

Post Implementation Review

Bethlehem Township Improvements

(Bethlehem 4-laning)

Bay of Plenty Highways and Network Operations



February 2014

The purpose of NZ Transport Agency Post Implementation Reviews are to:

- assess how well a project (or package) has delivered its expected benefits
- explain any variation between actual results and expected benefits and costs
- identify any lessons learned that can be used to improve future projects

Executive summary

Project description

This project increased State Highway 2's capacity through Bethlehem township by widening the highway from two to four lanes. The aim was to relieve peak hour congestion. The Transport Agency fast-tracked the highway widening to mitigate expected substantial further deterioration of traffic conditions caused by Tauranga City Council constructing a roundabout at the immediate western end of Bethlehem.

Summary assessment of project outcomes

Congestion relief and travel time outcomes

The project has successfully improved capacity through Bethlehem and offset the predicted deterioration in traffic flows and increased congestion from the new western roundabout if the highway was not widened.

Although not the primary driver for the project, predicted improved travel times from the highway widening have not eventuated. Comparison of results from floating car surveys done before and after the project construction show negligible changes in travel times through Bethlehem. For most times of day, there has actually been a marginal increase in surveyed travel times after project completion.

Curiously, the lack of improved travel times has occurred even though there was a marked reduction in local traffic volume growth since 2008. This would have been expected to help contribute to reduced travel times. It can therefore only be concluded that the highway widening has helped keep traffic flow at stable rather than improved levels. A contributing factor to the absence of any significant travel time benefits may be that traffic merging required at the roundabouts at either end of the widened highway section retards traffic flow.

Safety outcomes

Overall, the Bethlehem Township improvements project has had no significant impact on safety in the area, but there were no pre-existing safety issues and the incidence of crashes has remained low.

Although not specifically part of the project, the Moffat Road roundabout at the eastern end of the project location has had a statistically significant increase in crashes. It should therefore be monitored on an ongoing basis and, if necessary, safety improvements considered.

Project delivery and cost

This project was efficiently implemented ahead of budget time and within budget. It was constructed between April and December 2010, with project completion achieved three months ahead of its original schedule. The final cost was \$2.487 million, which was one percent lower than its \$2.5 million funded cost.

Lessons learned

Several lessons learned with relevance for other future projects were identified with this review. They are summarised here and discussed in more detail in *Section 3: Lessons Learned* of this report:

- Use of pre-project traffic surveys or other traffic condition monitoring supporting the case of project funding should be carefully scrutinised to ensure they do not present

irregular results that may contribute to either under- or over-stating problems that projects seek to address.

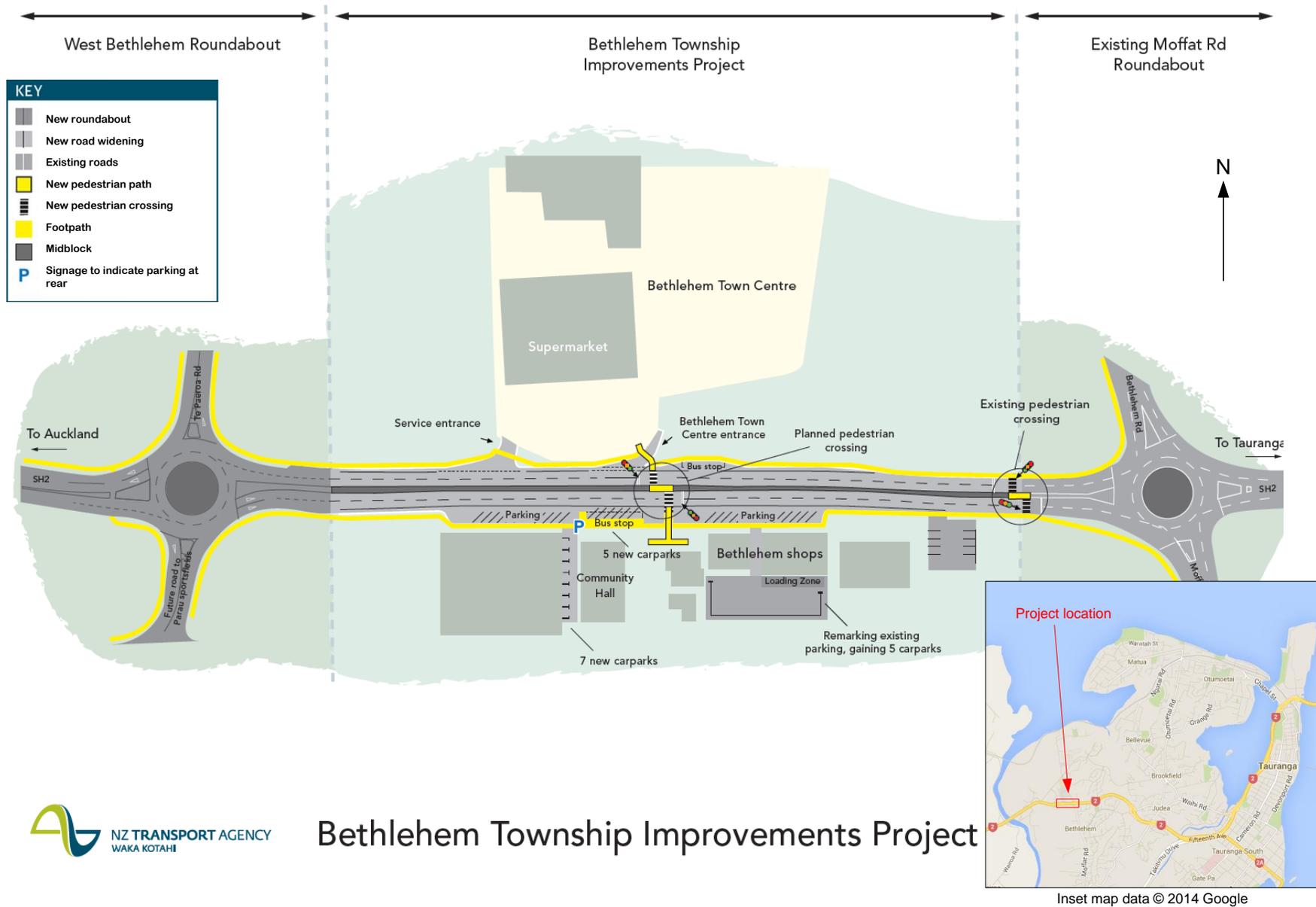
- Careful consultation with local communities and other affected parties is valuable for addressing concerns about planned projects and producing successful outcomes. Consultation was effectively done with this project.
- The Bethlehem project was an early example of close collaboration with another road controlling authority (Tauranga City Council). In this case, the collaboration produced efficient construction of two adjacent projects, which helped reduce disruption to the local community.
- The choice of vegetation used in median strips and related infrastructure should be assessed for any unintentional effects on safety and ongoing maintenance. The Bethlehem project planted trees in the median strip that are now obscuring signage and may be presenting a potential safety risk.

Recommendations

This Post Implementation Review recommends that the Transport Agency's Highways & Network Operations group (Bay of Plenty):

1. Monitors safety on an ongoing basis at the Moffat Road Roundabout on State Highway 2 at the eastern end of the Bethlehem township and consider if safety improvements are needed.
2. Actively maintain and prune the trees in the median strip of the state highway through Bethlehem to ensure they do not obscure signage and present any safety risks.

Figure 1: Bethlehem Township Improvements Project – location and project features



1. Project benefits

Project description

This project increased the capacity of 400 metres of State Highway 2 through Bethlehem township, west of Tauranga City, by widening the highway from two to four lanes. Other project features included the construction of a raised median along the widened section of highway and installation of a signalised pedestrian crossing. Figure 1 on page 4 shows the location of this project and its main features.

The Transport Agency fast-tracked the project after Tauranga City Council gained funding approval for construction of a roundabout immediately at the western end of Bethlehem. This roundabout was predicted to substantially exacerbate existing congestion problems at Bethlehem unless the highway was widened. Tauranga City Council had planned to build this new western roundabout irrespective of whether the highway through the township was widened.

The project therefore sought to improve traffic flows through Bethlehem and reduce congestion, especially for eastbound traffic in the morning commuter peak and westbound traffic in the evening peak. This congestion was observed to result in frequent queues of stationary traffic either side of the project location. Queue lengths of up to 800 metres for eastbound morning traffic were recorded in a floating car survey conducted to support the project's funding approval.

Traffic volumes on State Highway 2 near Bethlehem grew steadily over the decade 1999-2008 at a rate of between three and six percent per year. This growth was driven by major residential subdivision developments in the area and west towards Katikati. At the time of preparation of the project's Scheme Assessment Report (2009), the existing two lane highway configuration through Bethlehem was considered to have reached capacity. It was also predicted that the observed growth in traffic volumes was likely to continue as a result of ongoing residential developments.

In terms of the benefit cost ratio (BCR) that was used to support the project's approved funding, travel time related savings dominated the predicted benefits. Travel time savings comprised 88% of the expected benefits, with predicted vehicle operating cost savings contributing a further four percent.

The remaining 8% of expected benefits was from predicted accident cost savings through improved safety. Although safety benefits only made up a small proportion of the expected project benefits in the BCR, improved safety was nevertheless identified in key project documentation and communications as another important project objective.

Congestion relief and travel times through Bethlehem

Based on the results of travel time surveys, the capacity improvements in widening the highway through Bethlehem have not resulted in reduced travel times overall.

Figures 2a and 2b compare the average results of travel time surveys for different times of day done before and after the project on State Highway 2 from Clarke Road to the Waihi Road interchange.¹ This section of highway through Bethlehem Township is the same one used in the project's Scheme Assessment Report to assess travel times.

¹ The NZ Transport Agency commissions Beca to conduct regular travel time surveys of major state highway and arterial routes in several main cities, including State Highway 2 in Tauranga City. The surveys are undertaken in March and November each year. The results presented here compare the average travel times before the project, from surveys completed between March 2007 and March 2009, with average times from surveys done post project between March 2011 and November 2013.

Figure 2a: Travel time comparisons – SH2 Clarke Road to Waihi Road Off Ramp (eastbound)

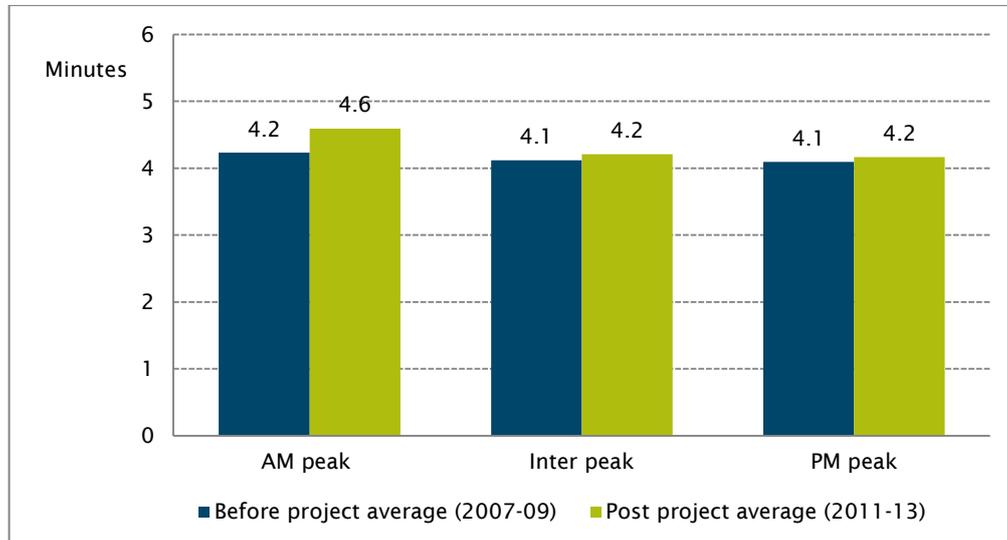
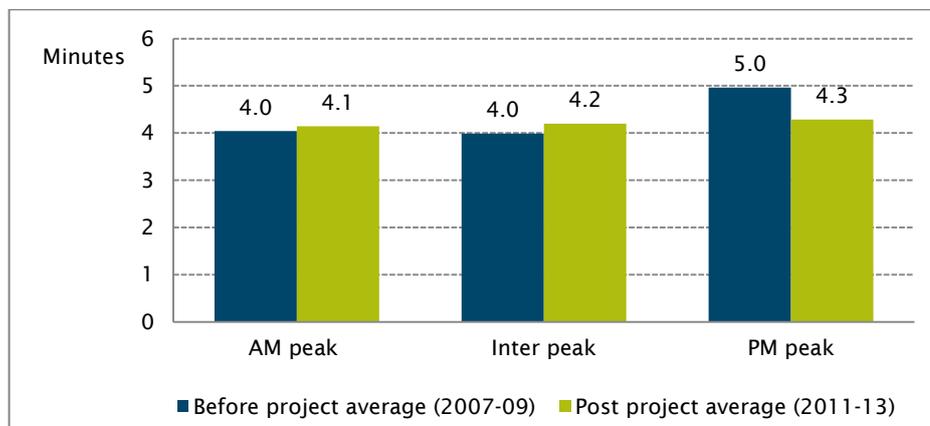


Figure 2b: Travel time comparisons – SH2: Waihi Interchange to Clarke Road (westbound)



Figures 2a and 2b show that, overall, there has been a negligible change in travel times along State Highway 2 since project completion. For most of the time of day periods, there has actually been a marginal *increase* in travel times of a few seconds. This includes the eastbound morning peak period which was a focus of the project. On average these surveyed travel times are nearly half a minute longer in the post project period than the before period. The only improvement in surveyed travel times is for westbound traffic traveling in the evening peak. In this case the average travel time has fallen by more than half a minute (42 seconds).

Travel times on a shorter section of State Highway 2 at Bethlehem Township were also analysed. This was to account for the possibility that congestion or other factors along State Highway 2 outside the immediate project location are retarding travel times. For example, congestion is commonly observed in the morning peak around the two lane Wairoa Bridge approximately 1.5km west of Bethlehem.

The shorter section of highway analysed extends from Carmichael Road, 400 metres west of the start of the Bethlehem Township project, to the Moffat roundabout at the eastern end of the project.² Figures 3a and 3b present the average travel times at different time periods before and after the project.

Figure 3a: Travel time comparisons – SH2 Carmichael Road to Moffat Road roundabout (eastbound)

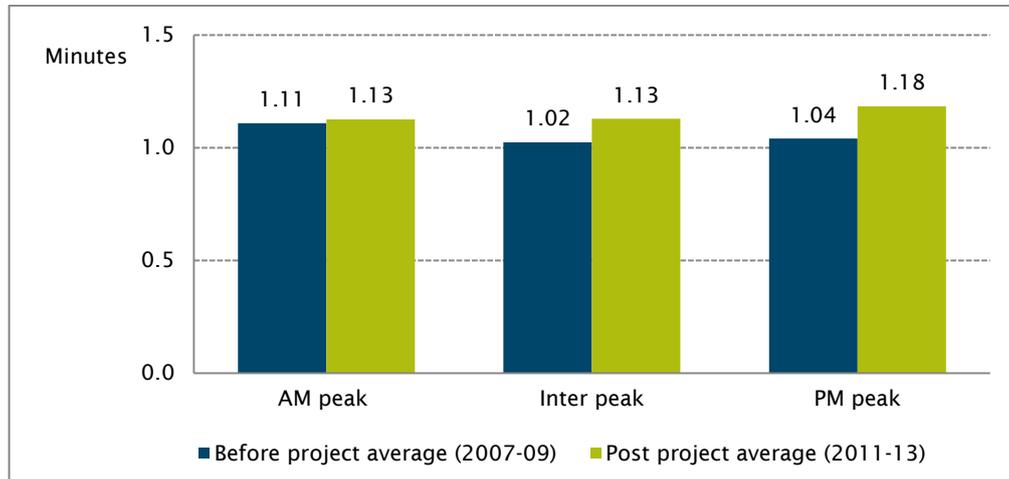
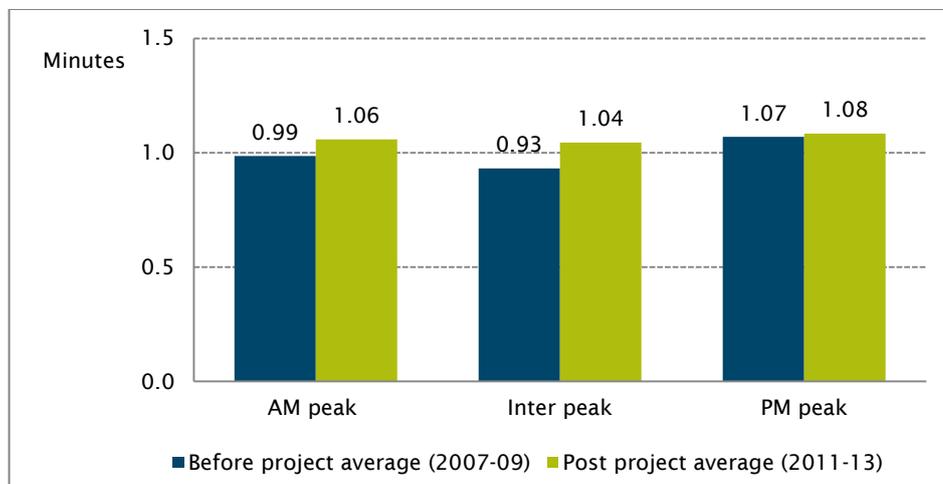


Figure 3b: Travel time comparisons – SH2 Moffat Road roundabout to Carmichael Road (westbound)



Figures 3a and 3b show that, even with the shorter section of State Highway 2 concentrating more closely on the project location, there have been negligible changes in travel times over all periods of day, and all of them have been marginal increases. However surveyed travel times through Bethlehem at this section of highway do not represent significant delays – on average from the surveys it tends to take from one and a half to two minutes to travel this 770 metre section of highway.

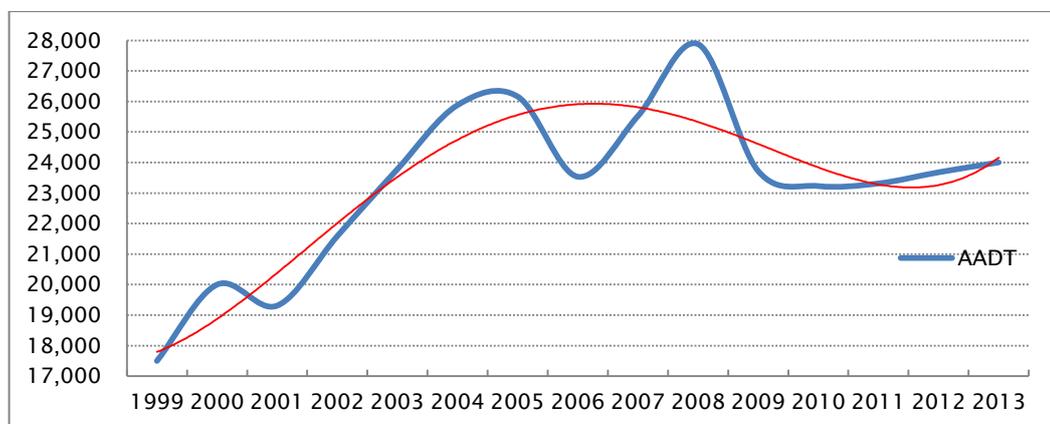
² This is a standard highway segment measured for travel times in the Beca travel time surveys for Tauranga City.

Traffic volumes near Bethlehem

The lack of discernible improvements in travel times through Bethlehem since project completion has also been accompanied with a marked reduction of traffic volume growth in the area, as shown in Figure 4. The traffic volume data up to 2008 shown in Figure 4 was used in the Bethlehem project's Scheme Assessment Report to illustrate strong local traffic volume growth.

Traffic volumes on State Highway 2 at this site 80m east of Bethlehem grew by nearly 60% in the decade 1999 to 2008, producing an annual average growth rate of six percent. This strong growth was predicted in the Scheme Assessment Report to continue in future years. However, as Figure 4 illustrates, actual recorded traffic volumes actually fell substantially between 2008 and 2009 (-15%) and since 2010 have grown only very modestly.

Figure 4: Traffic volumes – State Highway 2 at 80m east of Bethlehem Road, Tauranga (Average Annual Daily Traffic – AADT)



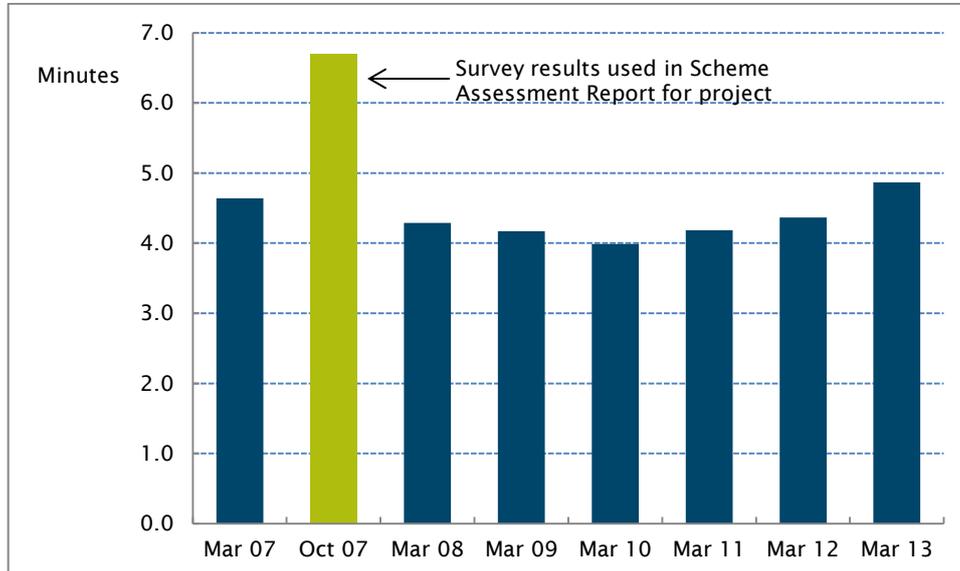
Conclusions – travel time savings

The following conclusions can be made in the absence of significant reductions in surveyed travel times since project completion and with drop off of traffic volume growth in the area:

- The project increased capacity along the midblock section of highway between two roundabouts – one pre-existing and the other constructed in parallel to the project. But the four-laning of the midblock section has been insufficient in itself to produce reduced travel times at both peak and inter peak periods.
- The sharp reduction in traffic volume growth since 2008 in combination with the capacity improvements should have been expected to reduce travel times. That this has not happened suggests that the project's outcome has been to only keep traffic flow at stable rather than improved levels.
- It appears the roundabouts at either end of the four-laning created by the project are slowing traffic, especially in peak congested periods, regardless of the traffic flow through the midblock section. Westbound traffic is required to merge from two lanes to one immediately west of the West Bethlehem roundabout, and eastbound traffic has to merge into a single lane immediately east of the Moffat Road (eastern) roundabout.
- It was also observed that the reported travel times from a October 2007 travel time survey commissioned for the project's Scheme Assessment Report are either significantly higher or at the top end of the ranges of travel times from the regular travel time surveys undertaken between 2007 and 2013 on the same section of State Highway 2. This is especially the case with the morning peak, as shown in Figure 5.

This observation and its implications for lessons learned is discussed further in Section 3.

Figure 5: Average travel times on State Highway 2 from Clarke Road to Waihi Interchange in the morning peak (eastbound)



Safety outcomes

This was not a safety improvement project, although improving safety was identified as an objective in the project's Scheme Assessment Report. Predicted accident cost savings were only a residual factor (8%) of the monetised benefit cost savings used in the BCR supporting the project's application for funding.

The reported incidence of crashes at the project location is low, with Figure 6 below showing that there has never more than four crashes per year since 2003. There is also no apparent trend with the incidence of crashes before and after the project.

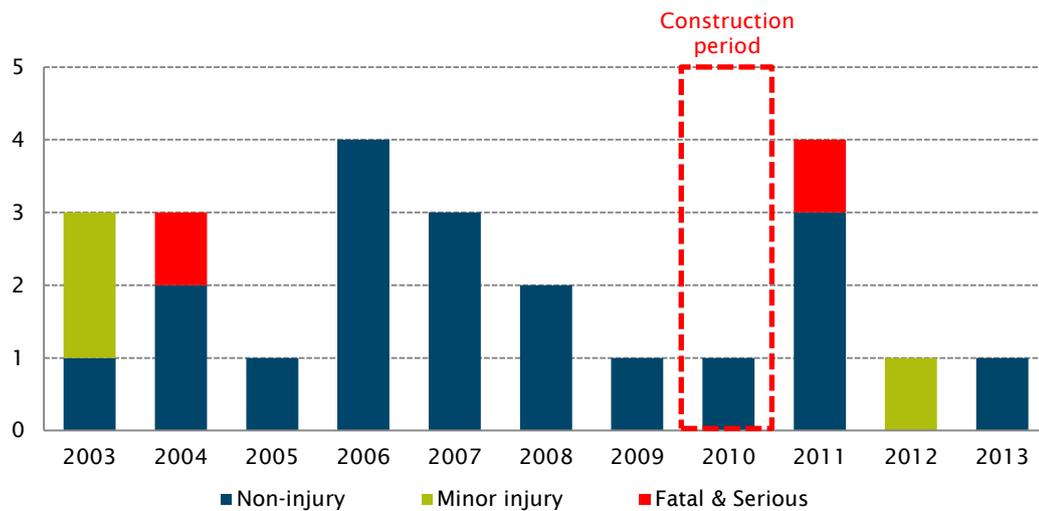
Summary findings

Overall, the Bethlehem Township improvements project has had no significant impact on safety in the area. Changes in the incidence of both injury and all crashes since project completion have been small and fall within ranges of fluctuation that can be expected based on the random nature of crashes:

- There have been two *injury crashes* at the location since project completion. This is the same as would have been expected based on pre-project crash history. One of these injury crashes was regrettably a fatality, but its cause was unrelated to features of the project.
- There has been a small reduction in *all crashes* since project completion from what might have been expected based on pre-project crash history. But this reduction falls within the range of random variation that might be expected with the incidence of crashes.

More detailed commentary on the crash analysis done with this review is given in the Appendix. This analysis tested for statistically significant changes in crashes and assessed actual safety outcomes against predicted crash reductions.

Figure 6: Crashes at Bethlehem Township by severity, 2003-2013



Potential safety issues identified

Some potential safety issues were identified during the site examination for this review that should be monitored and remedial action taken if necessary:

- Trees were used in the medium strip landscaping, partly for aesthetic reasons and partly to deter pedestrians from crossing the highway at places other than the pedestrian crossings. Use of trees was identified as a significant concern in a post construction road safety audit. This was due to the potential for pedestrians waiting in the middle of the road to be obscured by the plants (although people should only be crossing when they have right-of-way at the signalised crossings) and ongoing pruning of the trees requiring temporary lane closures to potentially create safety problems. The site inspection for this review found that the trees were already obscuring signage along the highway. The ongoing use of the tall trees along the median strip should be monitored and, if necessary, replacement with a lower maintenance option. It is acknowledged, however, that there is a longer-term plan for the state highway to bypass Bethlehem township and responsibility for maintaining the road transferred to Tauranga City Council. The Council was keen for a 'boulevard' feel through the township when planning for the trees was done. Consultation with both the local Council and local community would therefore be important before any decision made to remove the trees.
- Although not specifically a feature of the Bethlehem township improvement project, crash analysis (see the Appendix) found the Moffat Road roundabout at the eastern end of the project location has had a statistically significant increase in crashes. This roundabout should therefore be monitored for safety issues on an ongoing basis.
- The review team also observed a potentially dangerous situation for pedestrians seeking to cross the northern end of the Moffat Road roundabout. The line of sight for pedestrians attempting to cross from the north-west corner is very poor. It was observed vehicles tend to turn the corner very quickly from the state highway. Improvements to the safety of crossing facilities at this part of the roundabout should be considered, especially since the opposite (north-east) corner of the roundabout has a busy garden centre and café that is likely to generate pedestrian traffic from the Bethlehem township.

2. Project implementation

This project was completed ahead of schedule and within its expected budget.

Project timeframe

The four laning of State Highway 2 through Bethlehem and associated improvements was undertaken in parallel with Tauranga City Council's construction of the new roundabout at the western end of the township.³

Construction of the roundabout began in January 2010, with preliminary work on the 4-laning project started in mid April 2010. Full construction commenced in June 2010. Project information in the Transport Agency's databases originally expected completion of the 4-laning project in March 2011. By the time construction started, project-related media releases were expecting an earlier completion by the end of December 2010. Smooth progress with the project meant it was actually completed a bit earlier than this, with the four lanes operational and most improvement work finished by mid November 2010.

Project cost

The Bethlehem Township Improvements project was completed for \$2.487 million. This cost was marginally lower (-1%) than its funded cost of \$2.5 million.

3. Lessons learned

This review of the Bethlehem township improvements project has identified several lessons learned that have relevance for other future projects.

Establishing reliable baseline measures

It was noted in Section 1 above that the travel times from a floating car specifically commissioned to support this project were significantly slower than average results from regular surveys done both before and after the project's completion. It was unclear from this review why this was the case. Available project documentation did not identify any anomalous conditions which might have produced slower travel times for that particular survey. But the end result is that the stated condition with congestion and poor travel times presented was worse than has occurred on average in recent years.

A lesson learned from this is it is important that any potential for irregular results from travel time surveys and other data collected on road and traffic conditions is carefully scrutinised. This can help avoid either the over-stating or under-stating of problems that proposed projects seek to address.

Community consultation

The proposal to widen the highway through Bethlehem to four lanes caused considerable concern from the local community. Local retailers in particular were concerned the removal of parallel parking from the northern side of the highway to accommodate the extra lanes would be detrimental to their businesses.

³ Tauranga City Council actually project managed the 4-laning project on behalf of the Transport Agency, as well as its own roundabout project.

A lot of effort was undertaken to mitigate these concerns, including arranging for additional parking to be made available behind and beside the main row of shops on the southern side of the highway. Overall, the consultation and mitigation measures used appear to have helped produce a project that is acceptable for all affected parties.

Collaborative approach to implementing related projects

This project is an early example of a collaborative approach that is now being promoted by the Transport Agency. Widening the section of state highway was done in conjunction with the Tauranga City Council's construction of the new West Bethlehem roundabout at the western end of the Bethlehem township. The Council project managed the four-laning as a separable portion of its own contract.

In the absence of any identified issues with project implementation, this review concluded that this collaboration between the Transport Agency and Tauranga City Council worked very well. It also helped reduce disruption to local traffic during construction by building the projects together.

4. Bay of Plenty Highways & Network Operation's response to findings

Bay of Plenty Highways & Network Operations indicated they were comfortable with the findings of this review. Specific comments were received from the Project Manager, with minor amendments made to the report where relevant.

Appendix: detailed crash analysis

This appendix discusses in more detail the crash analysis and its findings summarised in Section 1 which was used to assess how well the project achieved its predicted safety benefits.

Crash analysis coverage

It is preferable with analysis of crashes before and after a project to focus on high severity (fatal and serious) crashes. However, there were too few of these at Bethlehem to enable significant conclusions to be made. Therefore, all injury crashes and all crashes were analysed.⁴

Three periods were used for the crash analysis:

- A pre-project '*before*' period between 2003 and 2007 which the crash data used in the project's Scheme Assessment Report was based on;
- A '*between*' period 2008-09 covering the years between the end of the before period and the start of project construction (in 2010); and
- A post *project* '*after*' period from 2011 to 2013.

Crashes from the construction period in 2010 were excluded from the crash analysis as construction activity can disrupt crash factors and types.

Three crash datasets were used:

- Crashes at the immediate project location on State Highway 2 between the West Bethlehem Roundabout and Moffat Road roundabout.
- An extension of the project location to approximately one kilometre west of the West Bethlehem roundabout, and approximately one kilometre east of the Moffat Road roundabout. This was selected to examine the possibility of any crash migration effects resulting from the project works at Bethlehem.
- Crashes in the north-western Tauranga City suburbs of Bethlehem, Judea, Brookfield, Bellevue, Otumoetai, and Bureta were used as a control group to assess the potential effect of wider regional crash or reporting trends on the observed number of crashes at the project location.

Injury crashes

Injury crashes and crash rates at Bethlehem are summarised in Figure A1, along with trend correction results using the control group of the north-western Tauranga City suburbs.

Overall, there have been no statistically significant changes since project completion in the incidence of injury crashes.⁵ Only two injury crashes have been recorded since 2011, producing an average crash rate of 0.5 injury crashes per year. This is nearly identical to the crash rate of 0.6 crashes per year in the before period 2003-2007 (when there were three injury crashes over the five years).

On the basis of the history of injury crashes at Bethlehem before project construction, it was estimated that two crashes would have been expected in 2011-13.⁶ Since this is the same as the actual result, it further reinforces the conclusion that there has been no change in crash incidence since project completion.

⁴ All crashes includes recorded fatal, serious, minor injury, and non-injury crashes.

⁵ The chance occurrence of crashes, which tend to vary randomly over time, is best represented by the Poisson distribution. Using this probability distribution, it was concluded that there have been no changes in injury crash numbers since project completion that are statistically significant.

⁶ As seen in Figure 7, the exact expected crash numbers calculated is 2.1. But since it is not possible to have a fraction of a crash, 2.1 is rounded down to two.

Using the control group of several Tauranga City suburbs to correct for any wider trends with crashes or reporting also does not alter the overall conclusion that the project has had no effect on the incidence of injury crashes at the project site.

One of the two injury crashes since project completion was a fatality. An elderly pedestrian hit by a vehicle after stepping onto the highway at the controlled pedestrian crossing against the pedestrian lights. The pedestrian did not activate the button controlled pedestrian cross phase. No features of the project's features were identified that contributed to this tragic fatality.

Figure A1: Injury crashes analysis table

	Before period (2003-07)	Between period (2008-09)	Expected for between period	After period (2011-2013)	Expected in after period
	5 years	2 years		4 years	
Bethlehem Township injury crashes	3	2	1.2	2	2.1
Injury rash rate	0.6	1.0		0.5	
Injury crashes in Tauranga north-western suburbs (control group)*	134	55		96	
Bethlehem Township injury crashes trend corrected using control group			1.2		1.5

* Includes Bethlehem, Judea, Brookfield, Bellevue, Otumoetai, and Bureta.

All crashes

Figure A2 widens the analysis to include *all crashes* at the Bethlehem project location. This indicates a reduction in the number of crashes has occurred, with six crashes since project completion (2011-13) compared with 14 crashes in the before project analysis period (2003-07). This is a reduction in the crash rate from 2.8 crashes per year to 1.5 crashes per year.

However, on the basis of the crash history in the seven years before project construction started, it was estimated that seven crashes could have been expected between 2011 and 2013. Although the actual result of six crashes is a marginal reduction on the expected number, it is not statistically significant at 90% confidence using the Poisson distribution.⁷ This means that it cannot be concluded that the reduction is not the result of chance variation in crash numbers.

Using the control group of Tauranga's north-western suburbs to account for the possibility of wider trends influencing observed crash trends diminishes the observed reduction in crashes further. On this basis, it would have been expected that 6.3 crashes would have occurred. Since it is not possible to have 0.3 of a crash, the expected six crashes matches the observed six crashes. This indicates no reduction in all crashes at the project location when adjusting for trends in crash incidence in the wider area.

⁷ There would have had to have been less than four crashes in the post project period to get a statistically significant reduction in crashes at 90% confidence.

Figure A2: All crashes analysis table

	Before period (2003-07)	Between period (2008-09)	Expected for between period	After period (2011-2013)	Expected in after period
	5 years	2 years		3 years	
Bethlehem Township crashes	14	3	5.6	6	7.3
Crash rate	2.8	1.5		1.5	
All crashes in Tauranga north-western suburbs (control group)*	668	248		341	
Bethlehem Township all crashes trend corrected using control group			5.2		6.3

* Includes Bethlehem, Judea, Brookfield, Bellevue, Otumoetai, and Bureta.

Crash migration

To test for the possibility of any crash migration effects resulting from the four laning of the highway through Bethlehem, crashes were also analysed covering State Highway 2 from approximately one kilometre west to approximately one kilometre east of it. Figure A3 presents the crash analysis results for this migration area (which includes the project location through Bethlehem).

Figure A3: Crash migration area analysis table

	Before period (2003-07)	Between period (2008-09)	Expected in after period	After period (2011-13)
	5 years	2 years		3 years
Migration area <i>injury</i> crashes	8	3	4.7	7
- trend corrected using control group*			5.6	
Migration area <i>all</i> crashes	50	27	33.0	32
- trend corrected using control group*			28.7	

* Control group used was all intersection crashes in Tauranga City.

There were seven injury crashes in the three years 2011 to 2013 after project completion in the migration area along State Highway 2. It would have been expected that five crashes might have occurred on the basis of the crash history over the seven years before project construction. Although the actual incidence of injury crashes indicates a small increase from what was expected, this increase is not statistically significant when applying the Poisson distribution at the 90% confidence level. This means it can be concluded that the observed increase in injury crashes in the migration area is within the range of random fluctuation in the underlying crash rate and not evidence of any crash migration effects.

Similar conclusions can be made when accounting for trends and analysing all crashes along the migration area of State Highway 2:

- Using all injury crashes at Tauranga City intersections as the control group to correct for trends still produces an expected number of crashes (5.6) less than the observed seven crashes, but it is not a statistically significant increase.
- A total of 32 crashes were reported along the migration area of State Highway 2 between 2011 and 2013 compared with 33 expected. This is not a statistically significant change and therefore the likely result of random fluctuation in crash numbers. Accounting for wider trends in all crashes at intersections using Tauranga City intersection crashes as the control group produces an increase in crashes between observed and expected (32 compared to 29), but again this is not a statistically significant increase.

One part of the crash migration analysis area that should be monitored is the Moffat Road roundabout at the eastern end of the project location. This busy intersection has had increase in all crashes that is statistically significant (see Figure A4). Fifteen crashes could have been expected at this intersection between 2011 and 2013 based on the previous crash history between 2003 and 2009. Instead there were 20 crashes, which is an increase that is statistically significant using the Poisson distribution at 90% confidence level. This indicates a greater crash rate at the roundabout than caused by chance variation.

Crash types and identified crash factors at the roundabout were therefore examined in more detail to assess whether changes made by the Bethlehem Township improvements project may have contributed to the apparent deterioration in safety.

There are no particular indications from the nature of pre- and post- project crashes at the Moffat Road roundabout to suggest the increase of lanes through Bethlehem township has contributed to the increase in intersection crashes. Reasons for concluding this are:

- The proportions of crashes at the roundabout by direction of entry of involved vehicles have remained relatively evenly distributed from all four directions both before and after the project. It might be expected that if the increase in capacity flow through Bethlehem was contributing to an increase in crashes at the roundabout that there would be a marked increase in crashes involving eastbound or westbound traffic. This has not occurred.
- Common identified crash factors have remained similar in both the before and after project periods, and include: failure to give way, and incorrect lane changing/merging at the roundabout. There is no evidence of emergent or newly dominant crash factors since project completion to indicate an introduced safety issue.
- The incidence of rear-end crashes at the roundabout have fallen markedly as an identified crash factor since project completion. It is unclear whether the four-laning of the highway has contributed to the apparent reduction in this factor as an identified cause of crashes.

Figure A4: Moffat Road Roundabout crash analysis table

	Before period (2003-07)	Between period (2008-09)	Expected in after period	After period (2011-13)
	5 years	2 years		3 years
All crashes at intersection	24	10	14.6	20
- trend corrected using control group of all intersection crashes in Tauranga City			10.6	
Crash rate	4.8	5.0		6.7