## **Brougham Street Multimodal**

## Improvements CONSTRUCTION Expected construction 2023-2025

Pedestrian/cycle bridge

Range of traffic management options including pedestrian/cycle overpass

	Units	Emissions Factor Unit	Sources and notes
Do Intervention			
		×	
Material Quantities Estimate		2	
		$\mathbf{O}_{\mathbf{V}}$	
Construction Fuel Use			
Diesel	U	0.0027 tCO2e/L	MfE 2020
Construction Materials			
Concrete	2,339 tonnes		AECOM derived factor (See assumptions I
Steel	788 tonnes	2.85 tCO2e/tonne	MfE 2020
		$\mathcal{S}^{\mathbf{v}}$	
Road Surface			
Crushed rock or recycled material	tonnes	CO2e/tonne	IS Calculator NZ v2.0
Gravel	1,150 tonnes	0.0182 tCO2e/tonne	IS Calculator NZ v2.0
Bitumen	tonnes	0.3966 tCO2e/tonne	IS Calculator NZ v2.0
Asphalt	68 tonnes	0.0542 tCO2e/tonne	IS Calculator NZ v2.0
Project Breakdown Total	2,528 tonnes of CO2e		
Calculated Emissions			
Best estimate of calculated emissions	2,528 tonnes of CO2e		
		X	
Accumptions			

## Assumptions

Emissions for construction have been calculated from data provided by Waka Kotahi for this project. When possible assumptions have been made in a consistent manner to ensure comparability between Refer to construction schedule worksheet for indicative schedule of quantities of concrete, steel, aggregates, gravels and fuels used during construction.

Based on previous research for Waka Kotahi, only emissions from the largest emission sources from construction of infrastructure projects have been estimated (concrete, steel, aggregates, asphalt, and on-site fuel use).

Materials and works related to bridge abutments have been included where relevant.

Fuel used in the construction is assumed to be 2 litres of diesel for every m3 of earth works (AECOM derived fuel-use ratio).

The following were not included in the estimate: fuel used in quarrying activity; emissions from the transportation of construction materials to/from site.

Emission factors are sourced from MfE's 2020 Guide (see link below) where appropriate, or from the ISCA-IS Calculator v2.0.

https://environment.govt.nz/publications/measuring-emissions-detailed-guide-2020/

The ISCA-IS Calculator v2.0 is available for ISCA members at https://www.isca.org.au/Tools-and-Resources

The emission factor for concrete is based on MfE 2020 guidance and is based on a standard concrete mix.

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## Brougham Street Multimodal Construction Schedule

Source: Quantities derived by AECOM based on Brougham St overbridge concept drawing, as provided by WK. (Beca drawing 3811752-SE-0020 & 0021, April 2021)

Pedestrian Walkway     200mm concrete slab     1136 m2     568.03 t     89.75 t       200mm sourcete slab     1136 m2     327.19 t     68.16367 t       40mm Ashphait surfacing     1136 m2     5.77 t     5.77 t       40mm Ashphait surfacing     227 m     5.77 t     5.77 t       3m Steel bracing along sides     274 m     67.95 t     5.81 co.91 t       Staircases     2 no     105 t     16.59 t     568.02 t       Countrast os taircases     4 no     5.50 t     56.88 t     56.00 t       Concrete posts to ramp     16 no     120.6371 t     19.06065 t     50.688 t       Concrete beams between posts     8 no     300 t     47.4 t     150 t       Post to overpass     6 no     125 t     17.775 t     150 t       Resurfacing to below ramp     2450 m2     612.5 t     96.775 t     918.75 t       Total     2338.668 t     787.798 t     88.16367 t     1149.75 t	Quantity unit Concrete t or m3 Steel t or m3 Asphalt t or m3 Asphalt t or m3 Steel t or m3 Fuel	l or kg
Pedestran Walkway 200mm Concrete slab 800mm Substructure to overpass 1136 m2 1136 m2 1149.75 t 1149.75 t 114		Ase
200mm Concrete siab   1136 m2   32.719 t     40mm Ashphali surfacing   1136 m2   32.719 t     40mm Ashphali surfacing   1136 m2   5.77 t     3m Steb bracing along sides   27 m   67.95 t     3taircases   2 no   105 t   16.69 t     Columns to staircases   4 no   5.4 t   0.8532 t     Concrete posts to ramp   16 no   120.6371 t   19.06065 t     Footings to above   16 no   250 t   56.88 t     Concrete posts to ramp   16 no   129.6 t   20.4768 t     Footings to above   6 no   135 t   21.37 t     Concrete beams between posts   3 no   112.5 t   17.75 t     Resurfacing to below ramp   2450 m2   612.5 t   96.775 t     Total   2338.668 t   787.798 t   149.75 t     Approximation   Approximation   149.75 t     Approximation   Approximation   40.44.75 t	n Walkway	Ass
boomm Substitutue to overpass   1136 m2   527.19 t     1.8m guardrail and fenoing   227 m   5.77 t     1.8m guardrail and fenoing   227 m   68.16367 t     3m Steb bracing along sides   2 no   105 t   16.69 t     Columns to staircases   4 no   5.4 t   0.8532 t     Concrete posts to ramp   16 no   120.6371 t   19.06065 t     Concrete beams between posts   8 no   300 t   47.4 t     Post to overpass   6 no   129.6 t   20.4768 t     Concrete beams between posts   3 no   112.5 t   17.775 t     Resurfacing to below ramp   2450 m2   612.5 t   96.775 t     Total   2338.668 t   787.7983 t   68.16367 t   1149.75 t	0ncrete slap 1136 m2 568.03 t 89.75 t	
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1.01 guardian and reading along sides   2.74 m   0.77 f     Staircases   2 no   105 t   16.59 t     Staircases   2 no   105 t   16.59 t     Concrete posts to ramp   16 no   120.6371 t   19.06065 t     Footings to above   16 no   220.11 t   19.06065 t     Concrete posts to ramp   16 no   220.6371 t   19.06065 t     Footings to above   16 no   120.61 t   20.4768 t     Concrete beams between posts   8 no   300 t   47.4 t     Post to overpass   6 no   135 t   21.33 t     Concrete beams between posts   3 no   112.5 t   17.775 t     Resurfacing to below ramp   2450 m2   612.5 t   96.775 t   918.75 t     Total   2338.668 t   787.7983 t   68.16367 t   1149.75 t	Ipriati suffacility 1130 1112 00.10307 t	httr
Shi codes fracting alors 2 n 105 t 105 t 16.59 t   Columns to staircases 4 no 5.4 t 0.8532 t 150 t   Concrete posts to ramp 16 no 120.6371 t 19.06065 t   Footings to above 16 no 250 t 56.88 t   Concrete beams between posts 8 no 300 t 47.4 t   Post to overpass 6 no 129.6 t 20.4768 t   Footings to above 6 no 135 t 21.33 t   Concrete beams between posts 3 no 112.5 t 17.775 t   Resurfacing to below ramp 2450 m2 612.5 t 96.775 t   Total 2338.668 t 787.7983 t 918.75 t   Total 2338.668 t 787.7983 t 918.75 t	$\frac{1}{1} \frac{1}{1} \frac{1}$	Δος
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Concrete beams between posts   8 no   300 t   47.4 t     Post to overpass   6 no   129.6 t   20.4768 t     Footings to above   6 no   135 t   21.33 t     Concrete beams between posts   3 no   112.5 t   17.775 t     Resurfacing to below ramp   2450 m2   612.5 t   96.775 t     Total   2338.668 t   787.7983 t   68.16367 t   1149.75 t	to above 16 no 250 t 56.88 t 150 t	Ass
Post to overpass   6 no   129.6 t   20.4768 t   1.33 t   81 t     Footings to above   6 no   135 t   21.33 t   81 t     Concrete beams between posts   3 no   112.5 t   17.775 t   81 t     Resurfacing to below ramp   2450 m2   612.5 t   96.775 t   918.75 t     Total   2338.668 t   787.7983 t   68.16367 t   1149.75 t	beams between posts 8 no 300 t 47.4 t	Ass
Footings to above   6 no   135 t   21.33 t   68 t     Concrete beams between posts   3 no   112.5 t   17.775 t   918.75 t     Resurfacing to below ramp   2450 m2   612.5 t   96.775 t   918.75 t     Total   2338.668 t   787.7983 t   68.16367 t   1149.75 t	verpass 6 ng 129.6 t 20.4768 t	Ass
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Resurfacing to below ramp     2450 m2     612.5 t     96.775 t     918.75 t       Total     2338.668 t     787.7983 t     68.16367 t     1149.75 t	beams between posts 3 no 112.5 t 17.775 t	Ass
Resurfacing to below ramp     2450 m2     612.5 t     96.775 t     918.75 t       Total     2338.668 t     787.7983 t     68.16367 t     1149.75 t		
Total     2338.668 t     787.7983 t     68.16307 t     1149.75 t	ng to below ramp 2450 m2 612.5 t 96.775 t 918.75 t	Ass
PROPUNAL MINIS	2338.668 t 787.7983 t 68.16307 t 1149.75 t	
K NI	PROPONAL MINIS	

Assumed all concrete weights are 2.5t/m3 concrete Assumed all steel reinforcing is 5% volume of item at 7.9

Allowed 250kgs/m2 for substructure (6m steel rows x 40k

https://www.nzta.govt.nz/assets/resources/road-safety-backsumed from elevations 9 posts, 10 single cross braces

ssumed 300x300 columns

Assumed 800 diameter posts average height of 4m Assumed 2.5x.2.5x1 hard fill to 1.5 below Assumed 2m width 1.5m depth

Assumed 1200x1200 posts 6m height allowed for additio Assumed 3x3x1 hard fill to 1.5 below Assumed 2m width 1.5m depth

Assumed 35x35 area on each side. Assumed 100mm co