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Tauranga City Council

Fifteenth Avenue Corridor
Improvements

**Preliminary Design Stage Road Safety
Audit Report**

September 2018

Tauranga City Council

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Preliminary Design Stage Road Safety Audit Report

Quality Assurance Statement



Status: Final

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*Audit Drawings and
Correspondence*

1. Background

1.1 Safety Audit Procedure

A road safety audit is a term used internationally to describe an independent review of a future road project to identify any safety concerns that may affect the safety performance. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including people cycling, pedestrians, mobility impaired etc.), carried out by an independent competent team who identify and document road safety concerns.

A road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

The primary objective of a road safety audit is to deliver a project that achieves an outcome consistent with Safer Journeys and the Safe System approach, that is, minimisation of death and serious injury. The road safety audit is a safety review used to identify all areas of a project that are inconsistent with a safe system and bring those concerns to the attention of the client in order that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the safety audit team.

The key objective of a road safety audit is summarised as:

To deliver completed projects that contribute towards a safe road system that is increasingly free of death and serious injury by identifying and ranking potential safety concerns for all road users and others affected by a road project.

A road safety audit should desirably be undertaken at project milestones such as:

- Concept Stage (part of Business Case);
- Scheme or Preliminary Design Stage (part of Pre-Implementation);
- Detailed Design Stage (Pre-implementation / Implementation); and
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A road safety audit is not intended as a technical or financial audit and does not substitute for a design check on standards or guidelines. Any recommended treatment of an identified safety concern is intended to be indicative only, and to focus the designer on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving the road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the "NZTA Road Safety Audit Procedures for Projects Guideline", the audit report should be submitted to the client who will instruct the designer to respond. The designer should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team recommendation that is accepted, the client shall make the final decision and brief the designer to make the necessary changes and/or additions. As a result of this instruction the designer shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid with the decision.

Decision tracking is an important part of the road safety audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations to be completed by the designer, safety engineer and client for each issue documenting the designer response, client decision (and asset manager's comments in the case where the client and asset manager are not one and the same) and action taken.

A copy of the report including the designer's response to the client and the client's decision on each recommendation shall be given to the road safety audit team leader as part of the important feedback loop. The road safety audit team leader will disseminate this to team members.

1.2 The Safety Audit Team

The road safety audit was carried out in accordance with the "NZTA Road Safety Audit Procedure for Projects Guideline – Interim Release May 2013", by the following Safety Audit Team (SAT):

- [REDACTED], Tauranga Branch Manager, Stantec, Tauranga (Team Lead);
- [REDACTED], Principal Engineer, Stantec NZ, Tauranga.

The safety audit team lead attended an audit briefing on Thursday 6 September 2018 with the designers led by [REDACTED] of Beca, and the Tauranga City Council project manager at the offices of Beca, Harington House, Tauranga. The SAT meet on 12 September 2018 to review and discuss the project followed by an inspection of the project length. No night inspection was undertaken for this audit.

1.3 Report Format

The potential road safety problems identified have been ranked as follows:

The expected crash frequency is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected speeds, type of collision, and type of vehicle involved.

Reference to historic crash rates or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, frequency and likely severity that may result from a particular concern.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Concern Assessment Matrix in Table 1.

The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Severity (Likelihood of Death or Serious Injury Consequence)	Frequency (Probability of a Crash)			
	Frequent	Common	Occasional	Infrequent
Very Likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very Unlikely	Moderate	Minor	Minor	Minor

Table 1: Concern Assessment Matrix

While all safety concerns should be considered for action, the client or nominated project manager will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide a suggested action for each concern category is given in Table 2 below.

Concern	Suggested action
Serious	Major safety concern that must be addressed and requires changes to avoid serious safety consequences
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences
Moderate	Moderate concern that should be addressed to improve safety
Minor	Minor concern that should be addressed where practical to improve safety

Table 2: Concern Categories

In addition to the ranked safety issues it is appropriate for the safety audit team to provide additional comments with respect to items that may have a safety implication but lie outside the scope of the safety audit. A comment may include items where the safety implications are not yet clear due to insufficient detail for the stage of project, items outside the scope of the audit such as existing issues not impacted by the project or an opportunity for improved safety but not necessarily linked to the project itself. While typically comments do not require a specific recommendation, in some instances suggestions may be given by the auditors.

1.4 Scope of Audit

This audit is a Preliminary Design Stage Road Safety Audit of the proposal to upgrade a section of 15th Avenue from Fraser Street to Turret Road.

It should be noted that a Road Safety Audit is not to be used as a substitute for design checking or peer review, nor is it a check on compliance with standards, drawings or specifications.

Moreover, the SAT notes that the audit is necessarily based on the level of detail on the drawings and therefore the omission of any concern does not imply agreement where details are not specified. Notwithstanding the SAT has endeavoured to highlight any significant areas that should be checked.

1.5 Documents Provided

The SAT has been provided with the following documents for this audit:

- Drawing set numbered 3934934-CA-003D, 004E, 005C, 031B,032B,009D, 010A, 011B, 12B,13B,16B,17B,18B,19A; labelled Tauranga City Council 15th Avenue Corridor Improvements, Fraser Street to Burrows Street Widening to 3 Lanes, Beca, dated 9 August 2018.

No previous safety audit has been undertaken for this project.

For background information, a set of lighting plans SK-E-000 to 004 Rev A, Beca dated 27 July 2018.

1.6 Disclaimer

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environs, and the opinions of the SAT. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe and no warranty is implied that all safety issues have been identified in this report. Safety audits do not constitute a design review or an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

1.7 Project Description and Context

This audit is a Preliminary Design Stage Road Safety Audit of the proposal to upgrade a section of 15th Avenue from Fraser Street to Turret Road. The project chiefly includes:

- Installing a signalised intersection at the intersection of Burrows Street and 15th Avenue with both pedestrian and cycle facilities on three approaches including a new T3 lane in the westbound direction only;
- Extending the existing dual eastbound lanes from Fraser Street intersection through to east of Burrows Street intersection;
- Construction of a shared path on the south side of 15th Avenue from Burrows Street to immediately east of Alexander Street;

While no design statement nor traffic/user data has been provided for the audit, at the briefing it was advised that the project meets Council standards and the proposed signalised layout at Burrows Street had been designed to cater for the expected traffic volumes including provision for expected queuing. It is understood that the intersection phasing will be managed in favour of the through movements on 15th Avenue.

2. Safety Audit Findings

2.1 Capacity – Burrows Street Intersection Comment

Notwithstanding the designer’s advice at the audit briefing that the signalised intersection at Burrows Street layout had been modelled and was expected to perform adequately, the SAT highlight that single through lanes on high volume roads with signalised junctions would likely result in poor levels of service with significant queuing.

The westbound approach to the intersection effectively will operate as a single through lane with only nominal volumes of traffic permitted to use the kerbside T3 lane. While the SAT acknowledges that an existing signalised pedestrian crossing is also only a single lane in each direction, it is likely that the pedestrian crossing phases are called more infrequently than the intersection side road phases will be called. Furthermore, the signalised intersection will likely continue to attract a number of rat-runs due to traffic attempting to bypass the intersection at Fraser Street and 15th Avenue, particularly with the closure of the Turret Road connection with 14th Avenue.

Capacity will likely be further affected by underutilisation of the left hand eastbound lane due to the numerous entranceways, retail entry and downstream in lane bus stop, all of which will likely discourage efficient use of this lane and further hinder the intersection performance.

Any increase in delays for westbound traffic in the peak periods is likely to result in driver frustration albeit unlikely to result in a crash if drivers are observant.

It is suggested that the designers confirm that the proposed signalised intersection will perform safely and efficiently for the anticipated traffic demands including consideration of lane storage requirements.

Frequency Rating:

NA

Severity Rating:

NA

Designer Response: Noted. There will be queuing in the City bound direction in the AM peak. We discussed traffic modelling outcomes with the project team earlier in the process. At that time we considered options to reduce the westbound queue such as closing or restricting access to Burrows Street south and providing two through lanes for general traffic. The team decided that restricting access was not desirable and that providing for HOV is better suited to TCC objectives of moving more people in less cars. The primary objective of this stage of the project is to alleviate issues in the PM peak and the PM peak operates with minimal queuing and delay. We note the comments around lane utilisation but in busy periods we consider both eastbound lanes will be well utilised as the two lane capacity is consistent from the Fraser Street intersection, the bus stops and driveways are not often used. There are advance queue warning signs to warn drivers of potential queues.

Safety Engineer:

Accept the designer response.

Client Decision:

Action Taken:

2.2 Eastbound Cycle Lane Termination

Serious

Currently the eastbound cycle lane leads into a shoulder immediately east of the Fraser Street signalised intersection. It is proposed to terminate the cycle lane approximately 55 m east of the signals and remove the existing shoulder.

Eastbound people on bikes (cyclists) will be forced into the adjacent traffic lane which is proposed to have a width of 3.5 m which is not adequate to safely cater for shared use with cyclists.

The SAT acknowledge that a shared path is proposed on the south side of 15th Avenue, however that path does not commence until approximately 65 m east of the proposed termination of the on-road cycle lane. A safe route is needed between the termination of the eastbound cycle lane and the shared path on the south side. While the proposed median refuge at about 80 m west of Grace Road would provide one option for cyclists to cross from the north to south of 15th Avenue, a safer option would be to provide for cyclists to cross the road at the Fraser Street signals and extend the shared path on the south side all the way to Fraser Street. Such an arrangement would also assist any cyclists on Fraser Street to link into the shared path at the Fraser Street intersection without the need to traverse the intersection (and it is likely that some cyclists would choose this route even if that meant using the pedestrian footpath for the length between Fraser Street and the commencement of the shared path).

Irrespective of the need to provide a continuous and safe route for eastbound cyclists, there are some cyclists who may prefer to stay on the road rather than use the shared path (in light of other issues with the shared path as identified in the other issues below). The SAT are concerned that the safety of these cyclists may be compromised unless a road shoulder of similar or greater width to the existing is retained. It would have been useful to the SAT team to understand the number and type of cyclist that are currently and forecast to use the 15th Avenue corridor.

Recommendation:

1. *Confirm the volume of the different cyclist user groups that use the corridor and, in particular, consider the expected volume of eastbound cyclists that may elect to stay on-road.*
2. *Consider provision of appropriate on-road shoulders (at least as wide as current shoulders) for any on-road cyclists.*
3. *As a minimum, provide a safe and efficient linkage for eastbound cyclists to access the shared path on the south side of 15th Avenue.*

4. *Extend the shared path on the south side of 15th Avenue westward to the Fraser Street intersection.*

Frequency Rating: Common **Severity Rating:** Very Likely

Designer Response: *We have amended the design to extend the eastbound cycle lane further along 15th Ave and provided a pull off path for cyclists to leave the road and then utilise the refuge crossing which will also be upgraded with hand rails so that cyclists can access the shared path on the south side of the road. We decided not to extend the shared path on the south side of 15th Ave because the berm is narrow in this area and there would be property boundaries very close to the path.*

Safety Engineer:

Accept Designer response.

1. *Ongoing data collection for road users should be gathered to monitor use of the facilities.*
2. *Off road facilities are provided, on road cyclists will conflict with in lane bus stops.*
3. *Accept upgrade of pedestrian refuge for cyclists staying on 15th Avenue in this section*
4. *Accept termination of westbound shared path in this location. This may need to be reconsidered in later stages of the 15th Ave Corridor Improvements.*

Client Decision:

Action Taken:

2.3 Shared Path

Moderate

The shared path on the south side of 15th Avenue is being retrofit within the existing berm immediately behind the kerb. The SAT noted that the shared path will be used by cyclists, pedestrians, prams and mobility scooter users (see Photographs 1 and 2). There are several safety concerns with this placement and the resulting path geometry, as follows:

- Vehicle crossings are proposed to be constructed within the shared path meeting the Tauranga City Council IDC standard which comprises a 1200 mm apron with a maximum gradient of 1 in 7. On each side of the crossing the resulting 500 mm wide transition would be 20% or greater plus any overall longitudinal gradient on the kerb. Shared path users will likely avoid the undulating profile created by the vehicle crossings and prefer the rear of the path. However, when shared path users need to pass each other they will be forced onto the crossings. Moreover, due to the gradient on 15th Avenue itself, downhill cyclists could pick up significant speed, which if coincident with an opposing user and a vehicle crossing, could cause a cyclist to lose control and inadvertently enter adjacent traffic lane with potentially vehicles including heavy vehicles travelling close to the kerblines. The resulting crash, while infrequent, could be of high severity. Even without the vehicle crossings the SAT are

concerned that cyclists may be travelling at speed downhill with opposing direction trucks close-by in the nearside lane.

- The effective width of the shared path will be reduced by the presence of vehicle crossing aprons as above and potentially the placement of rubbish bins.
- Desirably the shared path should have a cross-fall of no more than 2% to provide a safe and comfortable path for all users which includes cyclists, pedestrians and riders of mobility scooters. However, the shared path is proposed to undulate with the existing topography resulting in a cross-fall that significantly exceeds the recommendation and, in some instances, may be up to 16% (e.g. Section 4 on Sheet 010, and Photograph 3).
- Where the shared path crosses Scantlebury Street there is no earthworks currently indicated and yet the existing berm on the southwest corner is considered too steep to safely construct a shared path particularly with the possible speed of eastbound cyclists and the limited visibility to vehicles on the side road (Photograph 4). Regrading of the shared path is considered necessary with consideration to all shared path users.
- Section 2 on sheet 009 shows the existing footpath being widened to create the full width shared path. If intended as shown, this would result in two longitudinal joints which if not perfectly formed create a safety hazard for shared path users. Additionally, the existing footpath is not in good condition in all cases. It is recommended that a new full width shared path is constructed.
- It is also noted that the constructability of the shared path needs additional detail to accommodate the existing berm topography and existing low walls e.g. SW corner of Scantlebury Street as above; and the low wall adjacent to the western boundary of the Z Service Station.

Recommendation:

1. *Provide a separation strip of up to 1 m between the shared path and the kerb.*
2. *Construct the shared path at a safe cross-fall and gradient suitable for all users.*
3. *Ensure shared path surface is of a good quality, smooth and free of any trip and wheel trap hazards.*

Frequency Rating: **Infrequent** **Severity Rating:** **Very Likely**

Designer Response: We have reviewed the shared path geometry and driveway cross falls to lessen the variability in the path gradient as much as possible whilst maintaining acceptable driveway gradients and avoid flooding properties. The steep sections in the cross sections have been addressed as far as possible.

We consider this the best outcome for this stage of the process in a constrained environment and with the aim of Stage 1 being to implement minor improvements quickly before we can do more major upgrades as part of Stage 2.

It is not possible to provide a 1m strip between the kerb and the shared path without

property impacts as a number of driveways would be too steep. We could consider painting a line or using a different colour of concrete on the kerbside 0.5m to direct cyclists to ride more centrally on the path. TCC to advise.

We do not recommend that the existing footpath is demolished and a new full width shared path provided as suggested in the audit. The following stage of the project will remove this path again so this would be a wasted cost. We don't think a longitudinal join presents a safety risk. TCC can however decide to provide a full new path if that would be preferred.

Detail added around the walls as suggested.

Safety Engineer:

Accept designer response.

A yellow line adjacent to the kerb on the shared path should be provided. This is to provide additional delineation, and will also highlight change in grades at the vehicle entrances.

Accept the decision to provide a widening strip as opposed to a full width shared path for stage 1. During construction the joins should be carefully constructed, and may require some form of join sealant/mortar to reduce the risk of trip hazards, or vegetation growing in the joins.

Client Decision:

Action Taken:



Photograph 1: Exiting user - mobility scooter



Photograph 2: Existing user - pedestrian with pram



Photograph 3: Existing steep driveway shown to be incorporated into shared path



Photograph 4: Existing steep berm on southwest side of Scantlebury Street

2.4 Grace Road Right Turn Movements Comment

While the design is intended to close the Grace Road north leg to permit left turn entry only, the proposed island layout will only be partially restrictive to other movements and will readily allow for through and right turn entry movements. Any crossing or turning movement into either leg of Grace Road is particularly difficult in peak periods and, with drivers tempted to take inappropriate gaps in the traffic stream, there is potential for crashes.

However, the SAT acknowledge these movements are currently permitted and for this reason the issue is only raised as a comment. Notwithstanding, this ranking, safety could be improved through the elimination of all right turn movements at this junction and it is understood that this is the long-term strategy for this section. The SAT suggests that this project would be an opportune time to restrict both Grace Road legs to left turn movements only providing any associated network effects are able to be addressed in a safe manner.

Frequency Rating:	NA	Severity Rating:	NA
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Designer Response: *The intention is to restrict these movements in future, doing so now would necessitate traffic signals on Fraser Street. TCC decided to wait and see how the network operates with the Stage 1 changes first and to do wider network traffic modelling before we proceed with these restrictions and traffic lights.*

Safety Engineer:

Accept designer response. Monitor during and post construction if there are any immediate issues with the operation of either leg of the intersection.

Client Decision:

Action Taken:

2.5 Accesses/Shared Path

Moderate

Numerous driveways cross the shared path over the length of the project with predominantly residential driveways west of Scantlebury Street and higher volume commercial entrances east of Scantlebury Street.

The driveways are devoid of any devices to attract the attention of drivers which is of safety concern. Drivers, and particularly those visiting the commercial businesses who are less likely to be familiar with the layout, may not be aware of the presence of a shared path and may not adequately check for path users, particularly with cyclists who can approach from either direction and at higher speeds than pedestrians.

Furthermore, the high volume of traffic on 15th Avenue means vehicles exiting from these driveways onto 15th Avenue may need to wait for considerable periods of time for a suitable gap in traffic. They may do this from a position that blocks the shared path.

The SAT acknowledges that a similar issue is currently present for the section of existing shared path and with respect to pedestrians on the existing footpath.

Recommendation:

1. *At commercial driveways, provide clear definition of the shared path with signage, markings and speed-control devices as appropriate to denote priority.*
2. *At residential crossings consider provision of guidance to drivers in a similar manner to the commercial crossings (but of lower priority than for the commercial crossings).*

Frequency Rating:

Occasional

Severity Rating:

Likely

Designer Response: *We propose to incorporate small speed bumps and possibly shared path paint marking similar to the photo below on the shared path through the commercial area.*

In the residential area drivers will be aware of the presence of the shared path and should be entering and leaving their properties cautiously. The design is not dissimilar to existing shared paths in other locations, although the downhill gradient means cyclists may be travelling at a higher speed. We will include signage advising cyclists to ride with caution and watch for vehicles leaving driveways.



Safety Engineer:

Accept designer response. Confirm treatments at commercial entranceways prior to construction.

Client Decision:

Action Taken:

2.6 Commercial Parking/Shared Path

Moderate

The businesses between Burrows Street and the Z service station, currently have full width angle parking (mostly within the road reserve) over the street frontage resulting in a near continuous vehicle crossing. Vehicles currently use the shared path to provide for manoeuvring from these parking spaces as shown in Photograph 5. The proposed relocated shared path will be closer to the buildings and rear of parked vehicles which will result in exacerbating two existing issues:

- Vehicles reversing into the shared path users at risk particularly if sight lines are restricted by other adjacent parked vehicles. As noted at the driveways above, drivers may not adequately check for path users before pulling into the shared path.
- The lane widening will reduce the manoeuvring space which and the space previously used for turning, as shown in Photograph 5, within the T3 lane and therefore potentially conflicting with traffic on 15th Avenue.

Recommendation:

Remove angle parking adjacent to the shared path.

Frequency Rating:

Occasional

Severity Rating:

Likely

Designer Response: This parking is in the road reserve and will be removed. Line marking will be used to delineate the path.

Safety Engineer:

Accept designer response.

Client Decision:

Action Taken:

2.7 Commercial Activity Left turns

Minor

The proposal intends to remove an existing slip lane serving the retail activity on the northwest corner of the Burrows Street intersection and use the space for the one of the intersection approach lanes (Photograph 6).

The resulting layout will result in vehicles decelerating in the traffic lane when following drivers are expecting cars to proceed through the signals and the proximity to the intersection of the retail entry may result in left turn indication signals being misinterpreted by following drivers as associated with the intersection. Rear end type collisions may result.

Additionally, the loss of deceleration space may result in vehicles approaching the entry which has a sharp radius curve at higher speed than appropriate with the associated potential for loss of control type crashes.

Similarly left turns into accesses including the service lane on the east side of Burrows Street will also result in vehicles decelerating in the traffic lane when following drivers are expecting cars to accelerate downstream of the signals creating a similar safety concern exacerbated by the loss of the existing shoulder.

Recommendation:

1. Eliminate or re-design the entry to the retail activity (on NW side of Burrows Street intersection) with geometry appropriate to the expected speed of entering traffic.
2. Consult landowners with a view to minimising use of accesses on the north side of 15th Avenue through use of alternative access.

Frequency Rating:

Infrequent

Severity Rating:

Unlikely

Designer Response: We have discussed this with the project team in the past and decided we cannot remove or redesign the commercial access. Property entrances are common and drivers should be watching the vehicle in front and with adequate following distance. In the event of the crash the outcome is likely to be minor. No changes proposed.

Safety Engineer:

Accept designer response. There is an alternative access off Burrows Street for the commercial access mentioned.

Client Decision:

Action Taken:



Photograph 5: Manoeuvring from businesses east of Burrows Street



Photograph 6: Existing left turn slip lane to retail outlets on the northwest corner of Burrows Street intersection.

2.8 In-lane Bus Stops

Minor

In-lane bus stops can result in safety issues particularly in close proximity to the exit from signalised intersections, with drivers failing to observe a bus slowing ahead, resulting in rapid stopping or sudden lane changes, both of which can result in potential crashes.

In this project there are good sight lines which enables a driver to observe bus movements and drivers familiar with the movement of buses will likely make appropriate early judgements to avoid safety issues (although efficiency may be influenced) although it is noted that these will be one of the first in-lane use of bus stops in Tauranga. The adequate performance of the proposed stops should be monitored.

Recommendation:

Monitor the safety performance of the in-lane bus stops following construction and consider off-setting if safety concerns eventuate.

Frequency Rating:

Infrequent

Severity Rating:

Unlikely

Designer Response: In lane bus stops are preferred as there is less impediment to bus travel times. No changes proposed, if issues arise some public engagement / marketing to advise the public to expect more in lane bus stops and to drive sensibly could be an option.

Safety Engineer:

Accept designer response, there are a number of in lane bus stops already in Tauranga.

Conspicuity of the bus stop will help with awareness of the approaching bus stops. Ensure bus stop flags are well placed, and consider additional bus information flag (ie Transit App).

Client Decision:

Action Taken:

2.9 Footpath on 15th Ave North

Moderate

The drawings do not indicate a new footpath (or even route) on the north side of 15th Avenue (between the existing bus stop and proposed new footpath which terminates opposite Mayfair Street).

There are similar issues outlined in 2.5 with respect to the area to be traversed by pedestrians being also used for parking and manoeuvring. The pedestrian route will be closer to the buildings and rear of parked vehicles which will result in exacerbating these existing issues:

- Vehicles reversing into the shared path places users at risk particularly if sight lines are restricted by other adjacent parked vehicles.
- The lane widening will reduce the manoeuvring space and the space previously used for turning within the traffic lane and therefore potentially conflicting with traffic on 15th Avenue.
- Unless the footpath route is defined and constructed to an appropriate standard, pedestrians will likely need to contend with negotiating existing uneven pavement and vehicles parked.
- Unless the footpath is clear to drivers using the vehicle crossings, there may be confusion as to priority where the accesses cross the pedestrian route.

Recommendation:

1. *Provide a safe pedestrian route on the north side of 15th Avenue free of vehicle parking and manoeuvring and to an appropriate safe standard.*
2. *Ensure vehicle manoeuvring associated with adjacent businesses can be achieved clear of other road users.*
3. *At commercial driveways, provide clear definition of the pedestrian route with surfacing, markings and speed-control devices as appropriate to denote priority.*

Frequency Rating:

Infrequent

Severity Rating:

Likely

Designer Response: We will define the footpath route with line marking. If issues arise such as vehicles parking on the footpath, posts or bollards could be installed but this is not considered necessary at this stage.

Safety Engineer:

Accept designer response. Review during and post construction to ensure that there is no encroachment. A longitudinal separator may be required to delineate the path.

Client Decision:

Action Taken:

2.10 Signal Layout/ Phasing Comment

The signal phasing drawing (sheet 032) provided appears to be indicative only at this stage with several items either in error, incomplete or lacking detail which makes it difficult to make safety judgements. For example:

- Cycle movements in conflict with vehicles such as in D phase is likely a drawing error;
- It is not clear what the note with respect to pedestrian and cycle crossing being called together means although it is understood the final phasing of pedestrian and cyclists is being discussed with Council and a combined phase is being considered with detection control. Whichever phasing and control is adopted, the pavement markings should be appropriate. The lanterns will also need to be considered further in conjunction with this, as the current drawing shows three aspect cycle lanterns and two aspect pedestrian lanterns, which require different operational timings.
- Main road diamond overlap phasing consistent with other intersections is desirable;
- Signal Group 5 lantern should include a right turn green aspect;
- No cycle crossing has been included on the Burrows Street north approach while a shared path is proposed on both sides of the road. Consideration should be given to a cycle crossing to link the shared path facilities.
- Similarly, no pedestrian or cycle crossing is proposed on the 15th Avenue west approach requiring users to undertake three separate crossings to complete this movement.
- The existing shared path on Burrows Street north ends abruptly with no cycle facility beyond. Completion of cycle linkages to the north may have further bearing on the demand for shared path crossings at the signalised crossing.

It is suggested that a further safety audit be undertaken at the time of detailed design to consider the proposed lantern arrangements and phasing operation if not for the complete project.

Frequency Rating:	NA	Severity Rating:	NA
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Designer Response: The signal design are being revised following a recent meeting with TTOC and agreement on preferred intersection and crossing facility design.

Safety Engineer:

Accept designer response. Ensure the signal phasing is reviewed by a suitably qualified signals engineer and safety engineer prior to finalisation.

Client Decision:

Action Taken:

2.11 Vehicle Tracking

Comment

No drawings have been provided showing tracking of the design vehicles anywhere within the project and there are several key areas where the SAT have particular concerns:

- Left turn radii at the Burrows Street intersection appear to be tight on several approaches but in particular the southeast corner, particularly should a vehicle be stationary in the right hand lane of Burrows Street south approach. All intersection movements should be confirmed as feasible without conflict with other users.
- A vehicle exiting the first commercial access on the west side of Burrows Street appears to be difficult to enter the right hand lane without blocking both lanes and needs to be confirmed. The SAT acknowledges the low volume of traffic on this approach.
- Tracking of movements into and out of commercial entrances and parking areas as noted in the various concerns above.

Frequency Rating:

NA

Severity Rating:

NA

Designer Response: *The designs have been informed by vehicle tracking analysis. The corner radii have been minimised in the design to improve pedestrian and cycle crossings but the necessary vehicle movements can still be achieved within the carriageway. Very low volumes on Burrows Street south so we are not concerned about a vehicle accessing the right turn lane blocking the through / left lane.*

Safety Engineer:

Accept designer response.

Client Decision:

Action Taken:

3. Audit Statement

We certify that we have used the available plans, and have examined the specified roads and their environment, to identify features of the project we have been asked to look at that could be changed, removed or modified in order to improve safety. The problems identified have been noted in this report.

Signed:
[REDACTED], BE, ME (Civil), CPEng, CMEngNZ
Tauranga Branch Manager, Stantec NZ, Tauranga

Date: 21 September 2018

Signed:
[REDACTED], BE Hons (Civil), NZRN
Principal Engineer, Stantec NZ, Tauranga

Date: 21 September 2018

Designer: Name [REDACTED] Position Transport Engineer
Signature..... Date.....

Safety Engineer: Name: Philippa Browne..... Position: TCC Traffic and Safety Engineer
Signature..... Date.....

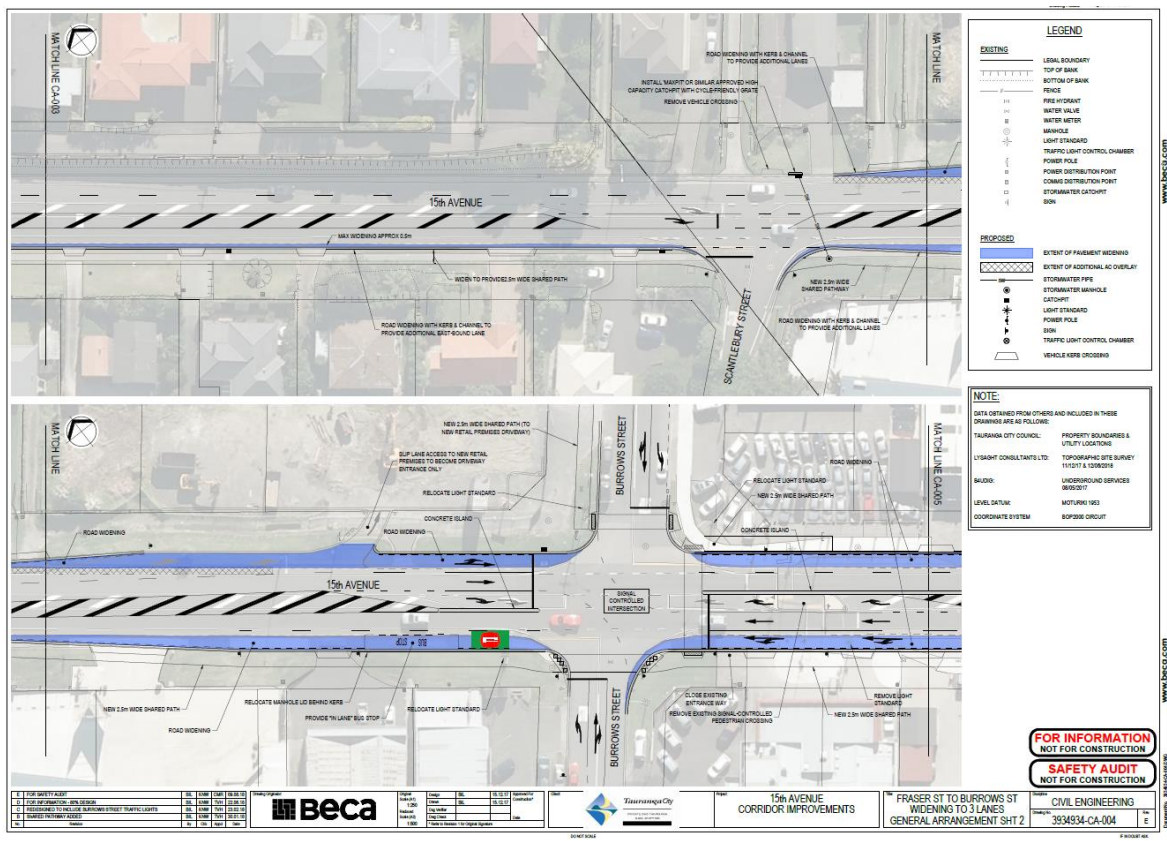
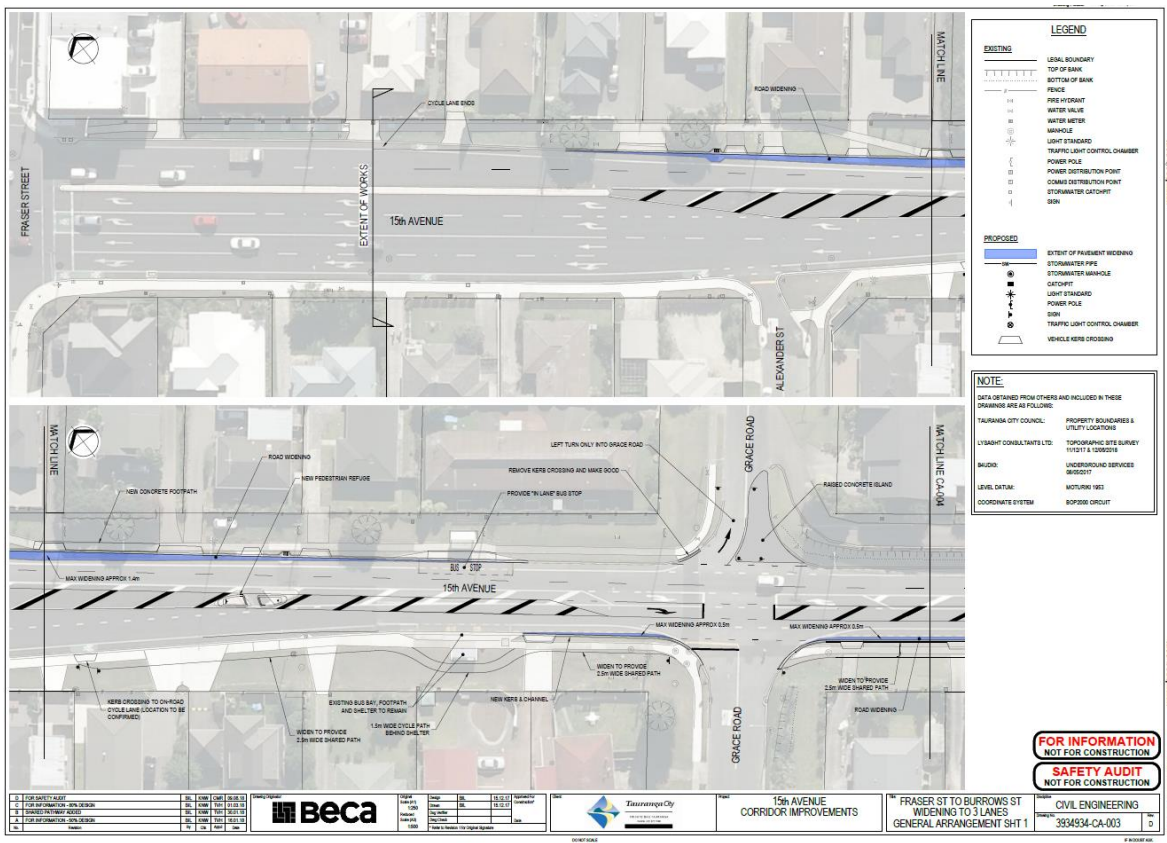
Project Manager: Name..... Position.....
Signature..... Date.....

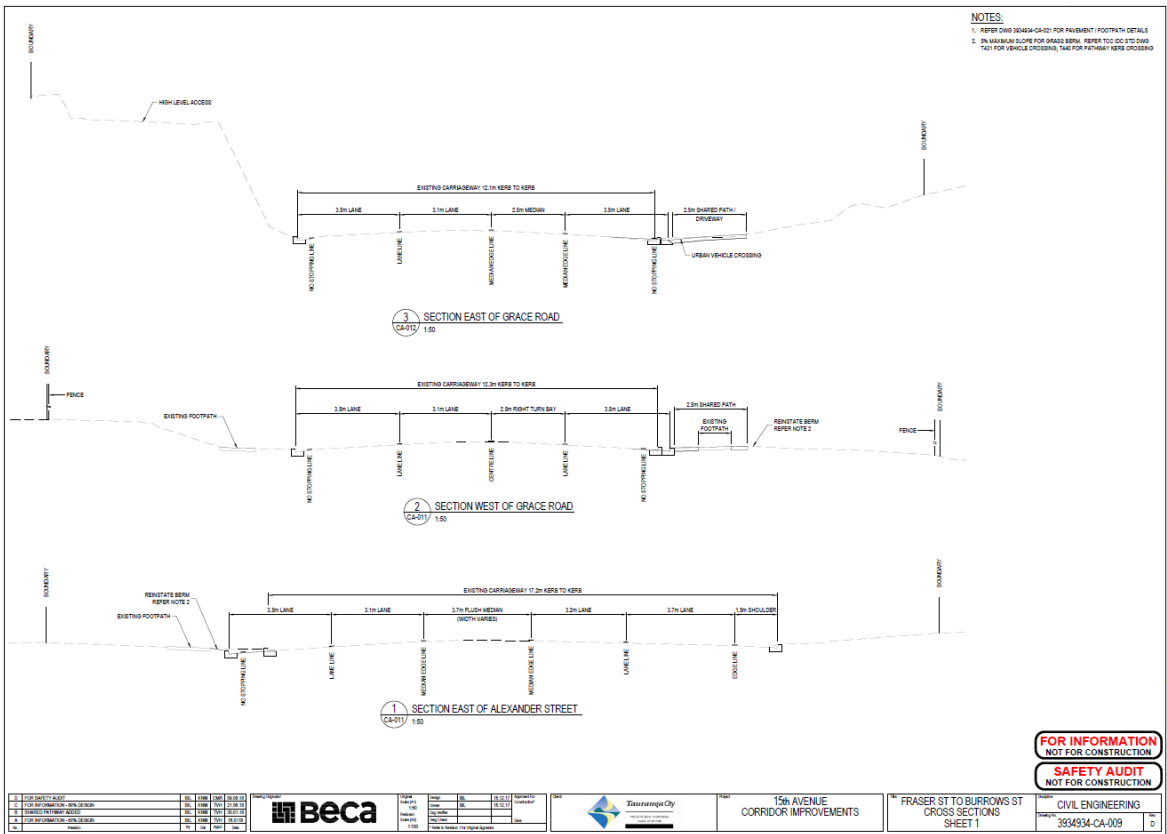
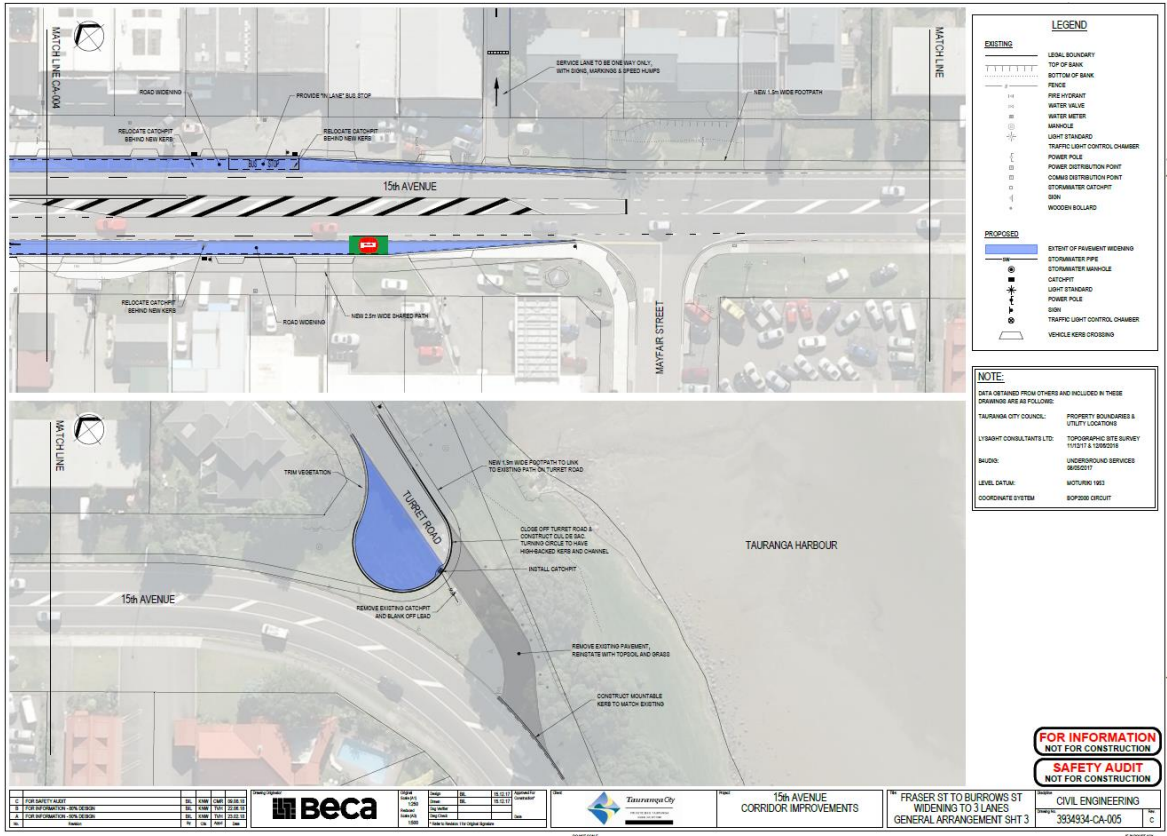
Action Completed: Name..... Position.....
Signature..... Date.....

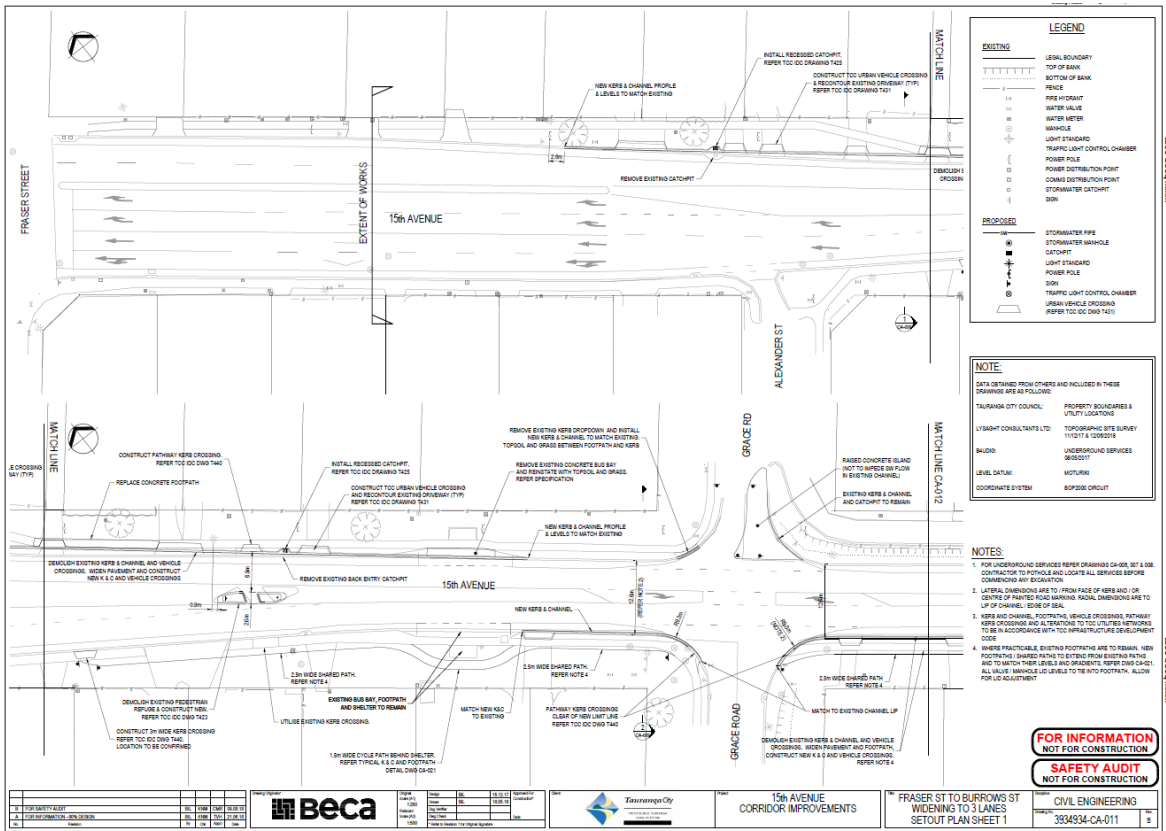
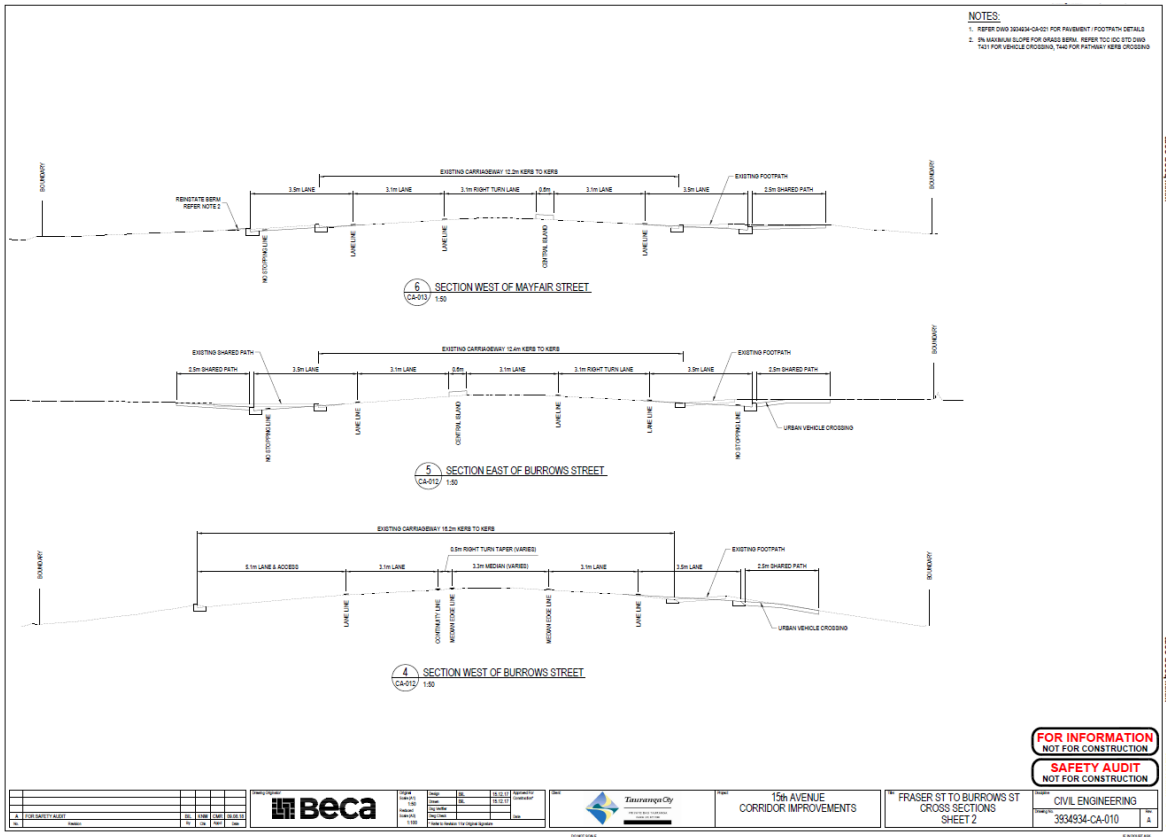
Project Manager to distribute audit report incorporating decision to designer, Safety Audit Team Leader, Safety Engineer and project file. Date:.....

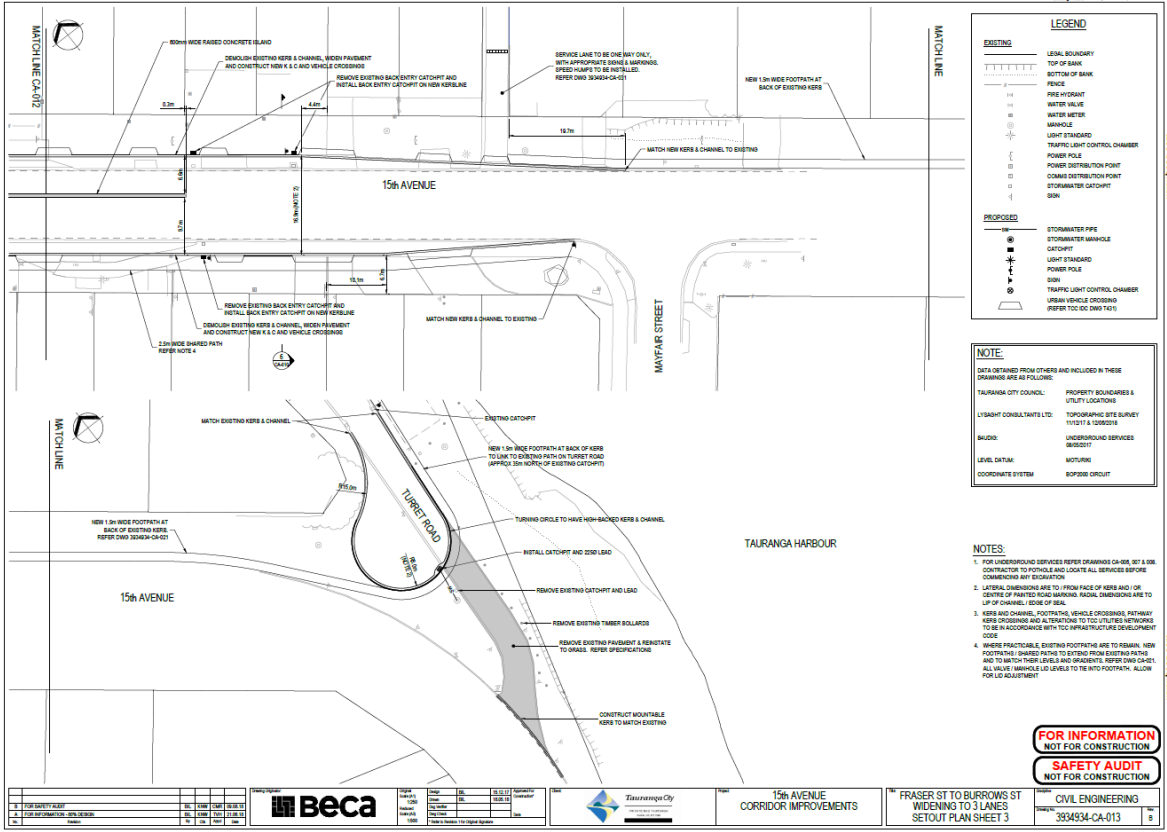
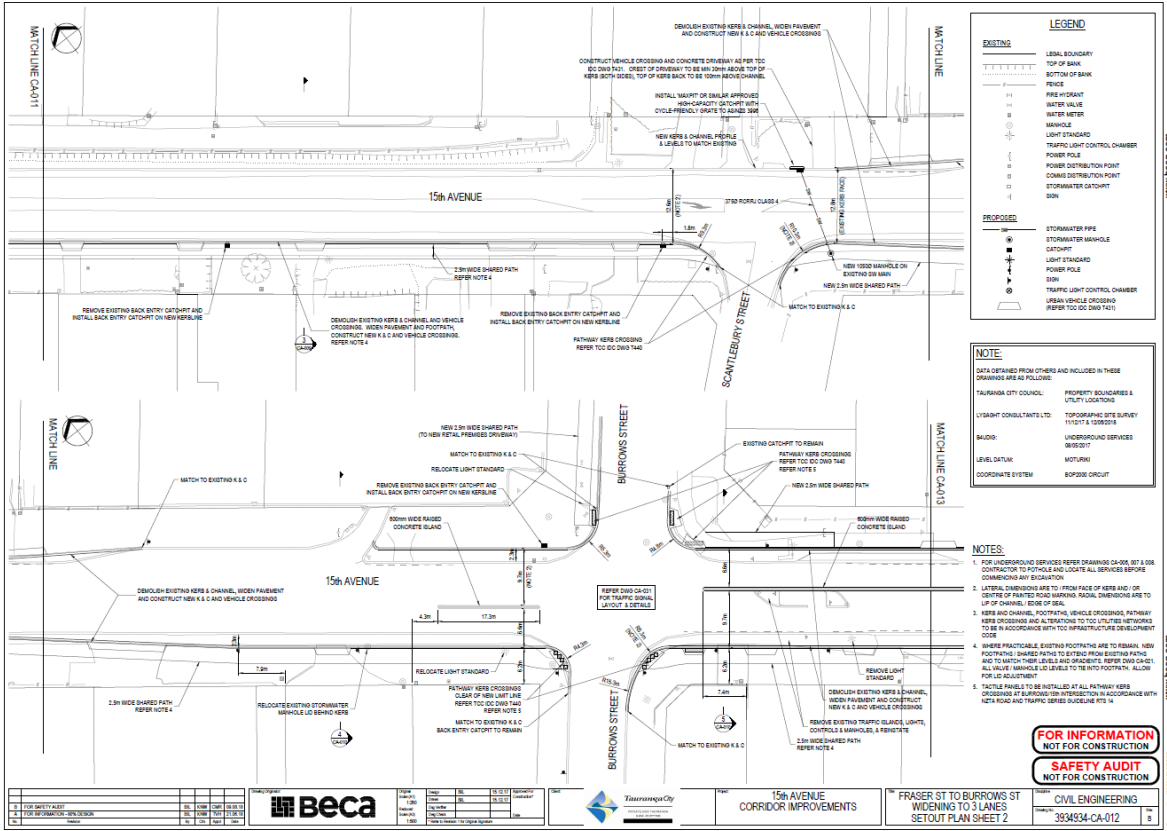
Appendix

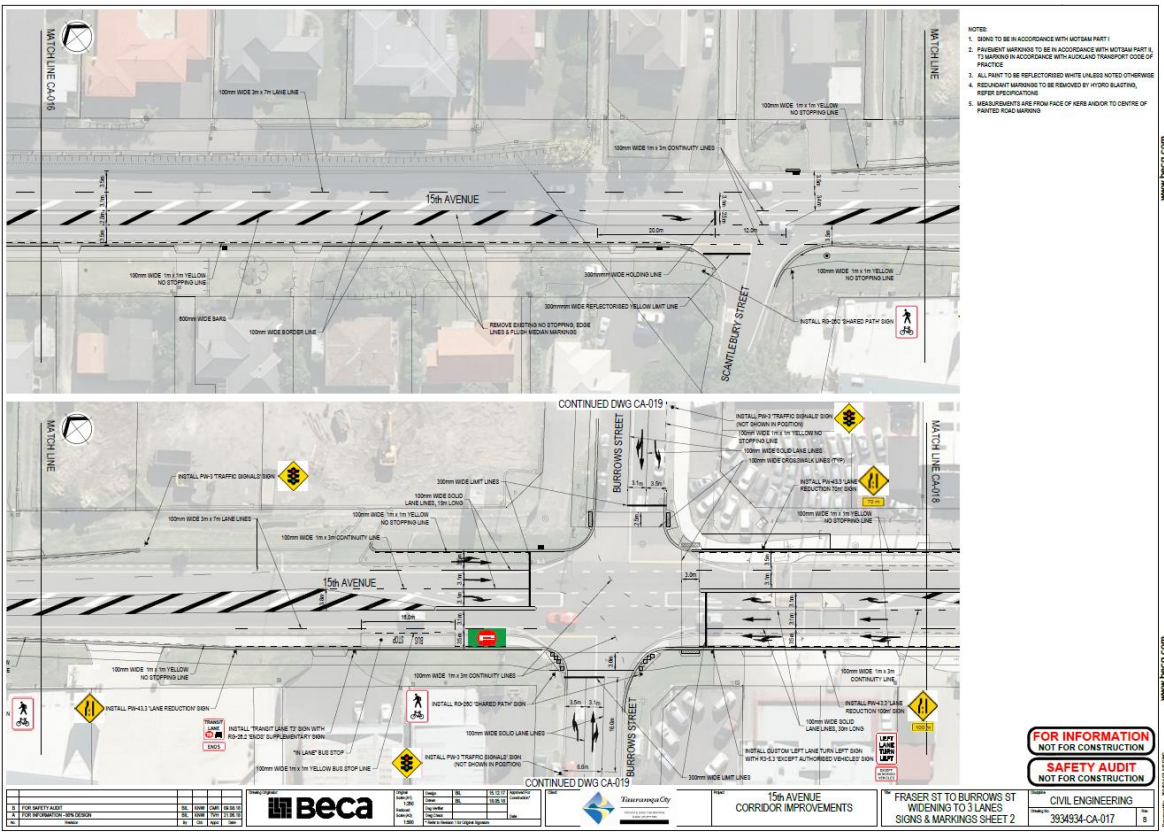
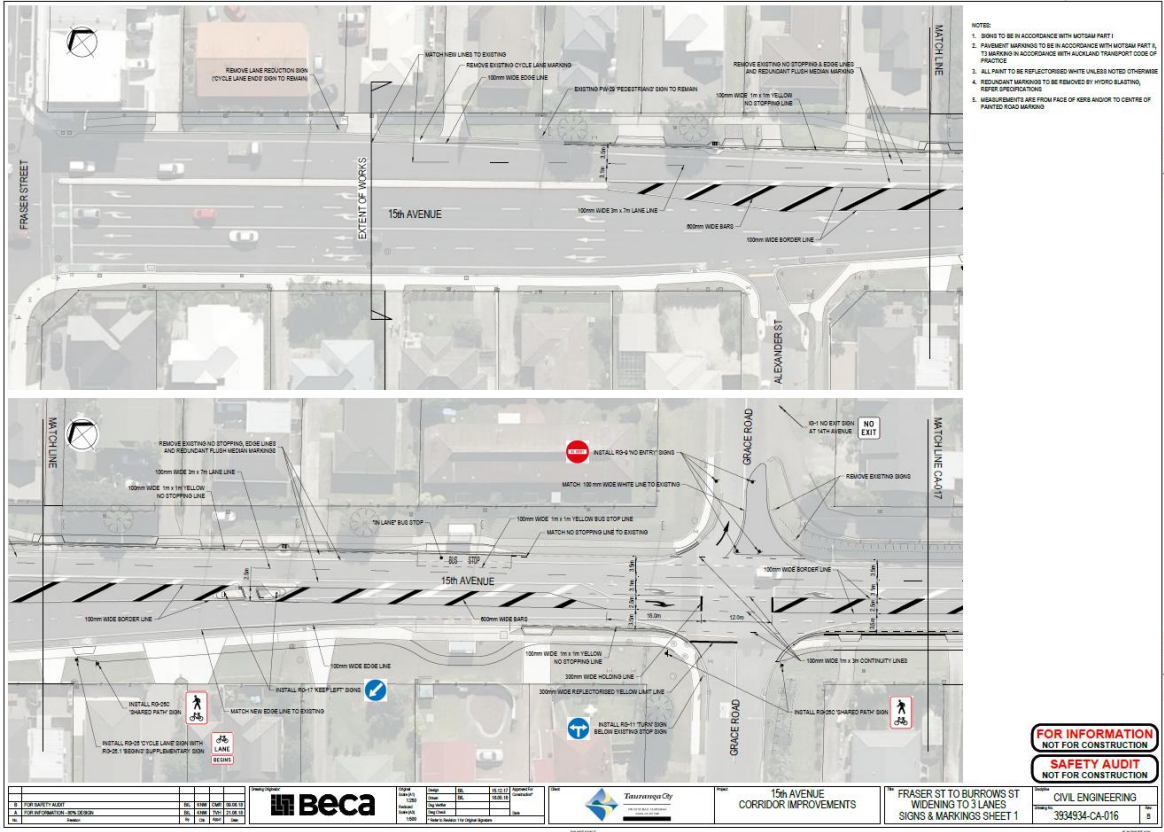
Audit Drawings and Correspondence











Tauranga City Council, Fifteenth Avenue Corridor Improvements
Preliminary Design Stage Road Safety Audit Report

