intersection performance.

6. Next Steps

a) CCC to provide updated 2021 and 2031 CAST model outputs with development traffic and the removal of 2 Lydia Street and correction to Oil Changers carpark access (to be completed this week)
b) Abley to re-run the 2021 and 2031 without development s-Paramics PM peak models using CAST demands received on 9 September from CCC, including a new scenario without the filter turn from Northcote Road into Main North Road southbound, and check the consistency of the other 2031 model runs presented at the meeting.
c) Results from b) above to be recirculated by Abley as soon as possible for CTOC/NZTA/CCC agreement on whether no filter on all four approaches or no filter on three approaches (other than Northcote Rd) will form the baseline
d) Abley to model 2021 and 2031 with development scenarios for morning peak and evening peak using inputs from a) above with mitigation as proposed. A Sidra-only test to be undertaken for interpeak period. If the Sidra result for the interpeak is worse than the 'Do Minimum Baseline', then we may need to look deeper.
e) Results to be pre-circulated and then all parties meet 1pm-4pm Friday 20th September (venue to be Anderson Lloyd Christchurch with video connection to Anderson Lloyd Auckland).

7. Other matters

CAST volume and volume change diagrams were shared with Ian Clark in advance of the meeting and discussed amongst all parties at caucusing. A concern was raised by Ian Clark regarding the reduction in traffic on Main North Road in the 'with development' scenario. The reduction was explained as being due to a combination of minor re-routing on the wider network from the introduction of the new access signals on Main North Road and corresponding incremental delay, and the ability of vehicles to turn right at the signals which reduces vehicles travelling circuitously around the local network to access Foodstuffs head office as per the current situation.

An observation was made that the CAST 'with development' scenario increased traffic flows along Winters Road in the evening peak to access the Christchurch Northern Corridor via the Winters Road connection to the QEII interchange. This was agreed to feasibly be an attractive route for traffic exiting the development with the model responding logically to congestion on the route via Main North/QE2 Drive; however, it probably isn't desirable for traffic to reroute via this residential street. The increase in traffic equates to 1 vehicle every 40-60 seconds in evening peak hour.

Signed & dated 12 September 2019.

Dave Smith

Jared White

Richard Holland

Mark Gregory

Bill Sissons

Ian Clark

FINAL STATEMENT

RMA/2018/2029 Proposed Papanui Pak'nSave Supermarket

JOINT EXPERT WITNESS STATEMENT – TRANSPORT

Conferencing Dates:

Second session 20 September 2019 - The conferencing took place at the Anderson Lloyd office in Christchurch with video link to Ian Clark in Auckland starting at 1pm and finishing at 2:30pm.

Third session 2 October 2019 - The conferencing took place at the Anderson Lloyd office in Christchurch with video link to Ian Clark in Auckland starting at 9:30am and finishing at 11:45am.

Experts Present:

Name	Company	Party Represented
Dave Smith	Abley	Foodstuffs (Applicant)
Jared White	Abley	Foodstuffs (Applicant)
Richard Holland	Christchurch City Council	Christchurch City Council
Mark Gregory	Christchurch City Council	Christchurch City Council
Bill Sissons	Advanced Traffic	Christchurch City Council
Ian Clark	Flow	NZ Transport Agency

The experts present, who have signed this joint statement, agree that they are familiar with and have complied with the Environment Court Code of Conduct of Expert Witnesses. In particular, by signing this statement the expert witness agrees that they individually:

- have conferred only on matters within their field of expertise
- have not acted as advocates for the parties who engage them
- during the conferencing have exercised independent and professional judgement and have not acted on any instructions or directions from the parties that have engaged them or any other person
- have signed this expert witness statement without assistance from any counsel
- have not excluded any material that they believe is essential to the decision-making
- have made a genuine effort to achieve agreement on the relevant facts and issues.

Issues agreed – Second session dated 20th September

The following matters were discussed in relation to the further modelling required to progress the assessment of effects of the proposed Pak'nSave supermarket on the receiving transport environment. The second conferencing session was predominantly a scoping exercise with agreed actions to inform final points of agreement in the third conferencing session.

1. **Discuss post-CNC operation 'without development' of Main Nth Road/QEII/Northcote signals at 2021 and 2031**

   Results including volumes, delays and LoS by turning movements were shared for the following scenarios (all 85 seconds cycle time without development):
   -2021 AM peak with current phasing and filtering
   -2021 AM peak with current phasing and no filtering on Main North Rd approaches
   -2021 AM peak with current phasing and no filtering on any approaches
   -2031 AM peak with current phasing and no filtering on Main North Rd approaches
   -2031 AM peak with current phasing and no filtering on any approaches
   -2018 PM peak with current phasing and filtering
   ]2021 PM peak with current phasing and filtering
   -2021 PM peak with current phasing and no filtering on Main North Rd approaches
   -2021 PM peak with current phasing and no filtering on any approaches
   -2031 PM peak with current phasing and no filtering on Main North Rd approaches
   -2031 PM peak with current phasing and no filtering on any approaches

   Concerns were raised regarding minimum green times and whether they provide enough times for pedestrians to cross. A 22 second walk plus clearance time is considered suitable although it is noted that this is not required at every phase.

   Short phase times would also limit the extent to which platooning could occur and coordination between signals could be achieved efficiently.

   Removing filtering generally preferred to improve safety at intersection acknowledging is a right turn against crash history especially during offpeak periods when traffic is more free-flowing.

   CAST modelling indicated around 35-40% of green time allocated to Northcote/QEII approaches which provides a sanity check around the Paramics green time allocation.

   ACTIONS: Ian to ask NZTA about any changes in speed environment and/or speed limit change location on QEII approach to intersection.

   ACTIONS: Bill to provide further information based on SCATS operation of the signals with respect to minimum green times required to cater for pedestrian movements at the intersection, and how often this is called.

ACTIONS: Abley to check all phase times against this information, adjust phase times where required and republish analysis with transparency around the timings.

2. **Present 'with development' results including proposed mitigation**

Results including volumes, delays and LoS by turning movements were shared for the following scenarios (all 85 seconds cycle time with development):
-2021 AM peak with mitigation including proposed split phasing (02 CAST demands)
-2021 AM peak with mitigation including proposed split phasing (02B CAST demands)
-2031 AM peak with mitigation including proposed split phasing (04 CAST demands)
-2021 PM peak with mitigation including proposed split phasing (02 CAST demands)
-2021 PM peak with mitigation including proposed split phasing (02B CAST demands)
-2031 PM peak with mitigation including proposed split phasing (04 CAST demands)

-Concerns raised earlier regarding minimum green times are also valid here so the same checks and actions apply to this analysis.

-Overall improved intersection performance observed with development traffic and mitigation but need to check validity of phase times.

3. **Compare AM peak (paramics), interpeak (sidra) and PM peak (paramics) 'with development' and 'without development' scenarios**

-Morning and evening peak with and without development scenario comparison to be undertaken at next conferencing session once phase times concerns are addressed.

-Interpeak Sidra modelling was presented. Abley had concerns about the quantum of re-routing and/or additional traffic in interpeak CAST demands with development traffic which show different trends to AM and PM peak period so these have not been modelled.

ACTION: Mark to revisit interpeak CAST demands to ensure the model is stable and trip generation is 80% of evening peak demands with consistent divert, pass by and primary trip generation assumptions as the morning and evening peak CAST models.

4. **Any other matters**

-Bus lane along Main North Road may become an HOV lane in the future. This would have the benefit of increasing car occupancy and reducing number of cars on the road. It is agreed that this is uncertain so will not be considered further.

-Concerns raised about the left turn out of the site then needing to weave across two lanes to turn right into QEII northbound. Is noted that with proposed layout of Main North Rd southern approach traffic exiting the development only needs to weave across to middle lane so this is an improvement over base situation.

-Safety audit signed off by Council expressed concern about conflict between pedestrians on left turn out of site and there is the potential to include ducting to futureproof the left turn for inclusion of signalized control.

ACTION: Abley to undertake modelling to demonstrate operation of left turn out if it were to be signalized.

5. **Next steps regarding assumptions for Main Nth Road/QEII/Northcote and any additional runs required.**

Actions identified in previous steps.

Subsequent to the second conferencing session Abley and CCC undertook the additional modelling as agreed and circulated results as follows:
Interpeak Sidra modelling results on the 26th September
Morning and evening peak Paramics modelling results on the 1st October

These were discussed at the third conferencing session recorded below. The package of model outputs that correspond to the discussion below are appended to this Joint Witness Statement. Page references to the package of conferencing material are included below and for completeness pages 3 (morning peak) and 5 (evening peak) of the Appendix correspond to the key model results presented at the second conferencing session.

Issues Agreed – Third Session dated 2nd October

6. **Discuss the ability of CAST to manage traffic demands and demonstrate likely routing of traffic.**

   A question was raised by Bill regarding as to how much reliance can be applied to the routing of traffic in CAST. All parties agree that CAST is the most appropriate tool to inform demands in Paramics. Mark explained how CAST operates there was as acknowledgement that there is not much route choice in the local area and that we are using the modelling tools to the best of their ability.

   Dave reiterated that the reductions in flow outside the site are influenced by the right turn in/out enabled by the access signals and the small delay introduced in CAST due to the new signals. All experts agree that it is important to explore any 'grey areas' or limitations in the modelling but the right tools have been applied in accordance with best practice.

   Mark is of the view that additional sensitivity testing may be helpful to better understand the context of uncertainty in the model outcomes.

7. **Discuss the updated s-Paramics modelling subsequent to second conferencing session (refer email on pages 1 and 2 of Appendix)**

   Jared presented the updated methodology whereby the 2021 and 2031 with and without development scenarios were remodelled including the following changes:

   - Extending north approach phase time out to 22 seconds for the morning peak and evening peak which are called every second and fourth phase respectively.
   - These proportions were calculated from SCATS data provided by Bill.
   - All other phase times checked to ensure they are sufficient to provide 22 seconds crossing time.

   It is agreed by all parties that this is consistent with the agreed modelling specification from the second conferencing session.

8. **Observe and discuss 2021 Evening Peak modelling without development (refer table headed 4. on page 6 of Appendix – second set of columns headed 2021 Base 85s Filter W)**

   All parties observed the 2021 PM Peak model without development with current phasing and right turn filters removed from the Main North Road approaches. Queuing was evident on Northcote Road approach and the right turn from Main North Road south had extensive queuing back into the through lane and past the Cranford Street intersection at times.

   Concern was raised as to the full delay on the Northcote Road approach which may be underestimated as the path only tracks back to the Vagues Rd signals.

   AGREED ACTION: Abley to provide full path back to the external adjacent to Sawyers Arms Road and report number of unreleased vehicles.

All parties agree that the proposed changes to the Main North Road/QEII intersection would appear to have merit, irrespective of the supermarket development, to address the increase in the right turn demand into QEII Drive. There is potentially a procedural issue around whether this improvement should be included in the future Do Minimum scenario (as the need has only just been identified, meaning that there is currently no commitment to the change). However all parties agree that ideally this improvement should be considered for implementation at around the same time as the opening of the Christchurch Northern Corridor (CNC) as remedial works, to allow traffic to access the CNC works satisfactorily (rather than continue to use Main North Road).

It is agreed that there is an additional safety benefit associated with the removal of the filter turns on the Main North Road approaches. This is likely to only require minor works with both efficiency and safety benefits likely. All parties agree that this should be recommended to NZTA based on the information available to the participants.

All parties agree that it would be useful to undertake an additional run including the proposed changes to the Main North Rd/QEII/Northcote intersection without the development to provide an alternative baseline. This will isolate the effects of the change in layout from the effects due to the development.

It is acknowledged that advice is required from other parties as to what is the appropriate base for the assessment of effects (as there is currently no commitment to the layout change recommended in the paragraphs above).

AGREED ACTION: Abley to run 2021 PM Peak model without development but including the proposed changes (offered as mitigation in the ITA) to the Main North Rd/QEII/Northcote intersection.

9. **Observe and discuss 2021 Evening Peak modelling with development (refer table headed 4. on page 6 of Appendix – third set of columns headed 2021 w/Dev 85s FilterW)**

All parties observed the 2021 PM Peak model running with the development and split phasing. It is agreed by all parties that the network is operating satisfactorily and is generally consistent with the published results for the corresponding run. The extensive queuing for right turners from Main North Road into QEII Drive is addressed by the change in the intersection layout and operation.

10. **Discuss 2031 Evening Peak with and without development model results (refer table headed 4. on page 6 of Appendix – two righthandmost sets of columns headed 2031 Base 85s Filter W for without development and 2031 w/Dev 85s Filter W for with development)**

The key difference in the 2031 future receiving environment is the four laning of Northcote Road which will result in more traffic accessing Northcote Road from side roads and it is noted by Mark that there are other projects planned which will change the nature of travel demands in the northwest of Christchurch. Land use changes will also be a significant factor in the forecast travel demands on the Northcote Road corridor. It is also noted that the supermarket is not expected to be operational until around 2023 which is well in advance of 2031.

All parties agree that the four laning project of Northcote Road does not have a scheme currently and that it may or may not require improvements at the Main North Rd/QEII intersection.

AGREED ACTION: CCC to confirm what assumptions have been included in CAST in relation to the four laning so that this can be clearly understood by all parties.

The key policy objectives (from CCC Network Management Plan) relating to the operation of the local network include:

- protecting the east-west corridor as a major arterial acknowledging its function
- safeguarding public transport on Main North Road corridor

The future operation of the network should give effect to these policy objectives.

The precise details of the Northcote Road four laning are not known and therefore the future operation of this intersection should be taken as indicative rather than precise in terms of the current modelling results. This notwithstanding all parties agree that some additional optimisation in Paramics to share out the delays across all intersection approaches would be beneficial, to understand the likely effects with and without development along the Main North Road corridor relative to the Northcote/QEII Drive corridor.

AGREED ACTION: Abley to undertake some optimisation of phase times in 2031 PM peak model with and without development to demonstrate implications for the intersection performance. Modelled phase times for the 2021 and 2031 with and without development scenarios will also be provided.

11. Discuss 2021 and 2031 Morning Peak with and without development model results (refer table headed 3 of -age 5 of Appendix)

The 2021 and 2031 morning peak results were presented. All parties agree that the intersection operates satisfactorily in the morning peak with and without the development and it is noted that supermarket retail traffic generation is much lower.

It is agreed that given the operation of the intersection in the morning peak with and without the supermarket is acceptable, that the focus of the assessment of effects should be on the critical evening peak period and not the morning peak period.

12. Discuss 2021 Interpeak Sidra Modelling results (refer Sidra outputs on page 9 (without development) and 10 (with development) of Appendix)

The Sidra modelling was presented based on the CAST model demands received from CCC on the 24th and 25th of September. It is noted that there was some rerouting occurring within CAST as a result of the additional right turn capacity from Main North Rd into QEII Drive.

Overall there is an approximate four second increase in delay as a result of a combination of the split phasing, a subsequent increase in traffic due to re-routing and additional supermarket traffic.

It is agreed by all parties that the changes proposed are acceptable in the interpeak period and there is no need to consider effects of the development in further in the interpeak period.

A question was raised about effects during the weekend. Dave notes that the demands on the network are much lower during the weekend.

13. **Discuss modelling of signalised left in and left out of Pak'N Save access signals (refer to results in pages 7 (morning peak) and 8 (evening peak) of Appendix)**

The safety audit accompanying the ITA highlighted that the left turns would preferably be signalised for improved safety especially if pedestrian demands are high. 2021 and 2031 Morning and Evening peak model runs have been undertaken with the left turn in and left turn out both signalised and checks undertaken to ensure all crosswalk times are sufficient to accommodate safe pedestrian movements.

All parties agree that there are safety benefits associated with the signalising the left turn out and in and the modelling results indicate that there is no deterioration of intersection performance in terms of efficiency.

All parties agree that it is recommended that both left turns are signalised as part of the detailed intersection design. This is consistent with upcoming works to be undertaken by CCC at the Main North/Halliwell/Northlands intersection.

Ian asked about any potential queuing from the new site access signals back to the Cranford Street intersection. Dave notes the modelling to date indicates that it is the performance of the signals at QEII that primarily impact on the performance of the Main North Road corridor and the new signals are not causing queuing in isolation.

AGREED ACTION: Abley team to provide all parties with a copy of the final Paramics models for any final checking to address these concerns.

Signed & dated 8th October 2019.

Dave Smith

Jared White

Richard Holland

Mark Gregory

Bill Sissons

Ian Clark

Jared White

From: Dave Smith
Sent: Tuesday, 1 October 2019 15:45
To: Bill Sissons; 'Holland, Richard'; Mark.Gregory@ccc.govt.nz; 'ian@flownz.com'; Jared White
Subject: Papanui Pak'N Save Updated Modelling for Conferencing on 2nd October
Attachments: Updated Results for Papanui PnS Paramics Model.pdf

Hi All

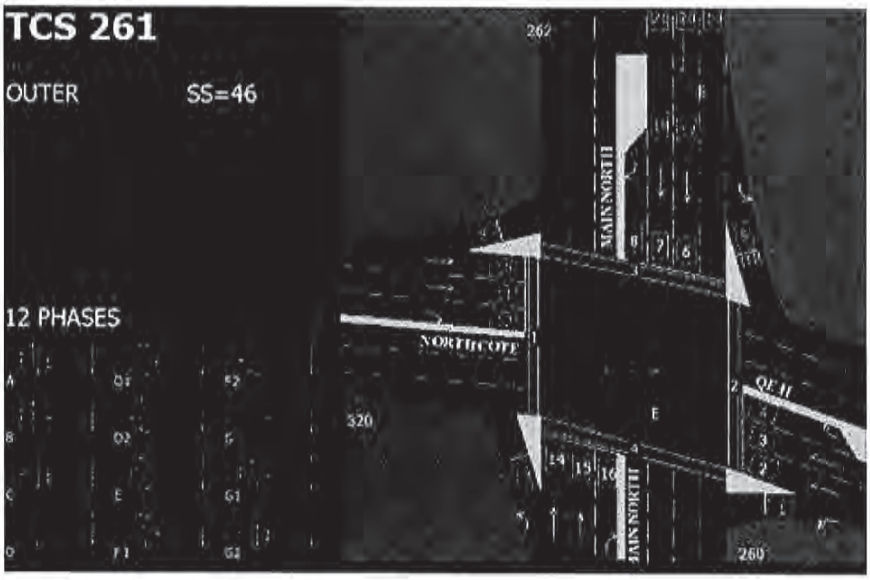
Please find attached a series of results from the Paramics models representing the results thus far and testing done over the past week or so. All of the results are informed by the CAST matrices provided by Mark on 13/09/2019. They are numbered and are described as follows:

1. Existing Result Set for AM Peak (0800-0900) presented at the 2nd conferencing session
2. Existing Result Set for PM Peak (1630-1730) presented at the 2nd conferencing session
3. Pedestrian Demand Analysis Result Set for AM Peak (0800-0900)
4. Pedestrian Demand Analysis Result Set for PM Peak (1630-1730)
5. Site Access Results Set for AM Peak (0800-0900)
6. Site Access Results Set for PM Peak (1630-1730)

The final four results sets have been developed to account for potential phase time changes when pedestrian demands are called at the Main North/Northcote/QEII intersection. Bill supplied actual phase times and pedestrian demand calls from Wed 18 Sep 2019 and the assumptions informing the updated analysis is below.

In the phasing data supplied the following table summarises the number of times the pedestrian movements were called. The Pedestrian movements are shown in the SCATS graphics below for which approach they cross and phases they currently run with. The phase durations were assessed and the minimum phase time for Phase E when a pedestrian movement was called was 22 seconds so this was used as the minimum for the P2 movement going forwards.

Ped Movements	P1	P2	P1, P2	All P1	All P2	P3	P4	P3, P4	All P3&4	Cycle
1600-1800	8	17	3	11	20	5	11	3	19	
1630-1730	4	8	3	7	11	2	5	3	10	
1600-1800 %call	10%	20%	4%	13%	24%	6%	13%	4%	23%	
1630-1730 %call	10%	19%	7%	17%	26%	5%	12%	7%	24%	
0700-0900	13	15	15	28	30	12	17	15	44	
0730-0830	8	9	12	20	21	9	10	14	33	
0700-0900 %call	15%	18%	18%	33%	35%	14%	20%	18%	52%	
0730-0830 %call	19%	21%	29%	48%	50%	21%	24%	33%	79%	
1400-1500	2	4	11	13	15	9	4	5	18	
1400-1500 %call	5%	10%	26%	31%	36%	21%	10%	12%	43%	



The phasing sequence in the base model is assumed to be A-D-E-G-B(or G1) at 85 seconds. In the development models with split phasing B-C-D-E at 85 seconds. In the evening peak models the phase time for when P2 would run is typically 14 to 15 seconds requiring an uplift of up to 8 seconds when pedestrian movements are called. In the base and with development model the P3 and P4 run in Phase E and have enough phase time to cover the pedestrian movements in all modelled time periods. The P1 runs with the B then A phases while P2 runs in the A phase only for the Base model. The B and A phase time covers the P1 run time requirement. The A Phase is increased to 22 seconds to cover the P2 demand by reducing the B phase time keeping other phases the same. In the with-development models the B phase is reduced and the C phase increased to 22 seconds when the P2 movement is required.

For the evening peak the P2 is called in 25% of cycles so the model has four cycles worth of phases with the last set changed to accommodate the P2 demand. The morning peak is demanded 50% of the time so there are two cycles in the model while the afternoon period is demanded one third of the time so three cycles are included. For all phase changes made to enable the pedestrian clearance times the total cycle time was retained at 85 seconds.

Look forward to discussing at conferencing tomorrow. We will also be discussing the interpeak modelling sent through late last week.

Regards

Dave

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1.Papanui Paramics Model Results AM Peak (0800-0900)

Main North Rd - QE2 Signal Intersection

		2021 Base 85s Filter W					2021 w/Dev 85s FilterW (Mx02)					2021 w/Dev 85s FilterW (Mx02B)					2031 Base 85s Filter W					2031 w/Dev 85s FilterW (Mx04)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	187	14.7	B			260	15.2	B			260	16.7	B			217	15.5	B			218	16.2	B		
North	Thru	436	51.5	D			332	47.2	D			333	48.3	D			400	57.2	E			429	51.5	D		
North	Right	108	54.5	D	42.5	D	120	42.3	D	34.7	C	125	39.0	D	35.2	D	180	53.7	D	45.0	D	150	42.7	D	40.2	D
East	Left	550	25.4	C			567	20.2	C			559	18.2	B			590	36.6	D			630	30.7	C		
East	Thru	911	57.3	E			943	46.7	D			946	47.2	D			1090	67.1	E			1073	52.9	D		
East	Right	60	53.1	D	45.6	D	63	47.8	D	37.2	D	63	48.4	D	36.9	D	50	68.4	E	56.7	E	66	54.5	D	45.0	D
South	Left	252	18.1	B			168	29.6	C			175	29.4	C			342	18.4	B			339	30.9	C		
South	Thru	401	35.0	C			354	52.3	D			353	47.3	D			409	34.7	C			341	43.6	D		
South	Right	276	62.4	E	38.5	D	291	44.4	D	44.8	D	293	43.5	D	42.1	D	260	52.0	D	33.6	C	270	41.4	D	38.4	D
West	Left	86	19.2	B			86	17.1	B			86	19.5	B			117	22.4	C			130	25.7	C		
West	Thru	655	38.0	D			664	36.0	D			671	38.8	D			789	37.4	D			860	41.1	D		
West	Right	312	53.1	D	41.0	D	285	42.9	D	36.3	D	270	41.0	D	37.8	D	277	77.6	E	45.3	D	89	34.6	C	38.7	D
Intersection		4233			42.4	D	4133			38.0	D	4133			37.9	D	4722			46.9	D	4595			41.3	D

Cranford - Main North Signal Intersection

		2021 Base 85s Filter W					2021 w/Dev 85s FilterW (Mx02)					2021 w/Dev 85s FilterW (Mx02B)					2031 Base 85s Filter W					2031 w/Dev 85s FilterW (Mx04)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	347	7.0	A			263	11.7	B			255	12.3	B			348	7.0	A			260	16.5	B		
North	Through	908	19.3	B	15.9	B	834	22.8	C	20.2	C	834	22.5	C	20.1	C	869	19.3	B	15.8	B	803	21.7	C	20.4	C
East	Left	288	9.2	A			271	9.2	A			279	9.0	A			52	9.7	A			68	8.5	A		
East	Right	372	38.5	D	25.7	C	338	37.7	D	25.0	C	331	38.3	D	24.9	C	502	44.5	D	41.2	D	494	44.7	D	40.3	D
South	Through	455	14.3	B			449	14.0	B			451	14.5	B			448	13.5	B			409	13.3	B		
South	Right	82	44.2	D	18.9	B	87	40.7	D	18.4	B	84	41.5	D	18.7	B	6	41.6	D	13.9	B	11	35.2	D	13.9	B
Intersection		2453			19.2	B	2242			21.0	C	2233			21.1	C	2225			21.7	C	2045			24.5	C

2.Papanui Paramics Model Results PM Peak (1630-1730)

Main North Rd - QE2 Signal Intersection

		2018 Base (updated LOS calc)					2021 Base 85s Filter W					2021 w/Dev 85s FilterW (Mx02)					2021 w/Dev 85s FilterW (Mx02B)					2031 Base 85s Filter W					2031 w/Dev 85s FilterW (Mx04)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	171	30.0	C			199	14.2	B			192	19.8	B			195	20.2	C			205	14.7	B			191	16.7	B		
North	Thru	727	79.8	E			206	73.9	E			227	60.0	E			221	63.3	E			194	61.8	E			227	78.0	E		
North	Right	162	141.1	F	81.1	F	112	94.5	F	55.4	E	118	65.1	E	46.8	D	120	71.3	E	49.5	D	175	151.8	F	72.3	E	94	58.5	E	51.6	D
East	Left	164	13.7	B			381	27.3	C			431	17.1	B			429	14.7	B			390	24.5	C			477	18.6	B		
East	Thru	605	44.1	D			892	68.2	E			908	57.9	E			887	50.9	D			1070	53.9	D			1000	46.1	D		
East	Right	151	65.2	E	42.2	D	127	124.0	F	62.1	E	139	39.8	D	44.3	D	140	35.1	D	38.7	D	122	124.2	F	52.1	D	127	93.3	F	41.7	D
South	Left	188	83.5	F			164	18.5	B			133	19.9	B			130	17.7	B			171	20.2	C			175	28.5	C		
South	Thru	1284	102.8	F			875	32.3	C			772	32.0	C			773	29.7	C			777	44.0	D			710	58.3	E		
South	Right	164	115.7	F	101.8		514	63.2	E	41.1	D	473	39.4	D	33.4	C	461	37.1	D	31.1	C	424	121.9	F	65.1	E	675	51.7	D	52.1	D
West	Left	158	102.5	F			75	158.7	F			73	51.8	D			79	60.0	E			203	228.6	F			252	185.9	F		
West	Thru	746	135.1	F			910	187.0	F			945	77.7	E			945	85.5	F			1016	231.6	F			976	195.8	F		
West	Right	165	90.2	F	123.4	F	199	159.9	F	180.7	F	120	53.4	D	73.5	E	136	57.8	E	80.5	F	203	201.7	F	226.9	F	76	155.6	F	191.6	F
Intersection		4685			90.3	F	4653			84.5	F	4529			48.6	D	4514			48.4	D	4951			108.3	F	4980			85.2	F

Cranford - Main North Signal Intersection

		2018 Base (updated LOS calc)					2021 Base 85s Filter W					2021 w/Dev 85s FilterW (Mx02)					2021 w/Dev 85s FilterW (Mx02B)					2031 Base 85s Filter W					2031 w/Dev 85s FilterW (Mx04)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	562	10.5	B			178	7.0	A			139	12.5	B			139	13.3	B			234	7.0	A			148	14.5	B		
North	Through	565	31.2	C	20.9	C	591	42.2	D	34.0	C	540	36.4	D	31.5	C	538	36.3	D	31.6	C	543	41.5	D	31.1	C	507	36.2	D	31.3	C
East	Left	280	45.9	D			281	10.7	B			272	11.2	B			265	10.8	B			133	70.8	E			106	79.2	E		
East	Right	795	123.7	F	103.4	F	561	44.3	D	33.1	C	533	47.7	D	35.3	D	541	46.8	D	35.0	C	575	182.4	F	161.4	F	530	199.8	F	179.7	F
South	Through	883	61.8	E			959	16.5	B			878	15.8	B			849	19.2	B			798	91.1	F			1057	42.5	D		
South	Right	251	47.8	D	58.7	E	366	29.4	C	20.1	C	399	28.7	C	19.9	B	436	34.2	C	24.3	C	126	52.2	D	85.8	F	104	26.4	C	41.1	D
Intersection		3336			60.3	E	2936			27.5	C	2761			27.2	C	2767			29.2	C	2410			90.4	F	2452			74.4	E

3.Papanui Paramics Model Results AM Peak (0800-0900) pedestrian phase extension models

Main North Rd - QE2 Signal Intersection (50% call of Eastern Pedestrian Crosswalk)

		2021 Base 85s Filter W					2021 Base 85s Filter W					2021 w/Dev 85s FilterW (Mx02)					2031 Base 85s Filter W					2031 w/Dev 85s FilterW (Mx04)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	187	14.7	B			189	13.8	B			263	16.5	B			218	14.8	B			219	16.3	B		
North	Thru	436	51.5	D			439	45.0	D			325	50.8	D			400	49.0	D			425	52.7	D		
North	Right	108	54.5	D	42.5	D	105	51.6	D	37.9	D	124	41.0	D	36.4	D	186	48.7	D	39.7	D	152	46.7	D	41.5	D
East	Left	550	25.4	C			545	25.3	C			567	19.2	B			588	34.0	C			627	30.5	C		
East	Thru	911	57.3	E			914	58.5	E			945	48.7	D			1086	62.2	E			1076	55.4	E		
East	Right	60	53.1	D	45.6	D	59	51.7	D	46.3	D	63	45.7	D	37.9	D	51	63.3	E	52.6	D	68	51.2	D	46.4	D
South	Left	252	18.1	B			246	18.5	B			176	30.0	C			338	18.9	B			337	30.8	C		
South	Thru	401	35.0	C			399	38.0	D			358	43.9	D			410	38.2	D			346	41.7	D		
South	Right	276	62.4	E	38.5	D	264	137.4	F	61.6	E	295	38.0	D	38.9	D	260	60.6	E	37.5	D	269	37.8	D	36.7	D
West	Left	86	19.2	B			86	18.0	B			87	19.3	B			114	23.0	C			129	26.9	C		
West	Thru	655	38.0	D			657	38.9	D			665	37.1	D			782	42.2	D			857	41.4	D		
West	Right	312	53.1	D	41.0	D	311	48.0	D	39.9	D	287	42.6	D	37.2	D	275	112.0	F	56.7	E	87	34.3	C	39.1	D
Intersection		4233			42.4	D	4214			46.5	D	4156			37.7	D	4708			48.2	D	4592			41.8	D

Cranford - Main North Signal Intersection

		2021 Base 85s Filter W					2021 Base 85s Filter W					2021 w/Dev 85s FilterW (Mx02)					2031 Base 85s Filter W					2031 w/Dev 85s FilterW (Mx04)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	347	7.0	A			348	6.0	A			268	12.2	B			348	7.0	A			258	15.8	B		
North	Through	908	19.3	B	15.9	B	886	19.0	B	15.3	B	836	22.5	C	20.0	B	858	19.8	B	16.1	B	799	22.7	C	21.0	C
East	Left	288	9.2	A			297	9.0	A			273	9.3	A			55	9.8	A			67	8.1	A		
East	Right	372	38.5	D	25.7	C	366	39.9	D	26.1	C	338	38.3	D	25.4	C	502	44.3	D	40.9	D	498	43.6	D	39.4	D
South	Through	455	14.3	B			452	15.4	B			456	13.8	B			440	13.0	B			406	14.5	B		
South	Right	82	44.2	D	18.9	B	84	43.4	D	19.8	B	84	42.2	D	18.2	B	3	47.0	D	13.3	B	9	33.3	C	14.9	B
Intersection		2453			19.2	B	2434			19.2	B	2254			21.0	C	2207			21.8	C	2036			24.9	C

4.Papanui Paramics Model Results PM Peak (1630-1730) pedestrian phase extension models

Main North Rd - QE2 Signal Intersection (25% call of Eastern Pedestrian Crosswalk)

		2018 Base (updated LOS calc)					2021 Base 85s Filter W					2021 w/Dev 85s FilterW					2031 Base 85s Filter W					2031 w/Dev 85s Filter W				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	171	30.0	C			198	14.3	B			192	19.0	B			206	13.8	B			192	14.4	B		
North	Thru	727	79.8	E			209	58.9	E			224	55.5	E			197	56.5	E			226	57.8	E		
North	Right	162	141.1	F	81.1	F	109	87.5	F	47.8	D	122	58.2	E	43.1	D	172	111.8	F	57.7	E	96	51.4	D	40.4	D
East	Left	164	13.7	B			384	27.4	C			426	16.4	B			390	29.8	C			471	16.8	B		
East	Thru	605	44.1	D			889	68.4	E			906	56.4	E			1068	61.5	E			1014	45.3	D		
East	Right	151	65.2	E	42.2	D	125	131.4	F	62.8	E	131	106.5	F	49.2	D	124	113.2	F	57.7	E	130	72.8	E	39.2	D
South	Left	188	83.5	F			155	19.0	B			135	23.2	C			152	19.8	B			160	31.5	C		
South	Thru	1284	102.8	F			861	34.1	C			775	43.2	D			748	44.7	D			666	64.6	E		
South	Right	164	115.7	F	101.8		486	103.1	F	54.8	D	471	41.9	D	40.8	D	400	115.4	F	63.5	E	658	54.3	D	56.5	E
West	Left	158	102.5	F			76	151.6	F			70	60.8	E			209	245.7	F			241	239.6	F		
West	Thru	746	135.1	F			912	181.4	F			943	83.3	F			1020	250.7	F			946	240.8	F		
West	Right	165	90.2	F	123.4	F	203	147.8	F	173.8	F	122	57.5	E	79.1	E	205	210.1	F	244.2	F	78	186.8	F	237.2	F
Intersection		4685			90.3	F	4605			87.2	F	4519			53.4	D	4892			113.9	F	4879			95.9	F

Cranford - Main North Signal Intersection

		2018 Base (updated LOS calc)					2021 Base 85s Filter W					2021 w/Dev 85s FilterW					2031 Base 85s Filter W					2031 w/Dev 85s Filter W				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Left	562	10.5	B			179	6.0	A			133	12.7	B			237	7.0	A			146	14.8	B		
North	Through	565	31.2	C	20.9	C	597	43.8	D	35.1	D	536	37.5	D	32.6	C	544	42.2	D	31.5	C	500	36.2	D	31.3	C
East	Left	280	45.9	D			282	13.0	B			268	10.7	B			141	75.3	E			88	123.1	F		
East	Right	795	123.7	F	103.4	F	550	68.7	E	49.9	D	532	47.7	D	35.3	D	579	183.5	F	162.3	F	469	291.8	F	265.2	F
South	Through	883	61.8	E			930	39.0	D			877	15.2	B			755	97.8	F			1022	69.3	E		
South	Right	251	47.8	D	58.7	E	357	33.9	C	37.6	D	402	28.5	C	19.4	B	126	58.2	E	92.1	F	104	41.4	D	66.7	E
Intersection		3336			60.3	E	2896			40.4	D	2748			27.2	C	2382			93.5	F	2329			104.4	F

5.Papanui Paramics Model Results AM Peak (0800-0900) Site Access

Proposed Site - Main North Signal Intersection (pedestrian activation at Main North/Northcote/QEII)

		2021 with Dev					2021 with Dev (no slips)					2031 with Dev					2031 with Dev (no slips)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Through	1169	12.2	B			1175	12.8	B			1121	13	B			1116	13.2	B		
North	Right	50	44.6	D	13.5	B	51	44.1	D	14.1	B	44	46	D	14.2	B	45	44.4	D	14.4	B
South	Left	63	8.8	A			69	9.7	A			62	9	A			71	9.5	A		
South	Through	721	11.2	B	11.0	B	711	10.5	B	10.4	B	851	10	B	10.1	B	848	9.8	A	9.8	A
West	Left	62	8.3	A			38	35.9	D			55	9	A			40	34.1	C		
West	Right	119	62.2	E	43.8	D	123	60.3	E	54.5	D	121	58	E	42.6	D	119	60.5	E	53.9	D
Intersection		2183			15.1	B	2167			15.8	B	2254			14.8	B	2238			15.3	B

6.Papanui Paramics Model Results PM Peak (1630-1730) Site Access

Proposed Site - Main North Signal Intersection (pedestrian activation at Main North/Northcote/QEII)

		2021 with Dev					2021 with Dev (no slips)					2031 with Dev					2031 with Dev (no slips)				
Approach	Turn	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS	Flow	Avg Delay	LOS	App Delay	App LOS
North	Through	699	11.2	B			690	12.7	B			676	12.5	B			670	12.3	B		
North	Right	106	52.0	D	16.5	B	106	50.7	D	17.7	B	101	48.8	D	17.2	B	93	52.6	D	17.3	B
South	Left	254	11.3	B			258	13.8	B			217	35.5	D			231	40.2	D		
South	Through	1090	20.8	C	19.0	B	1082	19.0	B	18.0	B	1227	79.4	E	72.8	E	1219	79.3	E	73.1	E
West	Left	224	17.3	B			212	36.4	D			222	38.5	D			217	56.9	E		
West	Right	229	46.5	D	32.1	C	237	46.3	D	41.7	D	217	43.3	D	40.9	D	220	45.3	D	51.1	D
Intersection		2601			20.5	C	2586			22.0	C	2661			51.3	D	2650			53.4	D

MOVEMENT SUMMARY

Site: 101 [Main North / QE2 2021 IP - CAST CTOC split phase 85s with dev]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Main North Rd S												
1	L2	109	0.0	0.104	8.0	LOS A	1.3	8.9	0.36	0.61	0.36	45.1
2	T1	617	0.0	0.791	37.3	LOS D	14.8	103.3	1.00	0.96	1.15	35.3
3	R2	396	0.0	0.791	42.0	LOS D	14.6	102.4	1.00	0.94	1.16	35.3
Approach		1122	0.0	0.791	36.1	LOS D	14.8	103.3	0.94	0.92	1.08	36.1
East: QE2 E												
4	L2	501	0.0	0.428	10.7	LOS B	6.6	46.3	0.43	0.72	0.43	56.4
5	T1	653	0.0	0.682	35.0	LOS D	12.6	88.2	0.96	0.84	0.98	38.9
6	R2	90	0.0	0.724	54.1	LOS D	4.1	28.6	1.00	0.84	1.24	33.8
Approach		1244	0.0	0.724	26.6	LOS C	12.6	88.2	0.75	0.80	0.78	44.0
North: Main North Rd N												
7	L2	112	0.0	0.132	15.1	LOS B	2.2	15.6	0.55	0.69	0.55	51.3
8	T1	465	0.0	0.629	34.6	LOS C	9.1	64.0	0.97	0.81	0.98	38.4
9	R2	94	0.0	0.267	37.3	LOS D	3.4	23.6	0.89	0.76	0.89	35.1
Approach		671	0.0	0.629	31.8	LOS C	9.1	64.0	0.89	0.78	0.89	39.5
West: Northcote Rd W												
10	L2	135	0.0	0.219	23.7	LOS C	3.9	27.2	0.74	0.71	0.74	39.9
11	T1	677	0.0	0.797	35.8	LOS D	16.3	114.0	0.97	0.94	1.14	38.3
12	R2	125	0.0	0.476	27.2	LOS C	3.7	26.2	0.93	0.77	0.93	38.4
Approach		937	0.0	0.797	32.9	LOS C	16.3	114.0	0.93	0.89	1.05	38.5
All Vehicles		3974	0.0	0.797	31.7	LOS C	16.3	114.0	0.87	0.85	0.95	39.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian Back of Queue ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		200	36.8	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Main North / QE2 2021 IP - CAST CTOC 85s no filter NS]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Main North Rd S												
1	L2	96	0.0	0.087	8.3	LOS A	1.2	8.2	0.37	0.61	0.37	45.0
2	T1	613	0.0	0.704	33.9	LOS C	12.2	85.6	0.97	0.86	1.03	36.7
3	R2	178	0.0	0.716	45.5	LOS D	7.6	53.5	1.00	0.88	1.13	33.9
Approach		887	0.0	0.716	33.4	LOS C	12.2	85.6	0.91	0.84	0.98	36.8
East: QE2 E												
4	L2	418	0.0	0.348	9.6	LOS A	4.3	30.3	0.36	0.71	0.36	57.4
5	T1	683	0.0	0.603	30.8	LOS C	12.2	85.7	0.91	0.81	0.91	40.8
6	R2	90	0.0	0.620	51.5	LOS D	3.9	27.5	1.00	0.80	1.09	34.7
Approach		1191	0.0	0.620	25.0	LOS C	12.2	85.7	0.72	0.78	0.73	44.7
North: Main North Rd N												
7	L2	126	0.0	0.130	11.9	LOS B	2.0	14.3	0.46	0.67	0.46	53.7
8	T1	398	0.0	0.457	30.6	LOS C	7.2	50.6	0.91	0.75	0.91	40.0
9	R2	108	0.0	0.434	43.2	LOS D	4.3	30.0	0.96	0.78	0.96	33.3
Approach		632	0.0	0.457	29.0	LOS C	7.2	50.6	0.83	0.74	0.83	40.7
West: Northcote Rd W												
10	L2	154	0.0	0.129	8.2	LOS A	1.9	13.2	0.37	0.61	0.37	47.9
11	T1	685	0.0	0.695	28.3	LOS C	14.8	103.4	0.91	0.80	0.94	41.5
12	R2	110	0.0	0.350	23.1	LOS C	2.9	20.4	0.86	0.75	0.86	40.1
Approach		949	0.0	0.695	24.5	LOS C	14.8	103.4	0.82	0.77	0.84	42.3
All Vehicles		3659	0.0	0.716	27.6	LOS C	14.8	103.4	0.81	0.78	0.83	41.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	50	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		200	36.8	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

RMA/2018/2029 Proposed Papanui Pak'nSave Supermarket

JOINT EXPERT WITNESS STATEMENT – TRANSPORT

Conferencing Dates:

Fourth session 15 October 2019 - The conferencing took place at the Anderson Lloyd office in Christchurch with video link to Ian Clark in Auckland starting at 12 noon and finishing at 1:30pm.

Experts Present:

Name	Company	Party Represented
Dave Smith	Abley	Foodstuffs (Applicant)
Jared White	Abley	Foodstuffs (Applicant)
Richard Holland	Christchurch City Council	Christchurch City Council
Mark Gregory	Christchurch City Council	Christchurch City Council
Bill Sissons	Advanced Traffic	Christchurch City Council
Ian Clark	Flow	NZ Transport Agency

The experts present, who have signed this joint statement, agree that they are familiar with and have complied with the Environment Court Code of Conduct of Expert Witnesses. In particular, by signing this statement the expert witness agrees that they individually:

- have conferred only on matters within their field of expertise
- have not acted as advocates for the parties who engage them
- during the conferencing have exercised independent and professional judgement and have not acted on any instructions or directions from the parties that have engaged them or any other person
- have signed this expert witness statement without assistance from any counsel
- have not excluded any material that they believe is essential to the decision-making
- have made a genuine effort to achieve agreement on the relevant facts and issues.

Issues agreed – Fourth session dated 15th October

The following matters were discussed in relation to the further modelling required to progress the assessment of effects of the proposed Pak'nSave supermarket on the receiving transport environment. The matters discussed progress on the four actions identified in the third modelling conferencing session (held on 2nd October) and documented in the corresponding Joint Witness Statement signed and dated on the 8th October 2019.

The four matters discussed are presented in turn in this statement and refer to emails including modelling outputs which are included as an Appendix to this Joint Witness Statement. A concluding statement with respect to the Main North Road/QEII Drive/Northcote Road intersection operation and supplementary material regarding modelled phase times at this intersection are also included.

1. ***AGREED ACTION: Abley to provide full path back to the external adjacent to Sawyers Arms Road and report number of unreleased vehicles.***

   The outputs included in the email on pages 1-2 of the Appendix were presented and discussed to address this action.

   All parties acknowledge that the modelling indicates extensive queuing from the west with on average 60 vehicles not released between 5:30pm and 6pm in the base model (without development). This is due to the single eastbound lane on Northcote Road and the relatively short provision for stacking at the Northcote Road approach to the Main North Road/QEII Drive/Northcote Road intersection. This extent of queuing would likely be addressed when the corridor is four-laned at some stage in the future. The 2031 modelling without the development demonstrates that the provision of an additional eastbound lane on Northcote Road provides sufficient capacity such that all vehicles are released in the evening peak period.

   With the addition of the development traffic, the modelling indicates that all vehicles are being released onto the network in the 2021 evening peak period. It is noted that this scenario includes changes to the layout and phasing as proposed including optimisation of phase times including the addition of two seconds of green time to the Northcote Rd and QEII Drive approaches every cycle.

   The key modelling assumptions and phase times are included as supplementary information in section 6 of this Joint Witness Statement.

2. ***AGREED ACTION: Abley to run 2021 PM Peak model without development but including the proposed changes (offered as mitigation in the ITA) to the Main North Rd/QEII/Northcote intersection.***

   The outputs included in the email on page 3 of the Appendix were presented and discussed to address this action.

   All experts agree that the modelling confirms the previous conclusion, that the changes in the layout and phasing proposed in the application are predicted to lead to a significant improvement in the performance of the Main North Road/QEII Drive/Northcote Road

intersection. The experts remain of the view that this should be investigated further by NZTA irrespective of the development. It is noted that this modelling includes provision for pedestrian movements.

The experts agree that the addition of the development is predicted to lead to an improvement in the performance of the intersection. The experts note that this is likely to be due in part to the traffic re-distribution and re-routing in the models when development traffic is added, however it is also due to the additional flexibility and route choice on the network as a result of the introduction of the additional signalised intersection on Main North Road (between QEII Drive and Cranford Street).

The experts note that there are two potential re-routing matters to be explored. One is the re-routing due to the equilibrium assignment within CAST and there is also some limited route choice within the Paramics model including Foodstuffs Head Office traffic that may be undertaking u-turn manoeuvres at the Main North Road/QEII intersection, or travelling via Vagues Road to connect from Northcote Road to the south[1]. Mr Smith states that he will provide more information with respect to the CAST re-routing and the route choice within Paramics in his evidence.

The sensitivity test undertaken in the righthandmost column of the table in page 3 of the Appendix includes an additional two seconds of green time to the east and west approaches. The modelling demonstrates that a higher level of priority to east-west movement on Northcote Road and QEII Drive can be provided in the 2021 evening peak, without undermining Main North Road corridor movement including public transport movement. It is noted that the SCATS software used by CTOC would reallocate time in this manner to protect the function of the corridors.

3. AGREED ACTION: CCC to confirm what assumptions have been included in CAST in relation to the four laning so that this can be clearly understood by all parties.

Mark has provided the following response to this request:

"The CAST model used for the Application is based on a project model developed as part of the Harewood Road corridor study (mid 2018). Taking in more than just Harewood Road, this study went to Council in 2018 and is guiding the investment strategy for the area. Calibrated with the most up to date scheme and land use change information (as of 2018), the model was a logical choice for testing the outcomes of the proposed Pak'N Save development. The original testing was undertaken in September 2018.

As of August 2019, it was decided to continue with the current version of CAST, over converting modelling to the updated v18a model (available as of May 2019).

The future CAST model for the year 2031 includes Northcote Road as having four lanes, for all time slices. Saturation capacities of 3600 per hour per direction and a cost flow curve allowing for the effects of two lanes has been included. Full turning movements are assumed at all intersections, including some offset ancillary lanes.

[1] See also comment within item 4 about potential rerouting through the site

It should be noted that the planning underway for this corridor has moved on. Alternative schemes are being considered which increase capacity without inducing demand, and which are likely to make better use of the existing network (in alignment with the current GPS) and which are likely to deliver better value for money."

4. ***AGREED ACTION: Abley to undertake some optimisation of phase times in 2031 PM peak model with and without development to demonstrate implications for the intersection performance. Modelled phase times for the 2021 and 2031 with and without development scenarios will also be provided.***

The outputs included in the email on page 4 of the Appendix were presented and discussed to address this action.

Mr Clark noted that there is a risk that there may be through traffic from Northcote Road travelling through the site to get to Main North Road. Mr Smith and Mr White will investigate to see if this behaviour is occurring.

Mr Clark also noted concerns regarding the delays on the Cranford Street approach to the Main North Road intersection. Some of the changes in delays on key intersection approach at 2031 appear to be not as expected. Mr Smith and Mr White have agreed to undertake some additional investigation to understand this further and Mr Smith will report this in evidence.

Mr Smith stated his intention is to present a comprehensive set of 2021 and 2031 evening peak hour modelling results with and without the development, which are consistent with the modelling assumptions and scenarios presented at this conferencing session.

5. **Concluding Statement with respect to Main North Road/QEII Drive/Northcote Road Mitigation**

All experts agree that it would seem logical that as part of the Christchurch Northern Corridor opening works, the lane allocation at the intersection and phasing should be changed as per the proposed mitigation (unless there are non-traffic reasons that the experts are not aware of) irrespective of the development, as this will deliver safety and efficient improvements at the intersection . This is a matter which should be advanced by NZ Transport Agency and Christchurch City Council.

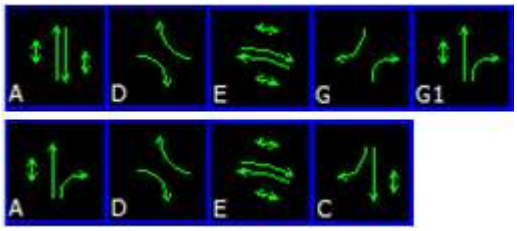
Assuming resource consent were granted for the Pak'N Save development, the works required to reallocate the right turn stacking room on the median for the new set of signals at the supermarket access, could then be undertaken at the expense of the developer prior to the opening of the supermarket.

6. **Supplementary material**

A full set of modelled Paramics phase times for all evening peak model runs discussed in this conferencing session is provided with this technical note as additional information for the experts.

All modelling has removed the filter right turns on the Main North Road approaches but retains filtering on the Northcote Road approach only. All modelling includes pedestrian activation in the 4th set of phases or 25% of the time, which is calibrated based on the current frequency of pedestrian calls across the eastern (QEII Drive) approach and requires an extension of green time for the Main North Road north approach.

The following shows the movements that the phasing represents with existing phasing shown in the first row and split phasing shown in the second row.



Scenario	General phasing times						Ped activation over QEII Drive approach					
	A	D	E	G	C-G1	**Cycle Time**	A	D	E	G	C-G1	**Cycle Time**
2021 base ex phase	14	11	28	13	19	**85**	22	11	28	13	11	**85**
2021 base Split Phase	30	11	29		15	**85**	23	11	29		22	**85**
2021 base Split Phase W+1sec	29	11	30		15	**85**	22	11	30		22	**85**
2021 with dev	30	11	29		15	**85**	23	11	29		22	**85**
2031 base Ex Phase	15	11	32	15	12	**85**	22	11	32	15	5	**85**
2031 with dev	28	12	31		14	**85**	23	11	29		22	**85**
2031 Split Phase Opt Delay set 1*	27	11	34		13	**85**	21	11	31		22	**85**
2031 Split Phase Opt Delay set 2*	28	11	34		12	**85**						
2031 with dev Opt Delay	30	11	32		12	**85**	21	11	31		22	**85**

*There were two sets of general phases called in the 2031 base with split phasing in order to give time to the west but manage the delays of the movements losing time.

7. Supply of model and peer review

A copy of the base year 2018 model and final 2021 and 2031 with and without development transportation models (five models in total) will be made available to all parties by close of business 18th October 2019.

Mr Smith and Mr Holland agree that there would be merit in an independent peer review being undertaken of the corresponding models. This will be a joint engagement between the Applicant and Christchurch City Council and both parties have agreed that Mr John Falconer from QTP is an appropriate reviewer.

Signed & dated 18th October 2019.

Dave Smith

Jared White

Richard Holland (for process)

Mark Gregory

Bill Sissons

Ian Clark

RMA/2018/2029 Proposed Papanui Pak'nSave Supermarket

JOINT EXPERT WITNESS STATEMENT – TRANSPORT

Conferencing Dates:

16th October 2019 - The conferencing took place at the Anderson Lloyd office in Christchurch with video link to Ian Clark in Auckland starting at 9am and finishing at 11:45am

Experts Present:

Name	Company	Party Represented
Dave Smith	Abley	Foodstuffs (Applicant)
Paul Durdin	Abley	Foodstuffs (Applicant)
Richard Holland	Christchurch City Council	Christchurch City Council
Mark Gregory	Christchurch City Council	Christchurch City Council
Bill Sissons	Advanced Traffic	Christchurch City Council
Ian Clark*	Flow	NZ Transport Agency
Len Fleete	Environment Canterbury	Environment Canterbury

* Left conferencing at 10:50am

Edward Wright representing Environment Canterbury was unable to attend due to illness.

The experts present, who have signed this joint statement, agree that they are familiar with and have complied with the Environment Court Code of Conduct of Expert Witnesses. In particular, by signing this statement the expert witness agrees that they individually:

- have conferred only on matters within their field of expertise
- have not acted as advocates for the parties who engage them
- during the conferencing have exercised independent and professional judgement and have not acted on any instructions or directions from the parties that have engaged them or any other person
- have signed this expert witness statement without assistance from any counsel
- have not excluded any material that they believe is essential to the decision-making
- have made a genuine effort to achieve agreement on the relevant facts and issues.

The conferencing was facilitated by Dave Smith of Abley. Mr Smith initially provided a brief overview of the key findings and outcomes of the four transport modelling conferencing sessions, primarily for the benefit of Paul Durdin and Len Fleete who did not participate in this conferencing. The conferencing then worked through the Integrated Transportation Assessment (ITA) report, produced as part of the resource consent application documentation, on a section by section basis. The outcomes of the conferencing are recorded on the following pages.

Section 1 - Introduction

The contents of Section 1 are a statement of fact and context for ITA.

Section 2 – Existing Site Information

All experts agree that section 2 of the ITA is an accurate representation of the existing site - agreed in full.

Section 3 – Existing Transport Environment

The following commentary was provided and agreed by all participants:

- It would be beneficial to mention the KiwiRAP ranking of the Main North / Northcote / QE II intersection to assist the commissioner to understand the rationale for safety improvements at the intersection, irrespective of the proposed development.
- It would be beneficial to add pedestrian crossing facilities to Figure 3.5 to paint a full picture of pedestrian and cyclist facilities in the vicinity of the subject site.
- The words “four laning” in the final paragraph of Section 3 should be replaced by “route improvements” to accurately reflect the current state of the project included in the CCC Long Term Plan.
- Ian Clark asked whether the modelling included activity on the existing Murdoch Manufacturing site in the modelled permitted baseline. Mr Smith responded that industrial activity on this site is not included and therefore the modelling assessment is conservative.
- A question was asked about the crash record at the Northcote Road / Lydia Street intersection and if any of the crashes at Main North Road / Northcote / QEII Drive intersection involved vehicles undertaking U-turn manoeuvres.

All experts agree that other than as noted above, section 3 of the ITA is an accurate representation of the existing transport environment. Mr Smith notes he will investigate the above suggestions and address these in evidence.

Section 4 - Proposed Development

Richard Holland and Mark Gregory raised concerns regarding the need for five access points along the Main North Road frontage. In particular, the need for Access 1 was queried, given the internal connectivity that is proposed to be facilitated via Access 2. All experts agreed that some consolidation of access points along Main North Road would be beneficial and supported consideration of removal of Access 1 in principle, acknowledging that the turn out of this access has potential safety implications. Mr Clark noted that Access 1 could be modified to left-in movements only if complete removal of the access was not acceptable to the Applicant.

POST CONFERENCING NOTE – Mr Smith confirms that Access 1 will operate as a one-way entry with no exit.

Mr Fleete expressed concerns that the introduction of a new signalised intersection (Access 3) had the potential to disrupt bus travel along the Main North Road corridor. All experts agreed that Access 3 should include a dedicated bus signal to preserve bus movement priority along the corridor. Furthermore, all experts agreed that there is flexibility around the location of the bus stops along the western side of Main North Road between Cranford Street and Northcote Road if the development and associated road improvements were to proceed.

Mr Fleete is concerned about the extent to which southbound bus services on Main North Road may potentially be impeded by the new signalised access, acknowledging that the current southbound bus lane is continuous.

All parties recommend a condition of consent such that the applicant will engage with CCC, Environment Canterbury and CTOC at detailed design stage of the new signalised access. This will ensure that public transport priority is maintained or enhanced within the design, including consideration of a northbound bus jump at the signalised access and the optimal location of bus stop(s) along the corridor to service the supermarket and other adjacent activities.

Regarding Access 7, the experts supported the extension of the median on Northcote Road to ensure this access continues to operate as left-in, left-out. There was discussion about the implications of Access 7 on the capacity of the intersection if the left-turn in was to become an attractive route into the supermarket. A risk was highlighted that if there were a high volume of westbound left turning vehicles, then the capacity of the adjacent Northcote Road westbound merge from two lanes into one would be reduced. Despite the transport modelling indicating a very low number of left turning vehicles, the experts believed it would be prudent to formulate a condition of consent that requires the use of Access 7 and its interaction with the Main North / Northcote / QE II intersection to be monitored. Should adverse effects arise then mitigation would be required, which could involve restricting entry from the commercial property to the supermarket at the internal roundabout on the Right of Way.

The experts discussed the need for some form of travel demand management at the adjacent Foodstuffs Head Office to be required as part of this consent. All experts agreed that travel demand management would be beneficial in spreading trip generation during the evening peak period and ensuring staff parking occurred on-site in preference to on-street.

All experts agree that other than as noted above, section 4 of the ITA is an appropriate description of the proposed development. Mr Smith notes he will investigate the above suggestions and address these in evidence.

Section 5 – Integration with Strategic Planning Framework

Mr Holland and Mr Gregory raised concerns around the sufficiency of staff parking supply and security. It was agreed that this would best be addressed in the Travel Plan that would be developed for supermarket employees. The experts agreed it would be appropriate for the Applicant to share the Travel Plan with Council for review and comment (but not approval) before the Applicant implements the plan.

The experts agreed that the content of Section 5 is accurate; however, wished to note that there are a larger range of planning matters that will need to be considered as part of the application, particularly as they relate to the land-use/transport relationship and key activity centres.

The experts agreed that it is important to preserve the public transport role of the Main North Road corridor, and explore the possibility of a bus jump at the new signals. Dave Smith notes that testing has been undertaken in the transport model to ensure the feasibility of a bus jump for northbound buses at the signals.

All experts agree that other than as noted above, section 5 of the ITA is an appropriate evaluation of the development in respect of the Strategic Planning Framework.

Section 6 – Accessibility of the Proposal

Mr Gregory expressed a strong preference for design changes to improve the directness and quality of pedestrian linkages between bus stops on Main North Road and the supermarket in the vicinity of Access 3, including consideration of the integration between of the internal connections and bus stop location to be designed together. All experts agreed that the position of the fuel facility meant pedestrian access would be indirect and circuitous between Access 3 and the supermarket. The experts agreed that there would be merit in considering alternative layouts that enhance pedestrian connectivity across the site however there may be other considerations beyond transportation that could be relevant to the consideration of alternative layouts.

Mr Gregory considers there is a need for Heavy Vehicle access options to provide flexibility and resilience, in light of anticipated changes to network design including changing availability of turning movements. Mr Smith and Mr Durdin respond that service vehicle access is intended to be separated out from other uses and the customer car park as far as possible with access intended to be via Lydia Street only. This is standard practice in supermarket design. The other accesses are not intended to be designed for large vehicles such as semi-trailers and in the extremely unlikely event that Lydia Street could not be used to access the site these vehicles would simply not be able to be used and smaller service vehicles such as rigid trucks would be used to service the site instead.

All experts agree that other than as noted above, section 6 of the ITA is an appropriate evaluation of the accessibility of the proposal.

Section 7 – Travel Characteristic and Trip Generation

Mr Holland requested that Abley check that a semi-trailer is able to undertake a left turn from Northcote Road into Lydia Street.

The experts agree that the parking should be designed in accordance with appropriate design standards including NZ S 2890.

All experts agree that other than the concern raised above, section 7 of the ITA is an appropriate representation of the trip generation, parking supply and service and delivery arrangements associated with the proposal.

Mr Clark left conferencing at this time.

Section 8 – Transport Modelling Assessment

All experts agreed that the transport modelling conferencing has superseded the information presented in this Section of the ITA report and that no discussion was necessary. (Mr Clark accepted this point, prior to departing the conferencing).

Section 9 – District Plan Assessment

All experts agree that section 9 of the ITA is an appropriate evaluation of the development in against the CCC District Plan provisions.

Section 10 – Assessment of Non-compliances

Mr Holland and Mr Gregory expressed concern about the potential for staff to park on-street. They would like the Travel Plan to direct staff to utilise on-site car parking.

The experts noted that previous comments in Section 6 also relate to the 2nd assessment matter under the High Trip Generator rule: Design and Layout. Any changes made to the site layout should be reflected in the evaluation of this assessment matter.

All experts agree that other than as noted above, section 10 of the ITA is an appropriate evaluation of the non-compliances identified in Section 9 of the ITA.

Other matters

Finally, the experts wished to record an acknowledgment that all works in the road corridor cannot proceed without approval from Council or the Community Board where that authority has been delegated.

Signed & dated 21st October 2019.

Dave Smith

Paul Durdin

Richard Holland

Mark Gregory

Bill Sissons

Ian Clark

Len Fleete