The First and Last Kilometre

How do Road Construction Activities Impact Local Government Assets?

Daniel Orriss
BE (Civil)

S.P.A.
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Asset Management

Pavement Design

Traffic Loading

Construction Traffic

Financial Impacts

Asset Management

- Asset value
  - Current
  - Replacement cost
- Maintenance Costs
- Asset life
  - Remaining Life
  - Replacement life

The first and last km

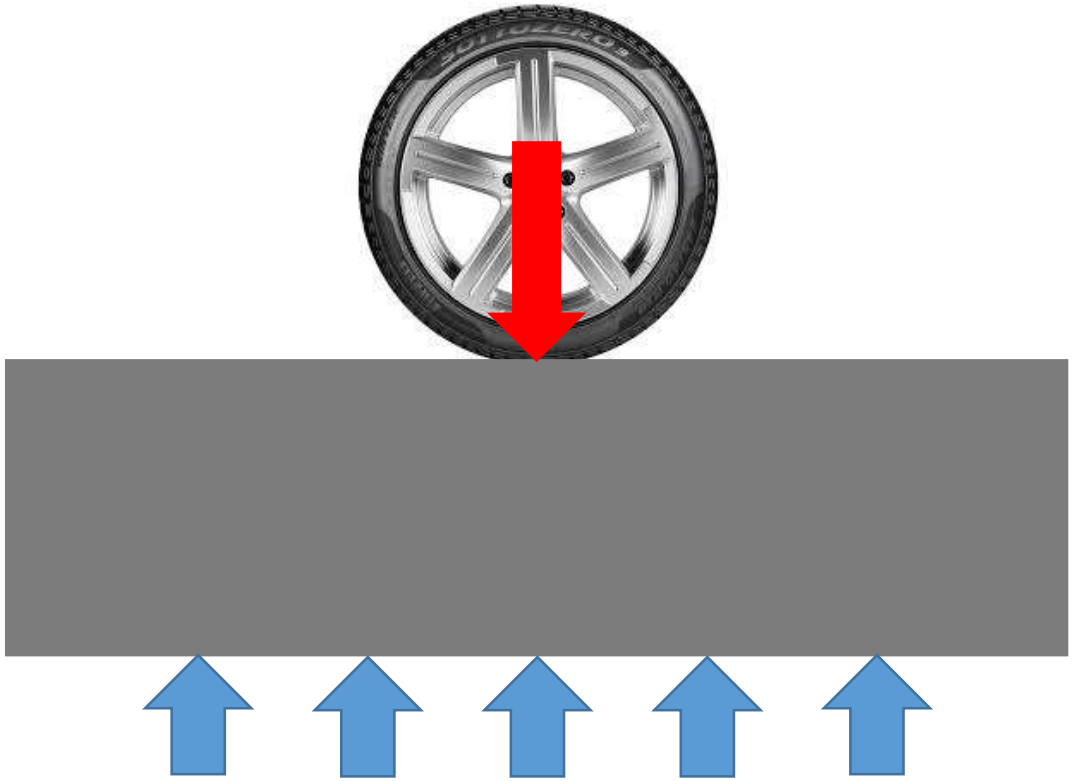
Asset Life - Basics of Pavement Design

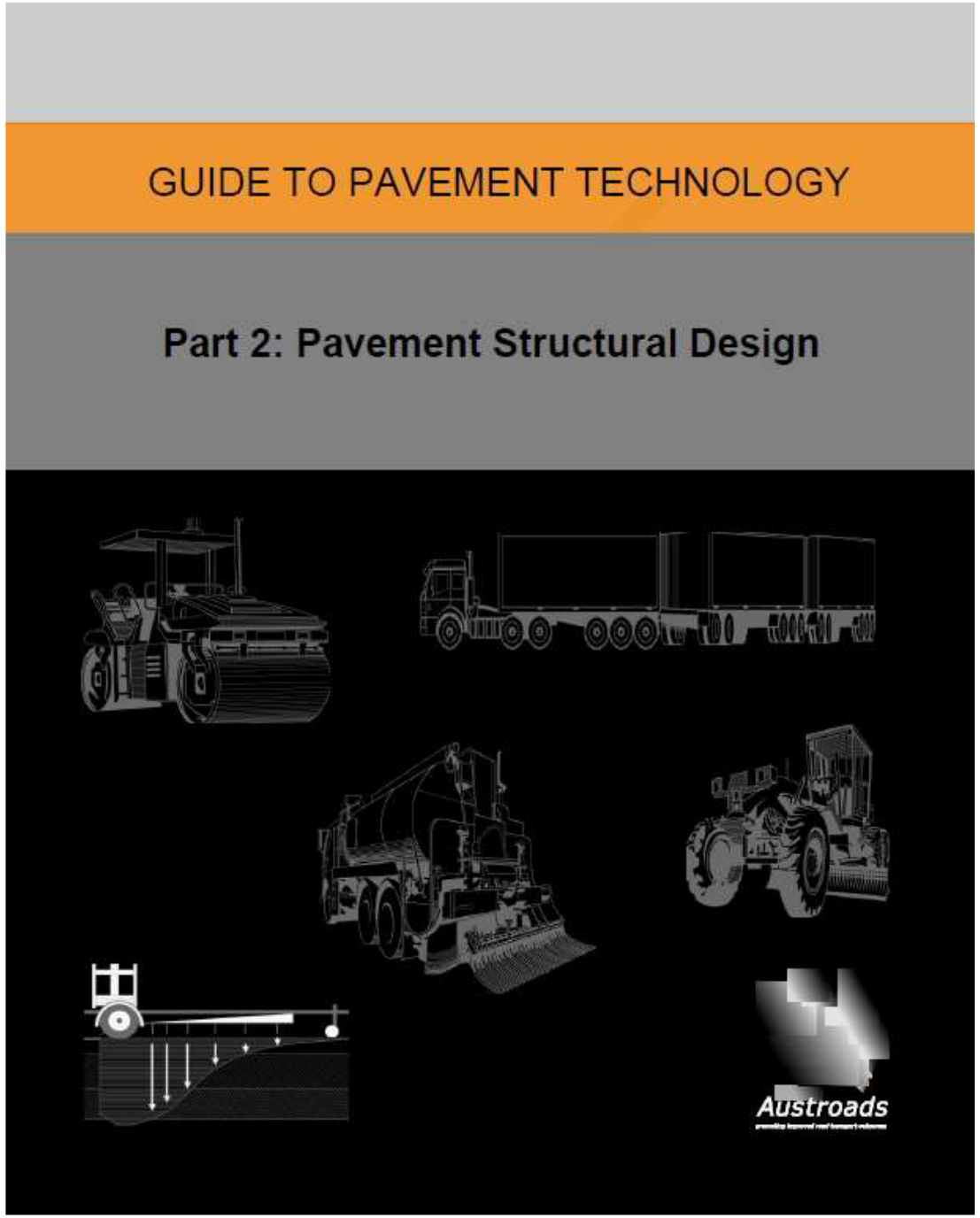
Design Principals

Pavement design is primarily a function of traffic loading and underlying subgrade strength

Traffic Loading Calculation – DESA's

- Existing traffic data
- Vehicle classification
- Functionality
- Predicted growth





DESA's and Relativity to Local Roads

"It has been well established that light vehicles contribute very little to structural deterioration, only heavy vehicles are considered in pavement design"

– AGPT Part s7.2

- Cars
- Garbage trucks
- Buses
- Delivery vehicles

DESA's and Relativity to Local Roads

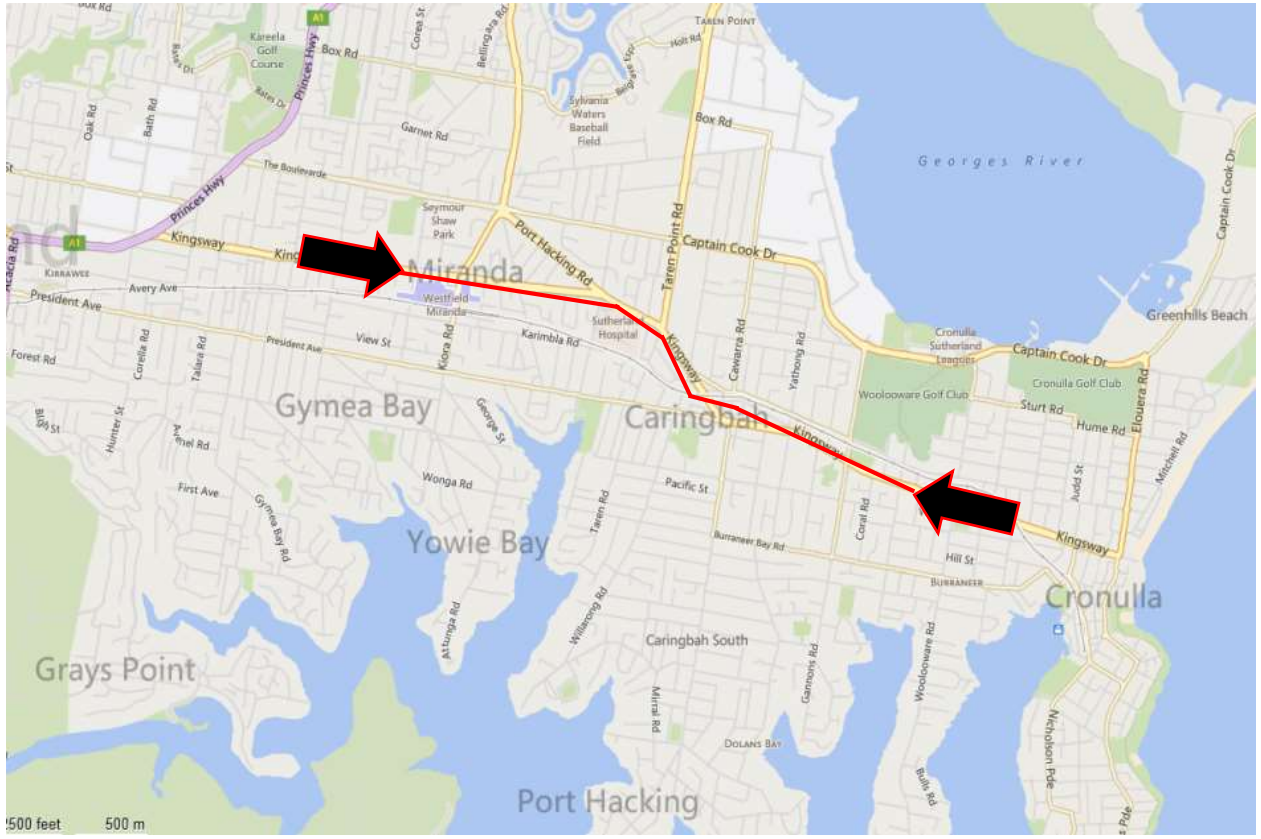
Table 12.2: Indicative heavy vehicle axle group volumes for lightly-trafficked urban streets

Street type	AADT two-way	Heavy vehicles (%)	Design AADHV (single lane)	Design period (years)	Annual growth rate (%)	Cumulative growth factor (Table 7.4)	Axle groups per heavy vehicle	Cumulative HVAG over design period	ESA/HVAG	Indicative design traffic (ESA)
Minor with single lane traffic	30	3	0.9	20	0	20	2.0	13 140	0.2	3×10^3
				40	0	40	2.0	26 280	0.2	5×10^3
Minor with two lane traffic	90	3	1.35	20	0	20	2.0	19 710	0.2	4×10^3
				40	0	40	2.0	39 420	0.2	8×10^3
Local access with no buses	400	4	8	20	1	22.0	2.1	128 480	0.3	4×10^4
				40	1	48.9	2.1	285 576	0.3	9×10^4
Local access with buses	500	6	15	20	1	22.0	2.1	240 900	0.3	8×10^4
				40	1	48.9	2.1	535 455	0.3	1.5×10^5
Local access in industrial area	400	8	16	20	1	22.0	2.3	256 960	0.4	1.5×10^5
				40	1	48.9	2.3	571 152	0.4	3×10^5
Collector with no buses	1200	6	36	20	1.5	23.1	2.2	607 068	0.6	4×10^5
				40	1.5	54.3	2.2	1 427 004	0.6	10^6
Collector with buses	2000	7	70	20	1.5	23.1	2.2	1 180 410	0.6	8×10^5
				40	1.5	54.3	2.2	2 774 730	0.6	2×10^6

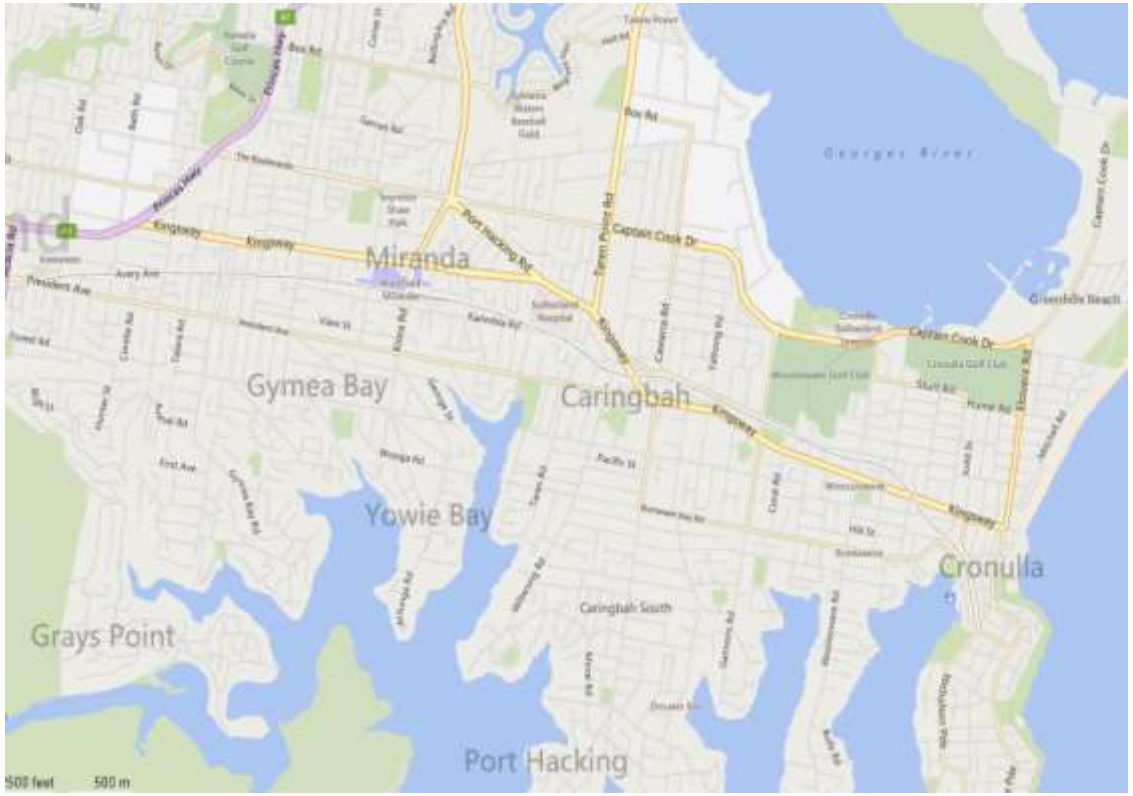
Note: Direction factor is 0.5, except for Minor Street with single lane traffic where DF = 1.0.

Reconstruction and Rehabilitation Options

Local Example - Kingsway

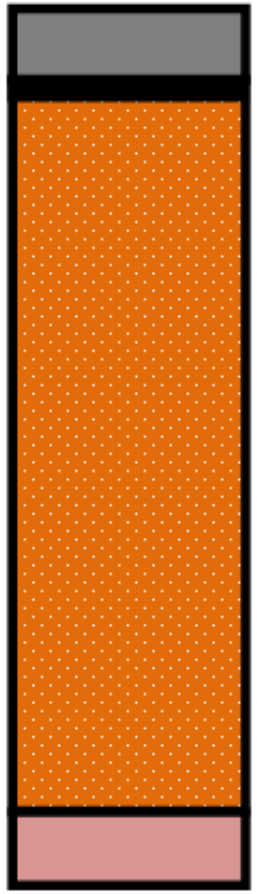


Reconstruction and Rehabilitation Options



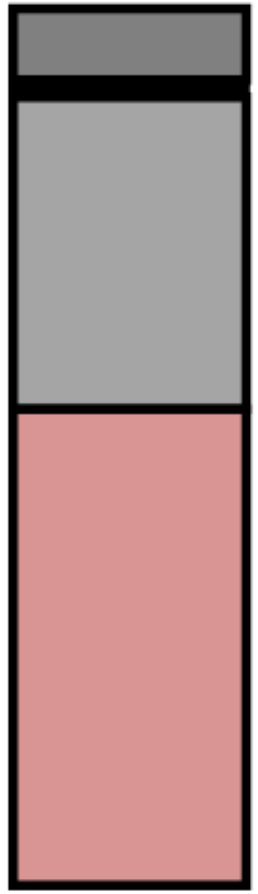
- Reconstruction options designed for 25 year performance life span and traffic loading of $1x10^6$ ESA
- $1x10^6$ ESA is a conservative figure as $6x10^5$ ESA was indicated by pavement investigations conducted by Council prior to reconstruction works in November 2013
- Four reconstruction options are compared in this case study:
  - Granular replacement
  - Deep lift asphalt replacement
  - Cement stabilisation
  - Foamed bitumen stabilisation

Granular Replacement



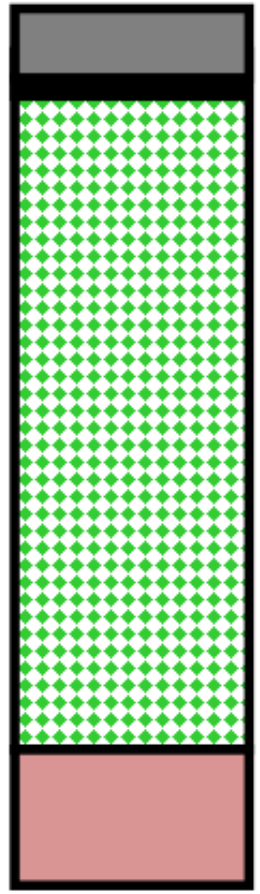
50mm Asphalt Wearing Course
Bitumen Single Coat Spray Seal
400mm Granular Replacement
Clay Subgrade with CBR 5%

Deep Lift Asphalt Replacement



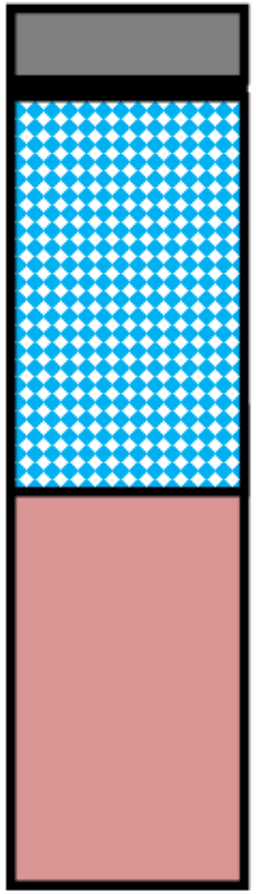
50mm Asphalt Wearing Course
Bitumen Single Coat Spray Seal
150mm Asphalt Base Course
Clay Subgrade with CBR 5%

Cement Stabilisation



50mm Asphalt Wearing Course
Bitumen Single Coat Spray Seal
325mm Cement Stabilisation
Clay Subgrade with CBR 5%

Foamed Bitumen Stabilisation



50mm Asphalt Wearing Course
Bitumen Single Coat Spray Seal
250mm Foamed Bitumen Stabilisation
Clay Subgrade with CBR 5%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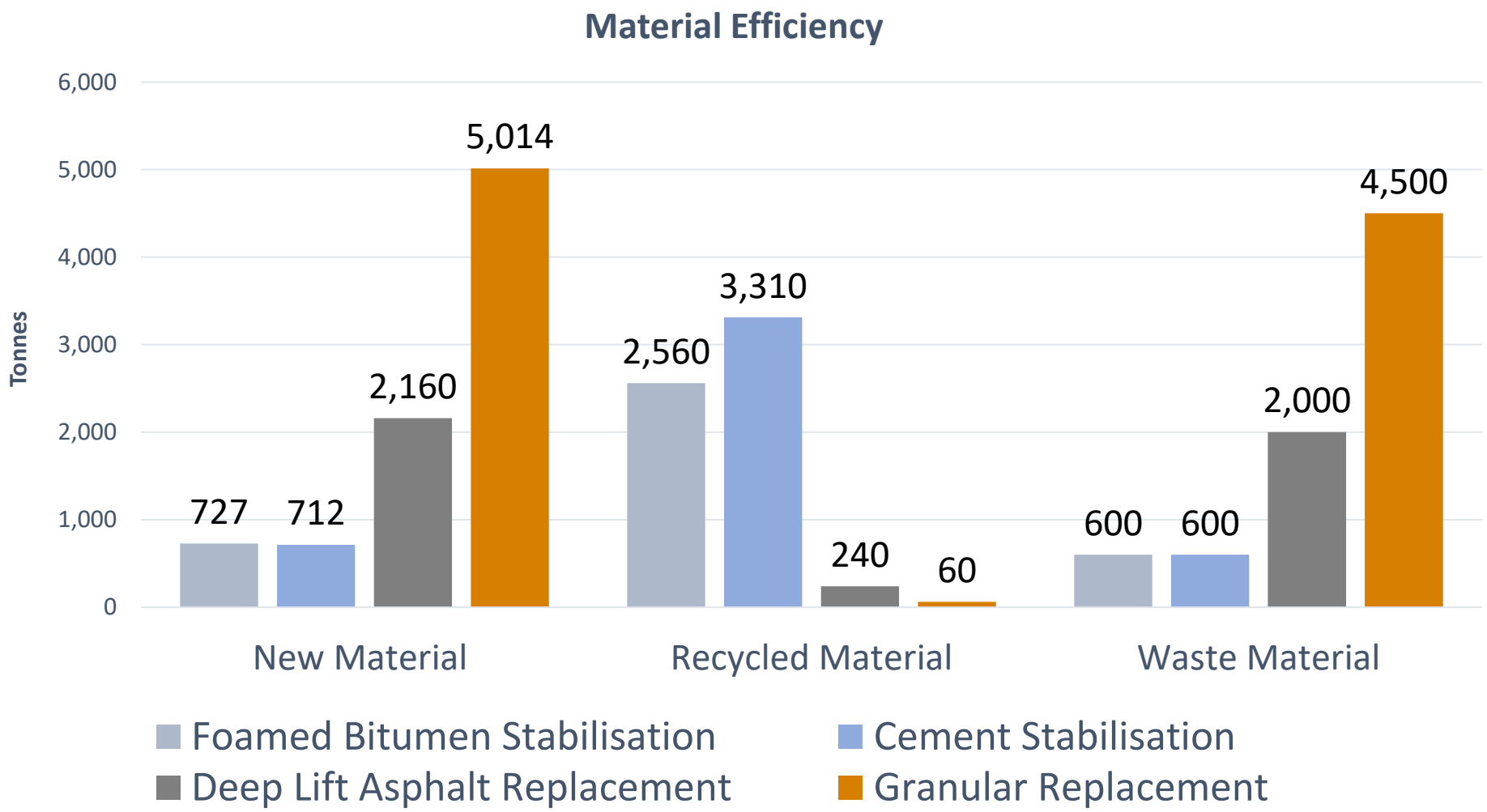
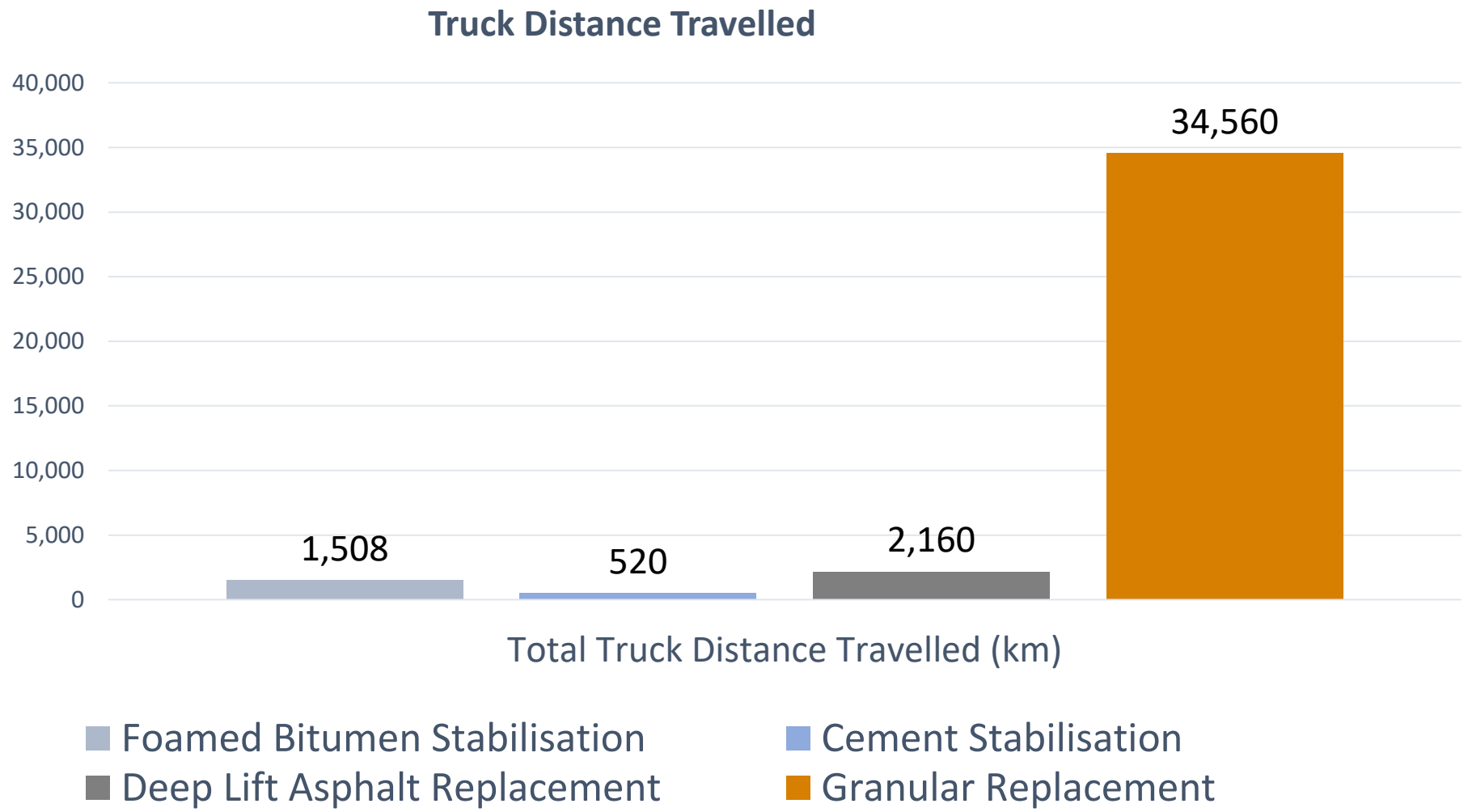
VOLVO

Exported and Imported Material



Truck Movements



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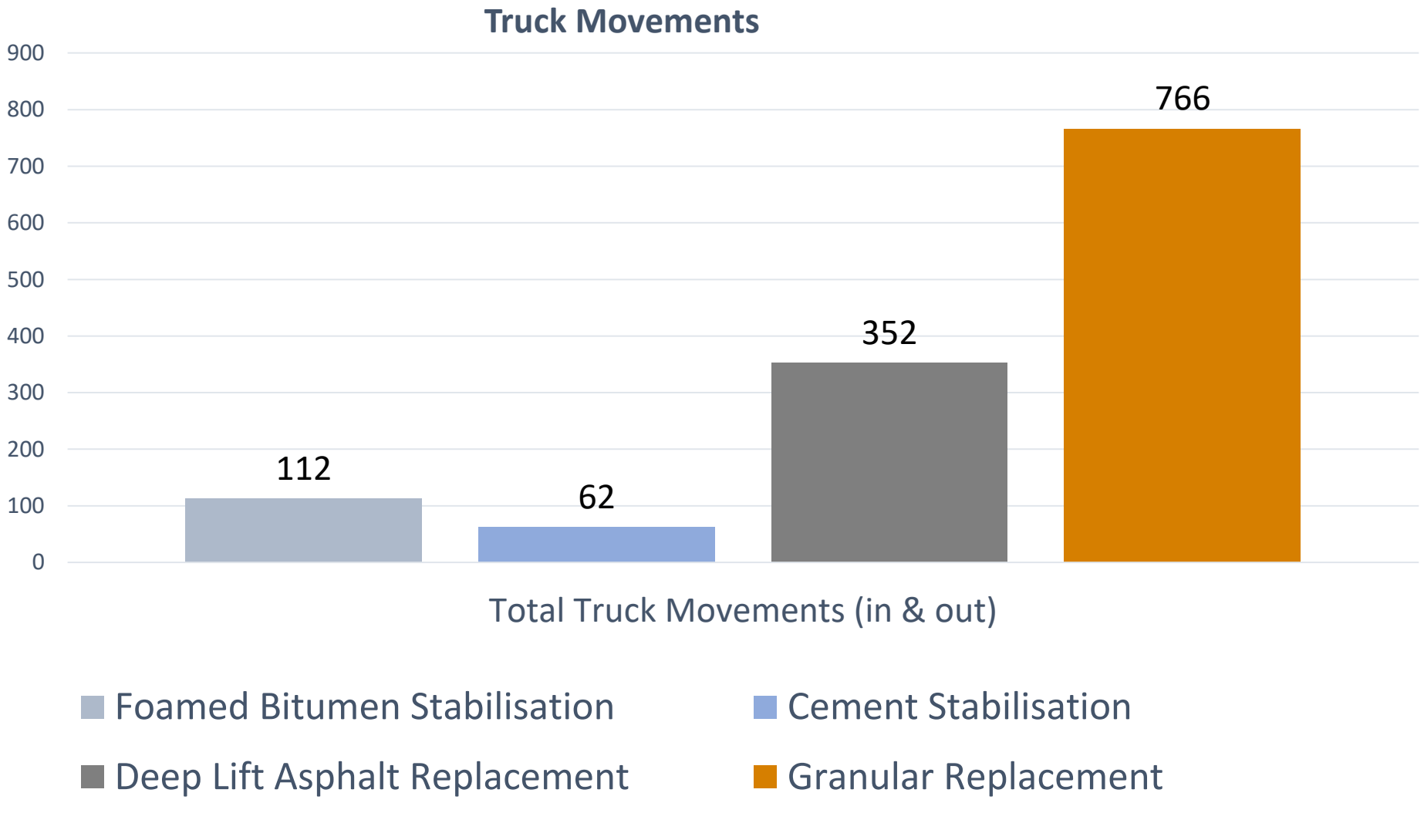

Construction Traffic

12t Load

DESA’s - 2

30t Load

DESA’s - 4

DESA's and Relativity to Local Roads

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Street type	AADT two-way	Heavy vehicles (%)	Design AADHV (single lane)	Design period (years)	Annual growth rate (%)	Cumulative growth factor (Table 7.4)	Axle groups per heavy vehicle	Cumulative HVAG over design period	ESA/HVAG	Indicative design traffic (ESA)
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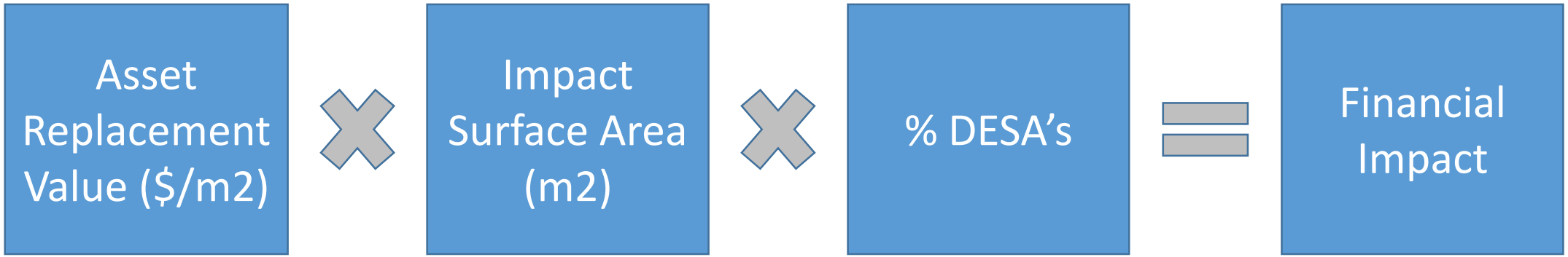
Note: Direction factor is 0.5, except for Minor Street with single lane traffic where DF = 1.0.

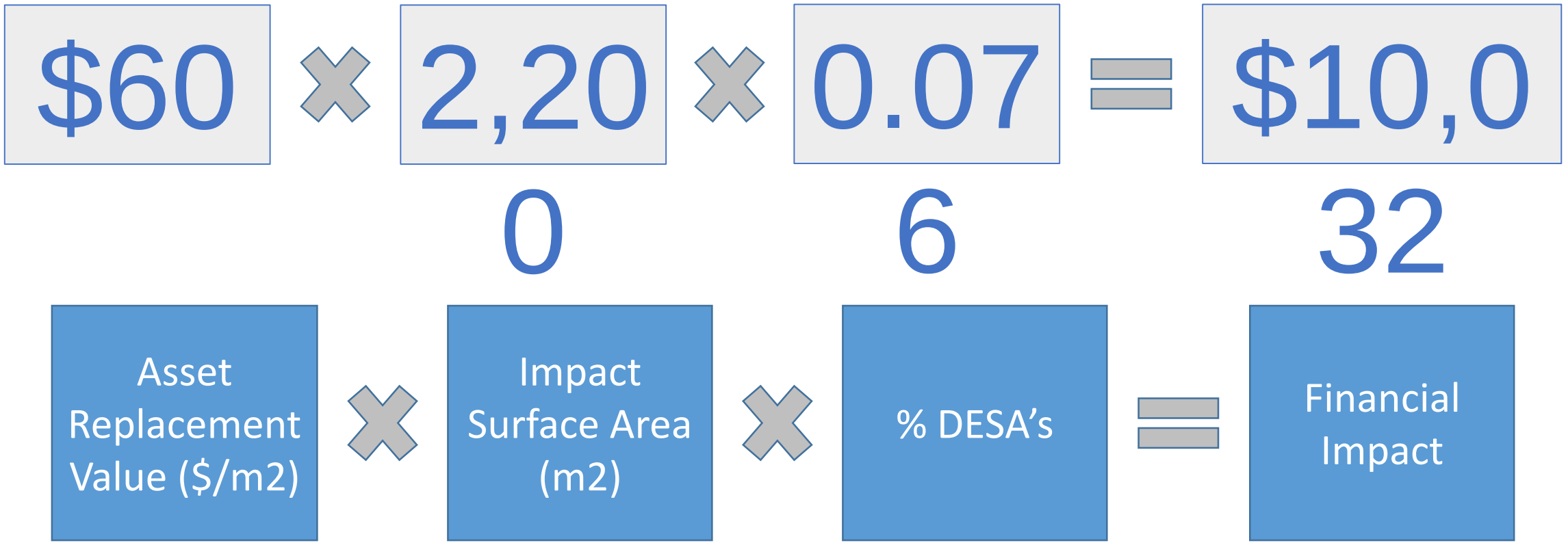
Construction Traffic Impacts and Pavement Life

Street Type	DESA's	Treatment	Truck Movements	ESA's	% of DESA's
Minor with 2 Lane Traffic	$2x10^4$	Insitu Foamed Bitumen	112	224	1.12%
		Deeplift Asphalt	352	704	3.52%
		Granular Reconstruction	766	1532	7.66%
Local Access no Buses	$4x10^4$	Insitu Foamed Bitumen	112	224	0.56%
		Deeplift Asphalt	352	704	1.76%
		Granular Reconstruction	766	1532	3.80%
Collector with Buses	$8x10^5$	Insitu Foamed Bitumen	112	224	0.03%
		Deeplift Asphalt	352	704	0.09%
		Granular Reconstruction	766	1532	0.19%

Calculating the Financial Impact of Construction Traffic



Example Calculation



How Can we Manage the Impact?

- Understand our construction options at treatment evaluation phase, give some thought to the associated impact
- For larger projects or programs, consider a formal evaluation
- Provide input into the construction VMP
- Material efficiency - look to reuse existing pavement, in place

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Final Thought…

What cumulative effect would these impacts have on your budget if considered throughout your overall works program?

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