Consensus through simplicity

Hamilton City Council
Te kaunihera o Kirikiriroa

The Need

Elected Members requested

- Less tech speak,
- Clear evidence,
- Clearer problem definition,
- Why is it important to fix this one, above others,
- What is the cost,
- What are the benefits/disbenefits, in simple words.

The Information

For each option being considered

- Potential crash reduction,
- Crash cost savings,
- Travel delay, and costs alongside
- Benefits/dis-benefits for active users,
- Residual risk scores and graphs.

Desired Outcomes

- Based on recognised source data
- Consistent
- Quick
- Inclusive language
- Embed Safe System Principles

Where we started...

M22 =MAX(AP5:AP28)

Table 1: TREATMENTS INCLUDED IN THE OPTION (Please place letters by categories in Options)

Item	Treatment	OPTION A	OPTION B	OPTION C	OPTION D	OPTION E	OPTION F	OPTION G	OPTION H
1	Courtesy Crossing								
2	Courtesy Crossing + Refuge Island								
3	Courtesy Crossing + Parking Reduction								
4	Courtesy Crossing + Refuge Island + Parking Reduction	A	B						
5	Kerb Build-outs	A	B		D		F	G	
6	RSP 1:15		B	C	D			G	
6A	Multi RSPs								
7	RSP 1:20								
8	Zebra Crossing			C	D				
9	Zebra Crossing on multi lane road								
10	Signalised Crossing								
11	Pedestrian phase added to signals					E	F		
12	Speed limit reduced by 20km/h								H
13	Speed limit reduced by 10km/h								
14	*Speed limit reduced by 30km/h from 80kph*								
15	Delineation that supports speed reduction (visual narrowing etc)								
16	Pedestrian fences								
17	Signage & Delineation that supports speed reduction (visual narrowing	A	B						H
18	Advanced Warning signs (speed activated Electronic/flashing								
19	Guardrail (to protect hazards								
20	pedestrian Lighting upgrade mid block			C	D	E	F	G	
21	Cycle lanes on road								
21A	Cycle Lanes with Hit sticks								
22	School crossing								
	Cost Estimate - Enter Here	$23,000	$123,000	$234,000	$345,000	$543,000	$423,000	$323,000	$212,000

WARNING - FICTIONAL COSTS FOR TESTING PURPOSES!

Results Table

Options	Cost Estimate	Safe Sytems Score Score	Safe Sytems Score % improvement	Crash Reductions Estimate	Traffic Delays / Travel Costs	Driver Discomfort	5-10 year Maintenance Costs	Active Mode Travel Time	Active Mode Comfort
Option A - Courtesy crossing Refuge island with kerb buildouts	<$100k	140	4%	0.505	Minor	Zero	Moderate	Low Benefit	Low Benefit
Treatment B - Courtesy crossing on raised safety platform with kerb buildout	$100k-$200k	125	13%	0.535	Minor	Moderate	Moderate	Low Benefit	Medium Benefit
Treatment C - Zebra crossing with RSP (without kerb buildout)	$200k-$300k	89	39%	0.58	Moderate	Moderate	Moderate	High Benefit	High Benefit
Treatment D - Zebra crossing with RSP and kerb buildout.	$300k-$400k	95	35%	0.615	Moderate	Moderate	Moderate	High Benefit	High Benefit
Treatment E - Signalised crossing (without RSP and kerb buildout)	$500k+	106	27%	0.595	Moderate	Minor	Moderate	Medium Benefit	High Benefit
Treatment F - Signalised crossing with kerb buildout (without RSP)	$400k-$500k	106	27%	0.63	Moderate	Minor	Moderate	Medium Benefit	High Benefit
Treatment G - Signalised crossing with RSP and kerb buildout	$300K-$400K	94	36%	0.66	Moderate	Moderate	Moderate	Medium Benefit	High Benefit
Treatment H - 30km/h speed limit + [illegible]	$200K-$300K	90	38%	0.72	Moderate	Minor	Minor	Low Benefit	Low Benefit

Table 3 - Numerical Output Table

Numercial Outputs Table	OPTION A	OPTION B	OPTION C	OPTION D	OPTION E	OPTION F	OPTION G	OPTION H
Cost Estimate	$23,000	$123,000	$234,000	$345,000	$543,000	$423,000	$323,000	$212,000
Safe Sytems Score (SSS)	140	125	89	95	106	106	94	90
SSS as % improvement from Existing	4%	13%	39%	35%	27%	27%	36%	38%
Crash Reductions Estimate	0.505	0.535	0.58	0.615	0.595	0.63	0.66	0.72
Traffic Delays / Travel Costs	1	1	2	2	2	2	2	2
Driver Discomfort	0	2	2	2	1	1	2	1
5-10 year Maintenance Costs	2	2	2	2	2	2	2	1
Active Mode Travel Time	2	2	0	0	1	1	1	2
Active Mode Discomfort	2	1	0	0	0	0	0	

Table 1A - Traffic Flow Input Table

ENTER TRAFIC FLOW	8,000.00
ENTER PEDS XING RD	80.00
P x V	640,000.00

Table 4A

Travel Time	Code	Example	
Zero	0	No change to existing	
Minor	1	Ped x vehs <15,000	Just Signals or just zebra based on vol
Moderate	2	30kph or Signals	Just Signals or just zebra based on vol
Significant	3	High flow zebra	Speed limit with signals or zebra

Table 4B

Driver Discomfort	Code	Example
Zero	0	No change to existing
Minor	1	Traffic Signals/Zebra
Moderate	2	RSP
Significant	3	Multi RSPs / Other

Table 4C

Maintenance	Code	Example
Zero	0	No change to existing
Minor	1	Signs and lines etc
Moderate	2	RSP, Traffic signals, lighting, refuge islands
Significant	3	Multi RSPs / Hit sticks

Table 4D

Travel Time Active Mode User	Code	Travel Time
High Benefit	0	Zebra
Medium Benefit	1	Signals or median island with kerb build out
Low Benefit	2	median island or kerb build out
No Change	3	Kerb build out
Adverse Impact	4	Remove facility / detour

Table 4E

Discomfort Active Mode Users	Code	Travel Time	
High Benefit	0	Zebra/Signals on RSP	
Medium Benefit	1	Courtesy on RSP	Kerb build out
Low Benefit	2	Refuge Island	
No Change	3	No Change	
Adverse Impact	4	Remove facility / detour	

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots, \quad \sin\alpha \pm \sin\beta = 2\sin\frac{1}{2}(\alpha \pm \beta)\cos\frac{1}{2}(\alpha \mp \beta)$$

$$f(x) = a_0 + \sum_{n=1}^{\infty}\left(a_n \cos\frac{n\pi x}{L} + b_n \sin\frac{n\pi x}{L}\right)$$

Data Entry and Instructions | Analysis | SAFE SYSTEMS OPTIONS | Do NOT use this SSA sheet

Safe System Assessment

Hamilton City Council
Te kaunihera o Kirikiriroa

Chart Title: Grandview Road Road Safe Systems score

Existing Conditions

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	2	3	3	2
Severity:	3	3	3	2	3.5	3	2
TOTAL:	18	18	27	12	31.5	27	12

Treatment A

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	2	3.5	3	2
Severity:	3	3	3	2	3.5	3	2
TOTAL:	18	18	27	12	36.75	27	12

Treatment B

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	2	2	3	2
Severity:	3	3	3	2	2	3	2
TOTAL:	18	18	27	12	12	27	12

Treatment C

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	1	3	3
Likelihood:	2	2	3	2	2	3.5	2
Severity:	2	1	3.5	2	3	3.5	2
TOTAL:	12	6	22.5	12	6	18.75	12

Treatment D

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	3	2	3.5	2
Severity:	2	1	3.5	2	3	3.5	2
TOTAL:	12	6	22.5	18	6	18.75	12

Treatment E

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	3	2	3.5	2
Severity:	2	1	3	2	2	3.5	2
TOTAL:	12	6	27	18	12	18.75	12

Treatment F

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	3	2	3.5	2
Severity:	2	1	3	2	2	3.5	2
TOTAL:	12	6	27	18	12	18.75	12

Treatment G

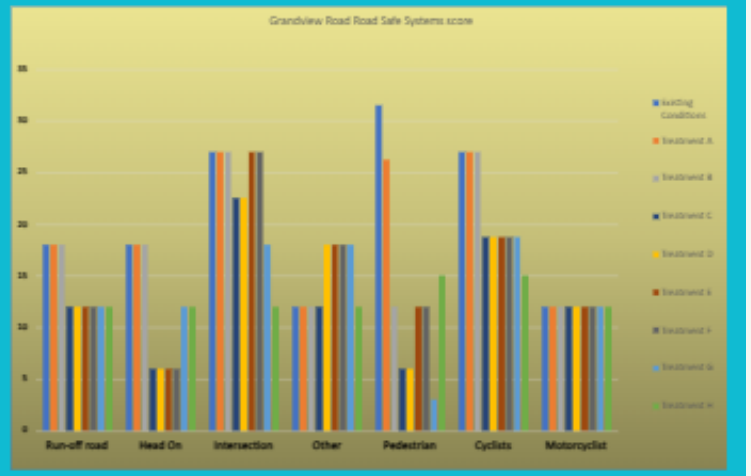
	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	3	3	2	3.5	2
Severity:	2	2	2	2	3	3.5	2
TOTAL:	12	12	18	18	9	18.75	12

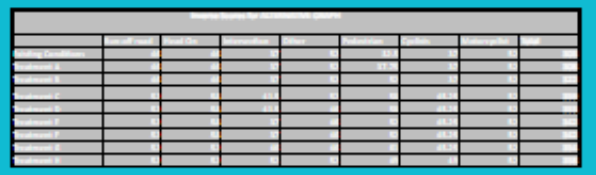
Treatment H

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist
Exposure:	3	3	3	3	3	3	3
Likelihood:	2	2	2	2	2.5	2.5	2
Severity:	2	2	2	2	2	2	2
TOTAL:	12	12	12	12	15	15	12

Overall Scores for each Design

	Run-off road	Head On	Intersection	Other	Pedestrian	Cyclists	Motorcyclist	Total
Existing Conditions	18	18	27	12	31.5	27	12	146
Treatment A	18	18	27	12	36.75	27	12	151
Treatment B	18	18	27	12	12	27	12	126
Treatment C	12	6	22.5	12	6	18.75	12	89
Treatment D	12	6	22.5	18	6	18.75	12	95
Treatment F	12	6	27	18	12	18.75	12	106
Treatment F	12	6	27	18	12	18.75	12	106
Treatment G	12	12	18	18	9	18.75	12	99
Treatment H	12	12	12	12	15	15	12	90





Instructions

1 In Table 1 in the Analysis worksheet, for each Option, enter a letter (or any symbol) against the categories that compose of the option.
For example, if your Option A contains a Curtesy Crossing and a Kerb build out, put the letter "X" in cells C5 and C9. Delete any existing letters from the previous chap's work.

1A Enter the Option name and description in Table Results, Column L.

2 Table 1A (currently cell L30) enter the traffic flows.

3 Tables 4A-4E should the scoring for each category of measure. You should not alter these unless you know what you are doing!

4 NEVER CHANGE ANYTHING IN THE MASTER - ALWAYS SAVE AND RENAME BEFORE ENTERING DATA OR EDITING!

5 Table 1A, bottom line, enter scheme costs.

6 Safe Systems Worksheet - Do you Safe Systems Analysis here at it will transfer automatically to the Analysis sheet.

7 Table G Crash reductions are based on the NZTA Crash Reduction Compendium.
This table also includes the ranking/rating for each score table of the categories. You can adjust them here for your individual project if needed, but do NOT alter the master copy.

Please do NOT delete any tables you are not using as you may destroy data processing links and loose formulie!

PASSWORD TO UNLOCK LOCKED CELLS IS:

BELLAMY

Use the "Review" menu in the top ribbon, then select "Protect Sheet" to unlock.

Project Detail

Safe System Options Assessment Tool

Project Name Fix it Quick

Problem Definition / Project Scope Something is Broken

Project Budget $ 1,234,567

Do Minimum Cost Estimate $ 9,876

Traffic Volume (AADT) 3,456 ☑ Estimate Other Road Users

Pedestrian Volume (Daily) 640

Cyclist Volume (Daily) 128

Motorcyclist Volume (Daily) 43

Project Length (km) 0.1

Crash History

Analysis Period (Typically, 5 years for high volume or 10 years for low volume areas.)

From 2016 To 2020

No. of Crashes by Severity

Fatal	0
Serious	1
Minor	6
Non-injury	11
Total No. of Crashes	18
Total Social Cost	$ 3,348,300

No. of Crashes by Type

Run Off Road	1
Head On	0
Intersection	15
Other	0
Pedestrian	2
Cyclist	0
Motorcyclist	0

Import CAS Data

Options Report Author Simon Crowther

Report Reviewed By

Hamilton City Council
Te kaunihera o Kirikiriroa

Start Options Assessment | Clear | Close

Modified Option

Treatments | Risk Comments

Option Name Option B - Roundabout with Multiple RSP's

Cost Estimate $ 1,500,000

Proposed Intersection Type

- ○ Mid-block Facility Define below
- ○ Traffic Signals
- ◉ Roundabout
- ○ Priority Cross Roads
- ○ Stop / Give Way T Priority
- ○ Uncontrolled
- ○ Grade Seperated

Pedestrian Facilities

Pedestrian Crossing Type

- ○ Courtesy Crossing
- ○ Courtesy Crossing + Refuge Island
- ○ Courtesy Crossing + Parking Reduction
- ○ Courtesy Crossing + Refuge Island + Parking Reduction
- ○ Zebra Crossing
- ○ Signal Crossing
- ◉ No Crossing

- ☐ Kerb Build-outs
- ☐ Pedestrian Lighting upgrade mid block
- ☐ School crossing
- ☐ Pedestrian phase added to signals
- ☐ Improved signal timing to reduce pedestrian delays
- ☐ Pedestrian fences

Cycle Facilities

Mid-block Cycle Facilities

- ○ Narrow On-Road Cycle Lanes (<1.4m)
- ○ Standard On-Road Cycle Lanes (1.4m +)
- ○ Hatched Separated Cycle Lane
- ○ Island Separated Cycle Lane
- ◉ No On-Road Cycle Lanes

- ☑ Shared Path or dedicated Off-Road Cycle Path
- ☐ Advanced Cycle Stop Box - Intersections

Road Environment

- ○ Straight/flat alignment few hazards or hazards are protected.
- ◉ Gentle curves, slight undulation, some hazards.
- ○ Curve speeds just above PSL and/or infrequent hazards to hit.
- ○ Curve speeds at or just below PSL and/or hazards likely to get hit.
- ○ Narrow, windy road and/or lots of hazards.

Speed Management

Speed Limit

○ 30 ○ 60
○ 40 ○ 80
◉ 50 ○ 100

Optional Variable

○ 30 KURA SCHOOL ○ ▭
◉ No Variable

Vertical Devices

- ○ RSP 1:15
- ○ RSP 1:20
- ◉ Multiple RSP's
- ○ No RSP's

- ☐ Signage & Delineation that supports speed reduction (visual narrowing etc)
- ☐ Advanced Warning signs (speed activated Electronic /flashing beacons)
- ☐ Traffic Calming
- ☐ Road Diet - Reduced number of traffic lanes

Miscellanous Treatments

Median Treatment

- ○ No Median/Standard Centre line
- ○ Flush Median
- ◉ Solid Median
- ○ Median Barrier
- ○ One Way Road

Parking Facilities

- ◉ No Parking - Either Side
- ○ Parking - One Side
- ○ Parking on both sides

- ☐ Intersection Throat Island
- ☐ High Friction Surface
- ☐ Adding Turn Lanes into Intersection

Legend

Pink Text - Treatment is remaining as part of the displayed option

Blue Text - Treatment is removed in the displayed option.

Red Text - Treatment is proposed for the displayed option.

Proposed Option Safe System Risk Assessment

☑ Risk Manually Set By User

	Run Off Road Crash Risk	Head On Crash Risk	Intersection Crash Risk	Other Crash Risk	Pedestrian Crash Risk	Cyclist Crash Risk	Motorcycle Crash Risk
Exposure	2	2	2	2	4	4	2
Likelihood	2.5	1	3	1.5	2.5	2	3
Severity	1.5	1	0.5	1.5	2.5	2.5	2.5

See Risk Comments

Save Edits | Clear | Close/Cancel

Modified Option

Treatments | Risk Comments

Fix it Quick, Option B - Roundabout with Multiple RSP's Risk Comments and Assumptions

	Exposure	Likelihood	Severity
Run Off Road	No Comment	No Comment	No Comment
Head On	No Comment	No Comment	No Comment
Intersection	No Comment	No Comment	No Comment
Other	No Comment	No Comment	No Comment
Pedestrian	No Comment	The RSP's are designed for <30 km/h travel speeds	No Comment
Cyclist	No Comment	No Comment	No Comment
Motorcyclist	No Comment	No Comment	No Comment

Save Comments

Treatment	Cost Estimate	Social Cost of Crashes / Savings	Crash Reduction Estimate	Traffic Delays (sec)	Travel Costs	Driver Discomfort	5-10 year Maintenance Costs	Active Mode Travel Time	Active Mode Comfort	Safe System Risk Score	Risk Reduction %	Risk Reduction
Existing	$ 9,876	$3,348,300	No Change	0	No Change	No Change	No Change	No Change	No Change	174.0	No Change	No Change
Option A - Roundabout	$1,500,000	-$1,674,150	50%	0	Moderate	Minor	Moderate	Medium Benefit	High Benefit	154.0	11%	20.0
Option B - Roundabout with Multiple RSP's	$1,500,000	-$1,590,443	48%	0	Moderate	Significant	Moderate	Medium Benefit	High Benefit	77.0	56%	97.0
Option C - Traffic Signals	$1,500,000	-$1,171,905	35%	0	Moderate	Minor	Moderate	Medium Benefit	High Benefit	165.5	5%	8.5
Option D - Traffic Signals with Raised Intersection	$1,500,000	-$1,188,647	36%	0	Moderate	Moderate	Moderate	High Benefit	High Benefit	118.5	32%	55.5

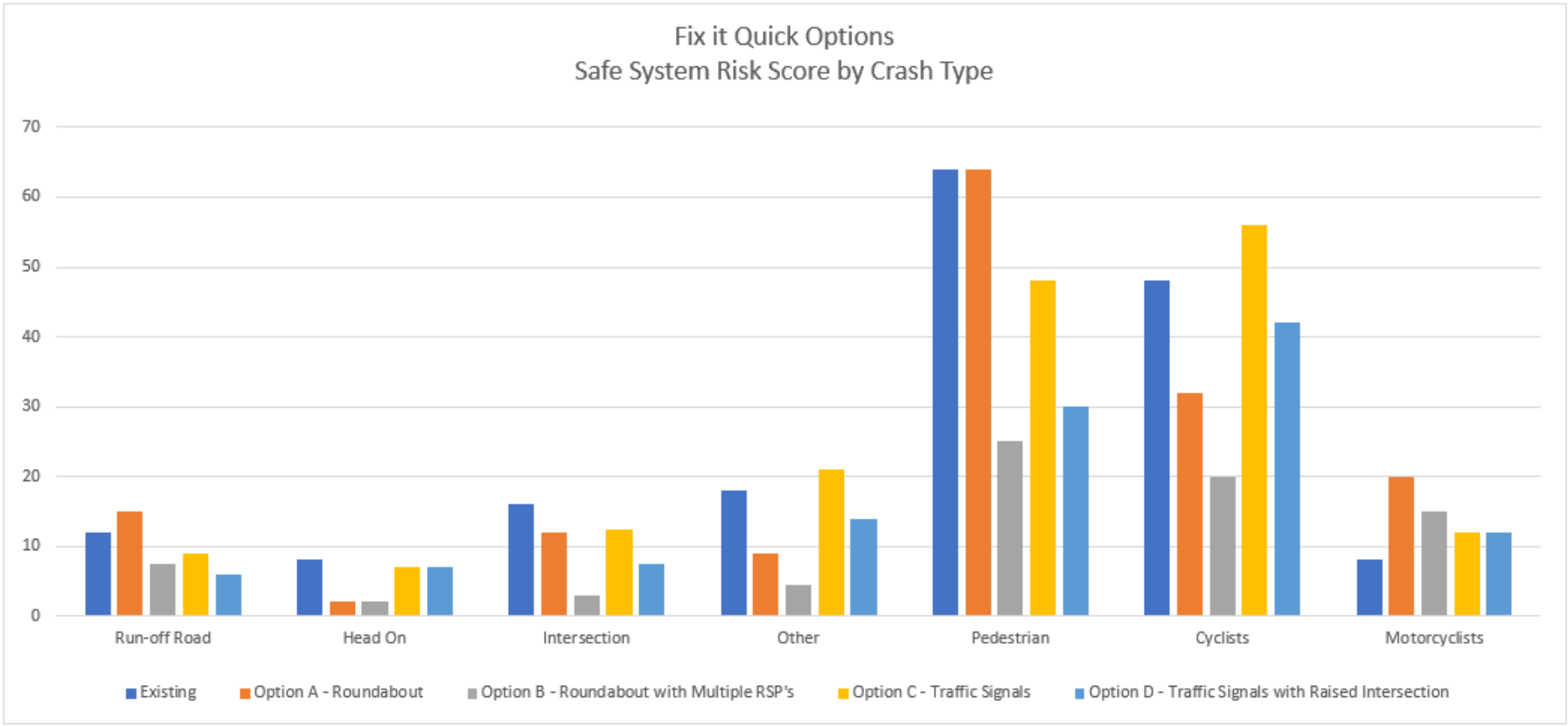
If the Treatment Name is highlighted in Yellow then the Safe System Assessment Framework risk scores have been manually set by the Author, recommend reviewing the Risk Comments.

Start/Edit Options Report

Export Table As PNG

Export Graph As PNG

Authored By:	Simon Crowther
Date:	6/03/2026 11:41:41 am
Reviewed By:	
Date:	



Treatment	Cost Estimate	Social Cost of Crashes / Savings	Crash Reduction Estimate	Traffic Delays (sec)	Travel Costs	Driver Discomfort	5-10 year Maintenance Costs	Active Mode Travel Time	Active Mode Comfort	Safe System Risk Score	Risk Reduction %	Risk Reduction
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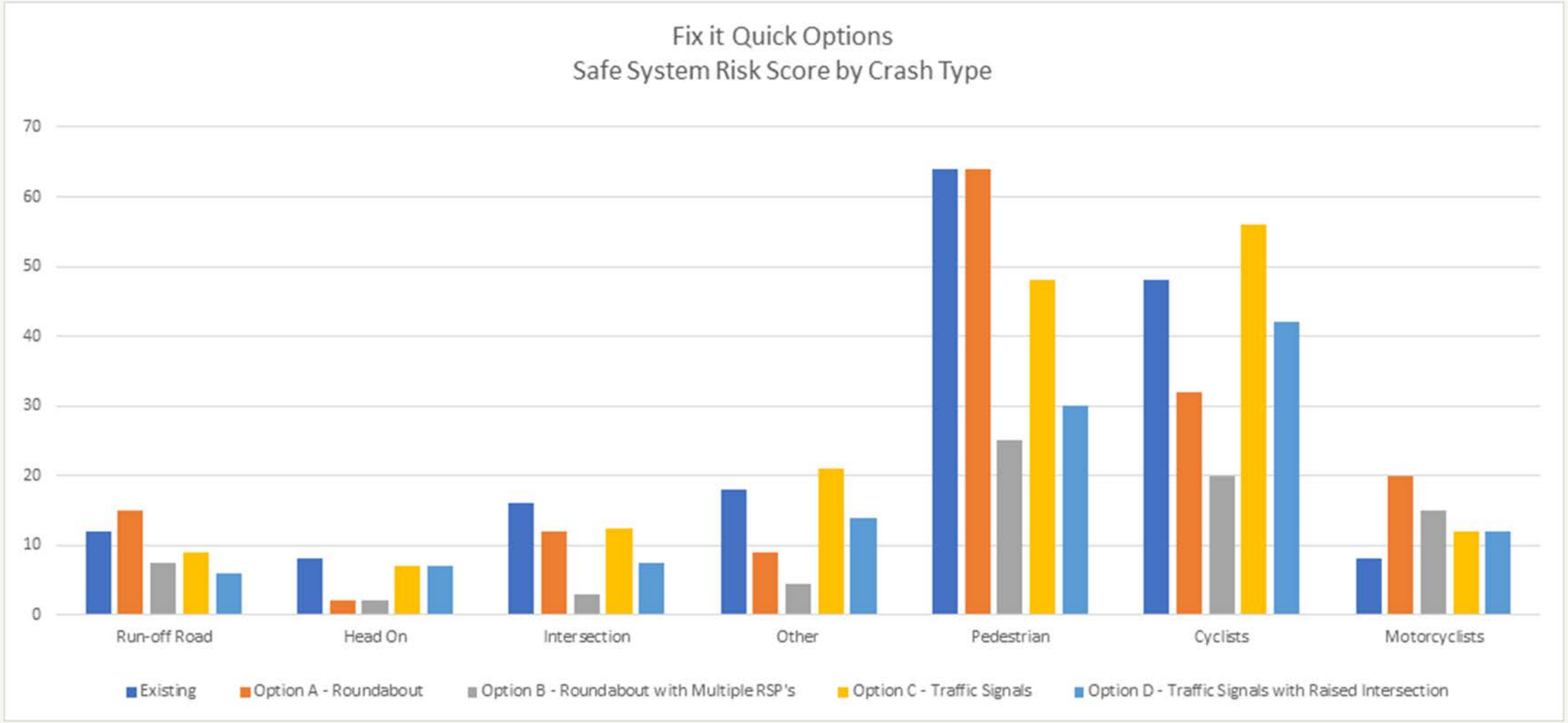

The Future

- Looking to share – See me at the TRAFINZ Stand.
- Online Workshop – via TRAFINZ/Transportation Group Notices
- Establish a working group

Thanks

- HCC Transport Safety Team
  - Robyn Denton
  - Michael Thorne
  - Gareth Bellamy (retired)
  - Richard Teeuwen
- WSP (Hamilton)
  - Renata Gomez
  - Cherie Mason

And Microsoft Copilot…

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