

**To** Andy Thackery  
 Darryl Coalter  
**Cc** Sarah Downs  
**From** John McCarthy  
**Date** 21 June 2019  
**Subject** Baylink Project - Underpass 50% design Cost Escalation

## Background

- NZTA supported a scope change to provide an underpass function for multi modal crossing of SH2 at Bayfair.
- A number of options were developed and the referred underpass concept was considered affordable and provided the best outcomes for walking and cycling
- Funding was approved at \$13M (12M from NZTA cycle fund and 1M from TCC contribution)
- At the time the concept design was estimated with Base construction cost of \$13M and risk contingency of an additional \$3M. Risk was to be absorbed into overall project costs.

## Design and Cost Development

- Following approval to proceed the Concept Design was developed further to a 50% detailed design for full pricing.
- The contractor (CPB) were asked to provide a cost to construct the underpass and a cost for the impact of adding the underpass scope into the existing project.
- The Cost Estimate just received on basis of 50% design is summarised in table below (refer appendix A for more detail).

	Concept Design Estimate	Detailed Design
<b>Detailed Design</b>		1.7
<b>PHYSICAL CONSTRUCTION</b> The actual physical cost of the underpass Incl:		
· General and Mobilisation		1.1
· Earthworks		1.3
· Structure		4.4
· Ground Improvements		2.9
· Urban Design		0.3
· Roothing		0.2
· Stormwater Drainage		0.6
· Utilities		2.2
· Lighting		0.4
	11.7	13.4
<b>TRAFFIC MANAGEMENT and TEMPORARY WORKS</b>  Additional Traffic Mgmt and temporary works to provide additional traffic switches and construction staging	<b>Could be incorporated into existing project traffic switches</b>	
· Sheet piling / propping		1.4
· Dewatering		0.9
· Traffic switches, and Traffic Mgmt Services		3.7
		6
<b>CONTRACT COSTS</b> Additional MSQA Risk		0.75 2
<b>EXTENSION OF TIME</b> The duration to construct underpass changed significantly at discovery that ground improvements under the box required, the original assumption could locate outside zone of influence. Complex insitu construction due to wall thickness precast is extremely risky, likely to cause prefabrication problems. Duration increase to 116 weeks,	18 Weeks  1.3	116 weeks  9
	13	33

## Cost Validation

- The costs above (detail at Appendix A) were independently assessed on the basis of the 50% design detail by OPUS in a parallel cost estimation process.

Element	Parallel Costs Est
Base Estimate	\$26M

Risk and Contingency	\$1.6M	
<b>Total Underpass Project (excluding contractual costs)</b>	<b>\$28.6M</b>	Compared to CPB 24.1M (price recd )
95 <sup>th</sup> Percentile Estimate	\$31.2M	

## Impact on Existing Contract

- Currently CPB contractors are claiming that they have experienced a 10 mth delay to critical path activities due to the NZTA request to investigate an underpass inclusion in the scope of the existing project.
- Not continuing with underpass scope is likely to incur time related costs due to delay, and costs to reinstate project elements to return to original programme (such as pavement left unsealed on assumption underpass excavation trench would be formed)
- Costs to return to programme without an underpass are estimated at \$3-6M but need further validation and interrogation between CPB and NZTA.

## Options

The NZTA and project advisors believe there are 4 viable options:

Option 1- Progress current underpass design and seek additional funding

Option 2 - Revoke underpass scope and return to original project scope

Option 3 - Install components of underpass under main embankment structure allowing for future underpass connectivity in future

Option 4 - Implement a cycle overpass bridge approx. 400m North of the proposed underpass location

Option 1 requires significant additional funding. Much of the cost is for time extension costs due to staging and temporary traffic arrangements costs (circa \$18M). This is really money that is not going towards any actual physical work. The option will provide 100% of expected outcomes from Underpass Scope

Option 2 is the return to current scope that will incur costs to return to programme. The costs will need to be investigated further and depend on ability to undertake concurrent works to realign to old program. Initial estimates are \$3-6M. The option will provide 0% of expected outcomes from Underpass Scope

Option 3 is based upon installing box culvert sections under the large overpass embankment ramps where it would be impossible to install in future. These would then be capped to be joined at a future point in time. This option commits a future underpass alignment, and would still incur significant staging and time costs, so may still exceed available funding. The option will provide 0% of expected outcomes from Underpass Scope at the time of opening.

Option 4 is the provision of a pedestrian and cycle overbridge at Concord Ave, approximately 400m from the current underpass location. Whilst this will not provide a viable option for pedestrian routes between Owens place and Bayfair it will support the wider TCC Cycle Route Plan and provide a grade separated cycle connectivity across SH2 linking cycle routes towards Hewletts road and Matapihi Rail Bridge. The option will provide approximately 40% of expected outcomes from Underpass Scope

## Walking and Cycling Impact

Preliminary conversation has taken place with Sarah Downs, informing the cost increase and obtaining support for a recommendation to progress option 4. In general she was supportive of the overbridge option for cycling, and recognised that an at grade pedestrian crossing arrangement was still in place at Girven Roundabout.

Conversations with TCC regarding the change were seen as still aligning to the TCC cycle action plan (which is currently under review) which has since identified 2 desire routes route A towards Hewletts and route B towards Matapihi (refer below). An overbridge could provide this connectivity to dual routes.

Pedestrian crossing is still provided via the signalised Roundabout design and if warranted the level of service (LoS) could be adjusted through use of signals to decrease LoS for vehicles and increase LoS for pedestrians if pedestrian demand increases in future.



## Assessment for Walking and Cycling Team (NZTA Sarah Downs)

An excerpt from email discussion is included below for your reference supporting the recommended approach.

Hi Sarah

I'm happy to support this approach.

Thanks

Andy

Sent from my iPhone

On 19/06/2019, at 3:54 PM, Sarah Downs <Sarah.Downs@nzta.govt.nz> wrote:

Hi Andy

I've had my team look over the issue of how to manage walking and cycling on Bayfair to Baypark plus a peer review by OP3. I've also discussed with Darryl.

The team are all of the view that continuing with the underpass option is not feasible considering the expense. However, it needs to be acknowledged as the preferred option.

While there may be some future benefits to an overbridge, we consider that it currently provides a very low LOS for cyclists (by adding an extra km to their journey) and none to pedestrians. However, as we better understand the strategic walking and cycling network in Tauranga this could be worth considering as a supplementary piece of infrastructure. s 9(2)(g)(i)

In terms of an alternative preferred option the one that provides the best LOS for users is an at grade crossing ability. As mentioned in a separate email to John, if the signals were phased well this could be an attractive alternative to active mode users. Christchurch has some great examples of how this works well and is creating considerable change in mode shift.

Niels Hoe and Simon Kennett are very happy to come to Tauranga and sit down with John and are keen to see how the at grade option would work on the most up to date detailed design.

I am travelling to Tauranga on 2 July and could easily organise for Niels to join me that day if that is convenient for John.

If you are all comfortable with that proposal, we should put a paper through Vanessa's delegation to test the option. It would also require an IQA (through Coral's team)

Thanks for the opportunity to comment

Sarah

## Recommendation

Following the guidance from NZTA Walking and Cycling advisors the recommendation is to progress Option 2 with a minor amendment to investigate opportunities for the at grade roundabout to provide a balanced LOS for both vehicles and active modes which will require agreement with TCC.

It is recognised that future demand may warrant cycling infrastructure in the form of an overbridge and that an overbridge solution could be incorporated at a future point in time (unlike an underpass solution). It is recommended that a review of the existing project design is undertaken to ensure future overbridge solution is not impacted by the current project, ie service locations, or clearances of airport approaches etc.

A quick decision is required to terminate all further underpass design and instruct CPB to return to previous programme is required to minimise delay and rework costs. The project team are hopeful NZTA can confirm its decision and instruct the contractor before end of June, and are progressing workshops to optimise a recovery programme as a matter of urgency.

## Stakeholder Risk Assessment

### Minister

TBC

### TCC

Initial conversations with TCC have indicated that they would be supportive of Option 4. A communication angle can be developed that an overbridge is best fit with TCC Cycle Route Plan currently in development by TCC. TCC is in the process of developing their Cycle network. The Strategy has been evolving over the last few years.

### Cycle Groups

Although not yet consulted there is a view that cycle groups would be supportive of Option 4 given an underpass option was not feasible as Option 4 still provides a safe functional grade separated cycle crossing and links to the strategic cycle network. In fact it may provide a higher level of connectivity specifically for cycling given ramps to link both desire routes could be provided from the overbridge.

### General Public

There will be disappointment at the removal of underpass. Opposition groups most likely those with school age children. It is likely that the new project overbridge will remove approximately 90% of heavy vehicles (destined to the port) from the roundabout and signal configuration could be modified to best suit pedestrians and

mobility scooter crossing requirements at grade whilst cyclists utilise the overbridge. The distance of the overbridge from the desire line between Bayfair and Owens place would mean only very few pedestrians would choose overbridge route due to distance away from desire route.

Released under the Official Information Act 1982

Ref: B2B-NTE-0907

31 May 2019

Beca  
32 Harington Street  
P.O. Box 903  
TAURANGA 3140  
NEW ZEALAND

By email: s 9(2)(a)

**Attention:**

s 9(2)(a)

Dear s 9(2)(a)

**CONTRACT NO. 2/09-024/603**  
**BAYPARK TO BAYFAIR LINK UPGRADE WORKS – PHYSICAL WORKS**  
**Underpass Detailed Design and Construction Indicative Price Submission**

We refer to recent conversations regarding our detailed design and construction submission relating to Contract Instruction 0838 - VPR 035

Currently, we are unable to submit a formal respond to this CI as both the price and programme are still under internal review. In order to assist your evaluation of the proposal however, we do issue an indicative price schedule for your consideration. This includes work items to complete the detailed design and construction of the Underpass north of MGI for an indicative price of \$19,996,135 (excluding GST). Please note that this indicative price excludes risk allowance and any extension of time entitlements.

**1. Programme**

Milestone programme dates which support the design and construction of this Underpass includes:

- |                        |               |
|------------------------|---------------|
| • 100% Design IFC      | November 2019 |
| • Early works commence | August 2019   |
| • Underpass Completion |               |
| ▪ Stage 1 West         | December 2020 |
| ▪ Stage 2 Central      | October 2021  |
| ▪ Stage 3 East         | March 2022    |

**2. Variances**

Scope development since the Design Philosophy Report has generated cost variance from the ROC provided September 2018:

- Ground improvements: increased area of stone columns and the introduction of sheet pile cut-off walls at entrance ramps
- Temporary works and sheet piling required for excavation support
- Temporary pavement work and temporary traffic management to safely control traffic and pedestrian movements

CPB Contractors Pty Ltd ABN 98 000 893 667

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### 3. Alternate Options and Opportunities

Further to discussions with you, the project team continues to consider possible time and cost reduction strategies and would like to develop these further with both the Principle Advisor and the Transport Agency. Some opportunities to better improve the outcome may involve altering construction methodologies, the location of the underpass or potentially mutually agreeing departures to the Principals Requirements.

Further alternatives of opportunities include:

- a) Adding extra bridge spans to the northern end of Bridge 1. This eliminated embankment loadings and potentially reduces overall time impacts by six months.
- b) Reassessing approaches taken in Design Philosophy Report such as ground water levels and quantum of stone columns at both Eastern & Western Portals
- c) Departure from PR A3.6.3.1 Construction Stage Settlement.
- d) Departure from PR N4 Minimum Standards of Traffic Management .

### 4. Closing Statement

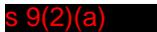
Given known financial constraints and time pressures, CPB seeks the opportunity to meet with you to discuss this proposal collaboratively and specifically, to explore potential opportunities to mitigate costs, delays and work scope risk.

Please contact me if you have any questions.

Yours sincerely

CPB CONTRACTORS PTY LIMITED

s 9(2)(a)  


s 9(2)(a)  


Contractor's Representative

## Indicative Price Breakdown

Bay Link - VPR 035 Underpass Detailed Design and Construction Pricing			
Item	Description	Price	% of Total Price
1	Design	\$ s 9(2)(b)(ii)	
2	Indirect and Mobilisation Cost	\$	
3	Earthworks	\$	
4	Structural		
4.1	Bayfair Eastern Portal	\$	
4.2	Eastern Tunnel	\$	
4.3	Central Tunnel Underpass	\$	
4.4	Western Tunnel Underpass	\$	
4.5	Matapihi Western Portal	\$	
4.6	Stitch Pours	\$	
5	Ground Improvements	\$	
6	Urban design	\$	
7	Roading	\$	
8	Stormwater Drainage	\$	
9	Utilities	\$	
10	Lighting	\$	
11	Traffic Management and Temporary works		
11.1	Sheetpiling Shoring and Propping	\$	
11.2	De Watering	\$	
11.3	Asphalt Enabling works for Switches	\$	
11.4	Diversion Construction	\$	
11.5	Pedestrian Ways	\$	
11.6	Temporary Traffic Management	\$	
12	MSQA	\$	
	<b>Sub Total</b>	<b>\$ 21,983,959</b>	<b>100%</b>
13	Risk and contingency included above	\$ s 9(2)(b)(ii)	
	<b>Indicative Price Excluding Risk</b>	<b>\$ 19,996,135</b>	

## Indicative Tags and clarifications to this offer

- Offer is subject to NZTA acceptance of the Design Philosophy Statement, 0-50% Design Detail including agreed PR changes and any departures required prior to the start of the 50-100% Design.
- We have not considered impacts or re-design required for the overlying MSE wall, Bridge 1, MGI Roundabout, or other changes to works currently under the contract, resulting from the integration of the Underpass. No provision has been made to cover this potential issue and any such work required will be subject to future variation.
- No allowance has been made for the installation of any security or CCTV monitoring equipment.
- It is assumed that there will be one design review stage at 85% for both the Peer Reviewer and The Principal's Advisor at the same time. Given the collaborative nature during design development we have allowed in the programme one week for return of comments, and one week to close out PA comments only.
- No provision has been made to undertake flood modelling or further define the ground water level. The ground water levels used to inform the 50% Design are as identified in the revised pricing packs.
- Service owner diversion costs have been included based on indicative quotations provided during the pricing exercise. Since it is not possible at this stage to provide a final value for each service diversion, our indicative price is contingent on these values been treated as provisional sums.
- Time delays as a result of service asset owners impacting the programme
- Our indicative price is based on service relocation methodologies identified in the pricing packs. It is assumed that these are feasible, and acceptable to the service owners.
- No provision has been made to include the underpass into the Greenroads certification process.
- No allowance has been made for temporary works required at Bridge 1 to allow the first two spans to be installed independently, thus reducing time delays.
- The Impacts to the design and construction of Bridge 1 as a result of introducing the Underpass.
- It is assumed that the arrangements for dealing with traffic will be acceptable and that Traffic Management Plans for the proposed traffic staging will be approved in the 20 day TMP approval process timeframe.
- Part time MSQA personal only are allowed for.
- Any impact due to consenting and land acquisition requirements are excluded.
- Additional cost associated with retrofitting barriers and completing pavement works due to settlement incurred from the Bridge 1 northern fill embankment, north of MGI are excluded.
- No Urban Design negative detailing has been allowed for into reinforced concrete walls, precast barriers and panels. As agreed, only standard formwork systems such as Doka, providing off shutter finishes have been allowed for.
- No special paint finishes to concrete surfaces are included.
- Dewatering requirements for service relocation and stormwater installation, if required are excluded.
- The physical costs and cost of time delays as a result of other parties such as service providers, PA design comment closure.
- Settlement slabs under the central section of the underpass have not been allowed for.

- Removal of all sheet piles, as many are sacrificial and will be left in place.
- Contractors risk duration within the Construction Programme is only 29 days.

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New Zealand

5 August 2019

**Attention: John McCarthy**

Dear John

**Baylink - Cycle Underpass Variation Value Assessment**

The purpose of this letter is to outline the potential additional costs associated with the proposed cycle underpass, based on the 50% design submission supplied by CPB on 31 May 2019 in NTE 0907.

CPB presented a physical works cost of \$21,983,959 excl GST with an estimated programme delay of 116 weeks. Our comparison between their preliminary design and 50% design estimates is provided in Attachment 1.

The CPB submission excluded costs for extension of time and excluded 22 price risks. The estimated cost for CPB's 116 week programme delay is shown below.

<b>Description</b>	<b>Price based on 50% design (May 2019)</b>
CPB Total of Physical works (refer attached spreadsheet)	\$21,983,959
Add: On Site Overheads	\$1,758,717
Add: Off Site Overheads	<u>\$2,255,554</u>
New Physical Works estimate	\$25,998,230
Assessed 116 week Extension of Time (EoT) cost \$8,250,000 (based on Working Day rate \$15k/day, assumed 5 working day/week)	
Add: Net EoT entitlement (\$8,250,000 less On Site and Off Site overheads above)	<u>\$4,235,729</u>
<b>Estimated Underpass Variation Value (excl risks identified by contractor)</b>	<b><u>\$30,233,959 (excl GST)</u></b>

Note there are 22 Price Tags in NTE 0907. If encountered, then the cost risk of these tags will likely rest with NZTA.

The estimated value of the underpass of \$30.2M, is made up of \$21.98M (Physical works), \$4.01M (Overheads) and \$4.23M (EoT cost entitlement from the 116 weeks).

The EoT cost for 116 weeks will be \$8.25M, this is based on contract Working Day rate which has included overheads. The overheads to be paid in Variation for physical works should then be deducted out from the EOT costs calculation, otherwise it will be double dipping. Refer to clause 9.3.11 of NZS 3916-2013.

Yours sincerely

s 9(2)(a)



Beca Project Team Leader.

on behalf of

**Beca Limited**

Email: tim.haig@beca.com

Attachment 1 – Comparison between preliminary design and 50% design estimates.

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Item	Description	Concept Price (September 2018)	Price based on 50% design (May 2019)	Difference	Reason
1	Design	\$ s 9(2)(b)(ii)	\$ s 9(2)(b)(ii)	\$ s 9(2)(b)(ii)	Design developed to 50% so the remaining cost should be less. Would need to compare cost to date and cost to complete to do comparison
2	General	\$	\$	\$	
3	Mobilisation	\$	\$	\$	General and Mobilisation has increased s 9(2)(b)(ii) Current sequence requires 3 mobilisations of the stone column rig, previously only allowed 1. Also need to mobilise sheet piling. \$100k additional for fencing, scaffold, access stairs, barrier protection to excavation, dewatering protection & other H&S requirements
4	Service Relocations	\$	\$	\$	Increased s 9(2)(b)(ii) due to more knowledge about required service diversions This includes s 9(2)(b) for a single Chorus cable s 9(2) due to stormwater (now designed and allows for night works Through the golf driving range) (b)(ii)
5	SW Drainage Ground Improvements	\$	\$	\$	Ground improvement has increased by s 9(2) previous allowance was for ground improvements under the underpass box only. Ground improvements are required under the landings and ramps, and to protect the retaining walls holding up the road. Permanent sheet piles are also allowed for at the adjacent property boundaries to contain the liquefaction effects.
6	Box Culvert (4m x 3m)	\$	\$	\$	
7	Approach Ramps	\$	\$	\$	
8	In Situ Entrances Earthworks	\$	\$	\$	The combined structure cost have increased by s 9(2) This is primarily around the excavation and backfill. The trench is now wider (Box plus s each side) to provide safe working room. The excavation is now planned to be between sheet piles rather than battered. The excavated material had been assumed it could be reused. It is now allowed to be cut to waste. The approach ramps are wider and more open, hence a larger excavation. The Ground water level has also meant that buoyancy governs the concrete thickness of the ramps.
9	Pavements	\$	\$	\$	
10	MSQA	\$	\$	\$	MSQA has increased by s this reflect the longer Time
	Urban Design	\$	\$	\$	Previously no allowance 9(2)
	Lighting	\$	\$	\$	Previously no allowance (b)
	TTM and Temporary Works	\$	\$	\$	Previously no allowance (ii) This largely reflects the time effect of the underpass. Price at Concept assumed open cut? Or no sheetpiling. Current staging has 3-4 traffic switches that added temporary pavements
	<b>Sub Total</b>	\$	\$	\$	<b>Note</b> the initial estimate had risk and contingency excluded. The current estimate has risk and contingency included. The Risk and contingency allowance has reduce by s 9(2)(b) (ii)
11	Risk Contingency	\$	\$	\$	
	<b>Sub Total</b>	\$	\$ 21,983,959	\$ 7,395,693	The apples for apples comparison should be <b>Sub total including risk and contingency</b> of \$14,588,266 vs \$21,983,959 a difference of \$7,395,693
13	On Site Overheads	\$	\$	\$	
14	Off Site Overheads	\$	\$	\$	
	<b>Project Base Estimate</b>	\$ 16,644,236			

Item	Description	18 weeks	116 weeks	Difference	Notes
15	EOT	18 weeks	116 weeks		The September Price was based on an 18 week delay to the overall programme. The current programme shows a 116 calendar weeks or 550 working days delay
	EOT cost (\$15k/day, assumed 5 working day/week))	\$ 1,350,000	\$ 8,250,000		
	EOT entitlement (+ve \$\$ of EOT cost less overheads)	0	\$ 4,235,729	\$ 4,235,729	
	Subtotal	\$ 16,644,236	\$ 30,233,959	\$ 13,589,723	There will be additional delay time related costs of \$8.25 M Less over head costs of \$4.236 M

Note there are 22 Price Tags in NTE 0907.

# Project Estimate

# PE1

Project name: Bayfair to Baypark Underpass

Pre-Implementation Estimate

Item	Description	Risk Output	5th %	50th %
A	Nett Project Property Cost			
	Project Development Phase			
	- Consultancy Fees			
	- Client Managed Costs			
B	Total Project Development	-	-	-
	Pre-Implementation Phase			
	- Consultancy Fees			
	- Client Managed Costs			
C	Total Pre-implementation	0	0	0
	Implementation Phase			
	Implementation Fees			
1.1	- Consultancy Fees			
1.2	- Client Managed Costs			
1.3	- Consent Monitoring Fees			
	Sub Total Base Implementation Fees	0	0	0
	Physical Works			
1	Environmental Compliance	s 9(2)(b)(ii)		
2	Earthworks			
3	Ground Improvements			
4	Drainage			
5	Pavement and Surfacing			
6	Bridges and Structures			
7	Retaining Walls			
8	Traffic Services			
9	Service Relocations			
10	Landscaping			
11	Traffic Management and Temporary Works			
12	Preliminary and General			
13	Extraordinary Construction Costs			
	Sub Total Base Physical Works	\$26,985,126.48	\$25,278,478.03	\$26,900,000
	Sub Total Project Risk Register	\$1,618,809.10	\$877,991.92	\$1,840,000
D	Total Project Cost	\$28,603,935.58	\$26,830,000.00	\$28,810,000.00
E	Project base estimate (A+C+D)	\$22,164,147.56		
F	Contingency (Assessed/Analysed) (A+C+D)		6,645,852	
G	Project expected estimate (E+F)		28,810,000	
	Nett Project Property Cost Expected Estimate		0	
	Project Development Phase Expected Estimate		0	
	Pre-implementation Phase Expected Estimate		0	
	Implementation Phase Expected Estimate		s 9(2)(b)(ii)	
H	Funding risk (Assessed/Analysed) (A+C+D)			2,440,000
I	95th percentile Project Estimate (G+H)			31,250,000
	Project property cost 95th percentile estimate			0
	Investigation and reporting 95th percentile estimate			0
	Design and project documentation 95th percentile estimate			0
	Construction 95th percentile estimate			28,250,000
Date of estimate	22/05/2019	Cost Index (Qtr/Year) 01/19		
Estimate prepared by	Simon Drummond	Signed		
Estimate internal peer review by	Robin Garrett	Signed		
Estimate external peer review by		Signed		
Estimate accepted by the NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.