



Tuesday 10 October 2017

ASBAP  
c/- Roads & Maritime Services  
George Street  
Parramatta  
(sent by email : [Suzanne.PHILPOTT@rms.nsw.gov.au](mailto:Suzanne.PHILPOTT@rms.nsw.gov.au))

Dear Suzanne Philpott,

At the ASBAP forum of Wednesday 23 August 2017, the Austroads Safety Program Manager, Dave Bobbermen, referred to the need for product in-service data. LB Australia is looking to support this initiative with 2-year in-service data for the Smart Cushion. ASBAP advised on 5 September 2017 that ASBAP has no format requirements for a 2-year in-service report and requested that LB Australia supply relevant data collected in a spreadsheet. This spreadsheet document is attached.

LB Australia is submitting 4 documents including this cover letter. The other two documents are (a) a brief report highlighting some key data in dot points and graphical form, and (b) a sampling of “before and after reset” photos of some of the reset Smart Cushions. Original photos, full pdfs of the graphs and other data captured (that ASBAP may later consider relevant) can be supplied on request.

In-service evaluation of a roadside safety feature seeks to monitor and document the manner in which the device performs under real world conditions to attempt to answer the following questions:

- Does the roadside feature perform as intended in typical real world collisions?
- Is the roadside feature installed correctly? If it is not, does the improper installation cause any particular performance problems?
- Is the performance of the roadside safety feature degraded by weather, age, climate, one other environmental conditions?
- What are the costs to install, repair and maintain the roadside feature

Performance in real world conditions, in this context, includes

- Knowing the number, severity and proportion of people injured in collisions with attenuators
- Knowing the installation and maintenance characteristics of the attenuator, and
- Knowing the installation and repair costs associated with the attenuator.

This brief report does not focus installation issues and installation times as multiple contractors were used and gathering data was difficult. Along with resets, installations often occurred under full road closures (not due to necessity) therefore traffic management costs directly associated with these Smart Cushion activities are hard to ascertain. Labour costs were also excluded at this time because travel time and site establishment time (at a work zone) made up such a significant proportion of the cost to render such figures meaningless to extrapolate to other situations.

To LB Australia’s knowledge the only injury that occurred in an impact involving a Smart Cushion in this 2 year period was that of an elderly driver reportedly treated at the site of impact by ambulance officers for shock and that is the limit of our knowledge).

It is LB Australia’s intention to prepare a comprehensive 2-year in-service report for ASBAP once ASBAP advises what ASBAP requires in a 2-year in-service report. Once the Australian 2-year in-service report is produced to ASBAP requirements it is LB Australia’s intention to request that ASBAP includes the Australian 2-year in-service report on the ASBAP web-site.

Yours sincerely,

Paul Hansen CPEng  
Director

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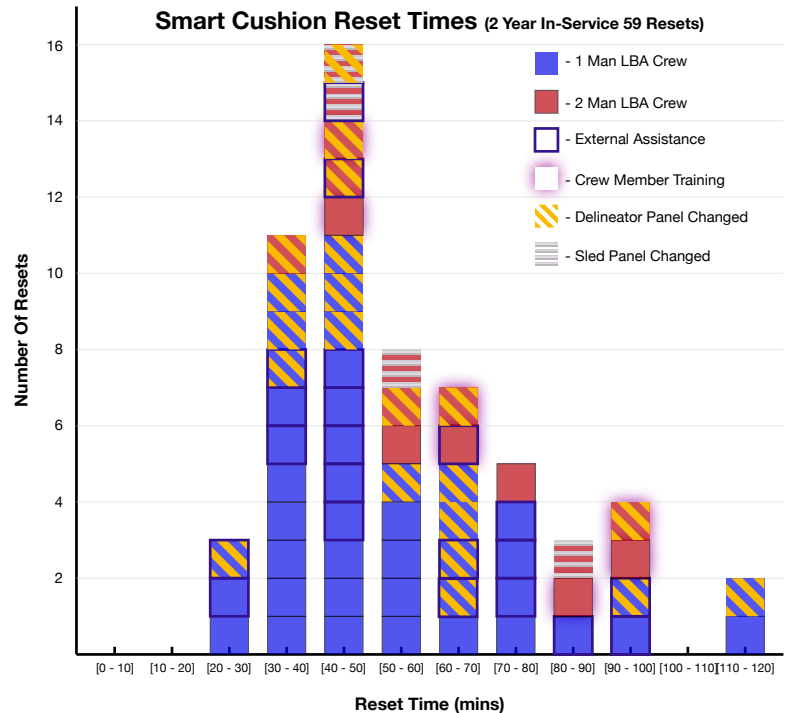
# Smart Cushion 2 Year In-Service Summary Report

## Smart Cushions In-Service

- 44 Smart Cushions have been deployed during the 2 years of this study
- The majority were used on the WestConnex M4 Widening and M4 East projects in NSW, as well as on the VicRoads projects at Laverton and Calder Hwy/Tullamarine Fwy intersection
- The Smart Cushions used in work zones are moved and stored as required, the number of active units at any given time cannot be ascertained
- At least 17 relocations of Smart Cushions were performed
- 31 of the Smart Cushions have required a reset or repair, these were all on WestConnex

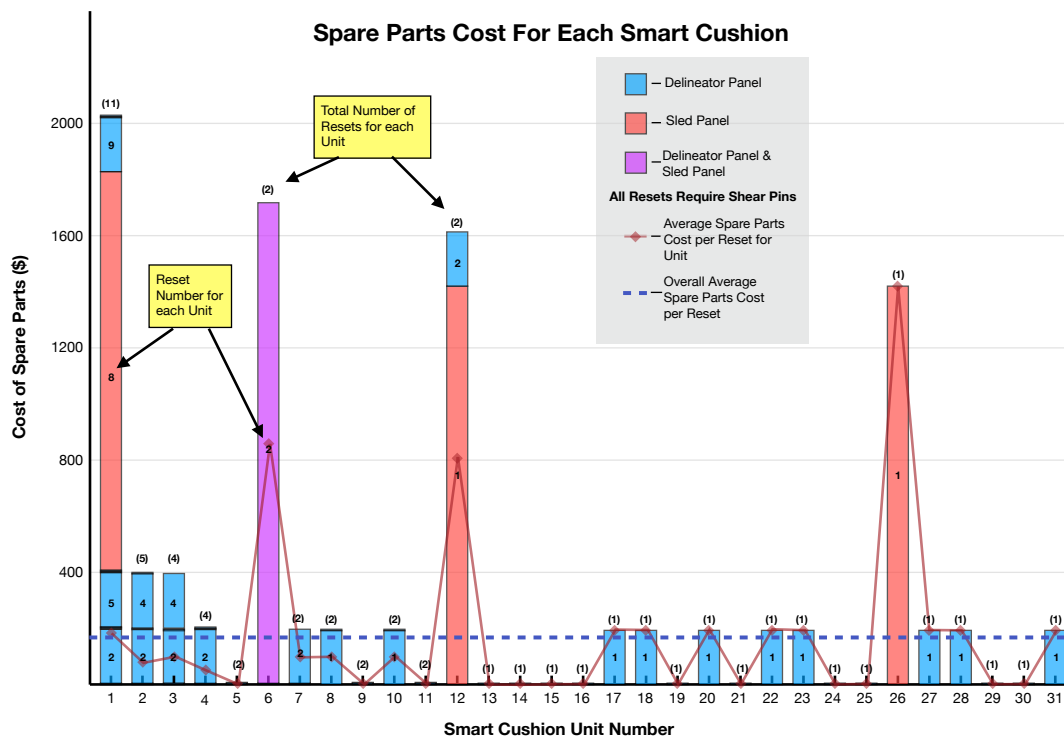
## Smart Cushion Resets

- LBA crew performed all 59 required resets in this period
- All resets were due to frontal impacts
- There was evidence of side impacts (eg. paint transfer, tyre marks etc.) however no damage was reported for repair
- Reset times were recorded from the moment inspection of the Smart Cushion started, to the time that the reset was completed and tools were packed away ready to leave site
- The average reset time was 55 minutes, and the median time was 49 minutes
- 25 resets were performed by a 1 man crew
- 18 resets were performed by a 1 man crew with assistance from a 3rd party vehicle for the pullout of the frame and mobile sheaves
- 2 or more men were used when one was being trained, a sled panel was being replaced or other work was conducted on the same night e.g. relocate a different Smart Cushion



## Smart Cushion Replacement Parts Costs









- 3 main types of components were replaced over the 59 resets
- Shear Pins (2 x \$2 = \$4) required for every reset
- Delineator Panel (\$190) required for 21 resets
- Sled Panel (\$1416) required for 4 resets
- The total cost of replacement parts over the 59 resets was \$9,994
- The average cost for each reset was \$169



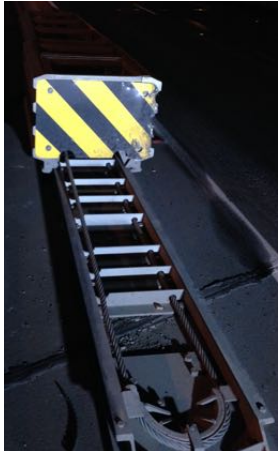


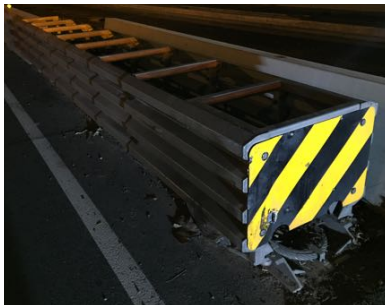












## Durability and Robustness

- 31 different Smart Cushion units required 1 or more resets
- 8 Smart Cushions were reset twice
- 2 Smart Cushions were reset 4 times
- 1 Smart Cushion was reset 5 times
- 1 Smart Cushion was reset 11 times
- All Smart Cushions were reset fit for service after an impact
- 2 Smart Cushions were irreparably damaged during removal by untrained workers. (Some anchor bolts were not removed prior to removal, crane continued to lift despite indicated load exceeding weight of Smart Cushion. Base frame was bent)
- One of these cushions never required a reset, the other is referenced as Unit 8 in the data

- During resets, Smart Cushions with up to 18 anchor pins missing or installed incorrectly were identified. Despite this, these Smart Cushions still functioned successfully. (Installation defects were due to untrained labour hire and minimal oversight by contractor. LBA's understanding is all defects were rectified within 24hrs of identification)
- During resets, it was noted that some Smart Cushions had been inundated with rubbish and debris. Despite this, these Smart cushions still functioned successfully. (Example photo supplied in sample photos, date of reset: 12/7/16)

Details	Before Reset	After Reset
<p>Date of Reset: 28/7/15  Unit Number: 1  Severity: 30%  Repair Time: 70 mins  <u>Parts Used:</u>  Shear Pins</p>		
<p>Date of Reset: 6/10/15  Unit Number: 6  Severity: 15%  Repair Time: 46 mins  <u>Parts Used:</u>  Shear Pins</p>		
<p>Date of Reset: 4/11/15  Unit Number: 3  Severity: 100%  Repair Time: 85 mins  <u>Parts Used:</u>  Shear Pins</p>		
<p>Date of Reset: 12/11/15  Unit Number: 3  Severity: 80%  Repair Time: 65 mins  <u>Parts Used:</u>  Shear Pins  Delineator Panel</p>		

Details	Before Reset	After Reset
<p>Date of Reset: 4/5/16  Unit Number: 16  Severity: 60%  Repair Time: 42 mins  <u>Parts Used:</u>  Shear Pins</p>		
<p>Date of Reset: 16/6/16  Unit Number: 3  Severity: 40%  Repair Time: 95 mins  <u>Parts Used:</u>  Shear Pins  Delineator Panel</p>		
<p>Date of Reset: 12/7/16  Unit Number: 19  Severity: 69%  Repair Time: 66 mins  <u>Parts Used:</u>  Shear Pins</p>		
<p>Date of Reset: 10/8/16  Unit Number: 1  Severity: 40%  Repair Time: 36 mins  <u>Parts Used:</u>  Shear Pins</p>		

Details	Before Reset	After Reset
<p>Date of Reset: 16/2/17  Unit Number: 12  Severity: 19%  Repair Time: 88 mins  <u>Parts Used:</u>  Shear Pins  Sled Panel</p>		
<p>Date of Reset: 25/3/17  Unit Number: 28  Severity: 58%  Repair Time: 37 mins  <u>Parts Used:</u>  Shear Pins  Delineator Panel</p>		
<p>Date of Reset: 7/5/17  Unit Number: 2  Severity: 51%  Repair Time: 36 mins  <u>Parts Used:</u>  Shear Pins</p>		
<p>Date of Reset: 7/6/17  Unit Number: 11  Severity: 86%  Repair Time: 54 mins  <u>Parts Used:</u>  Shear Pins</p>		

**Smart Cushion 2 Year In-Service Reset Data**

<b>Reset number</b>	<b>Date</b>	<b>Unit Number</b>	<b>Model</b>	<b>Severity (Compression)</b>	<b>Parts</b>	<b>Repair time (minutes)</b>	<b>Crew</b>
1	2015-07-28	1	SCI100	30.0%	Shear Pins	70	2xLBA
2	2015-07-28	5	SCI100	100%	Shear Pins	50	2xLBA
3	2015-09-08	13	SCI100	25%	Shear Pins	60	2xLBA + External Assistance
4	2015-09-30	1	SCI100	25%	Shear Pins, Delineator Panel	34	2xLBA
5	2015-10-06	6	SCI100	15%	Shear Pins	46	1xLBA + External Assistance
6	2015-10-06	14	SCI100	60.0%	Shear Pins	41	1xLBA + External Assistance
7	2015-11-04	3	SCI100	100%	Shear Pins	85	2xLBA + Training
8	2015-11-12	3	SCI100	80.0%	Shear Pins, Delineator Panel	65	1xLBA + External Assistance
9	2015-11-17	1	SCI100	50.0%	Shear Pins	48	1xLBA
10	2015-11-17	7	SCI100	15%	Shear Pins	47	1xLBA
11	2015-11-19	8	SCI100	50.0%	Shear Pins, Delineator Panel	90	1xLBA + External Assistance
12	2015-11-26	4	SCI100	65%	Shear Pins	77	1xLBA + External Assistance
13	2015-12-01	8	SCI100	90.0%	Shear Pins	74	1xLBA + External Assistance
14	2015-12-05	4	SCI100	50.0%	Shear Pins, Delineator Panel	25	1xLBA + External Assistance
15	2015-12-14	1	SCI100	52%	Shear Pins	24	1xLBA + External Assistance
16	2015-12-21	3	SCI100	95%	Shear Pins	35	1xLBA + External Assistance
17	2015-12-21	1	SCI100	15%	Shear Pins, Delineator Panel	35	1xLBA + External Assistance
18	2015-12-22	9	SCI100	15%	Shear Pins	70	1xLBA + External Assistance
19	2016-01-14	1	SCI100	20.0%	Shear Pins	46	1xLBA + External Assistance
20	2016-01-16	1	SCI100	20.0%	Shear Pins	35	1xLBA
21	2016-04-28	15	SCI100	50.0%	Shear Pins	55	1xLBA
22	2016-05-04	16	SCI100	60.0%	Shear Pins	42	1xLBA + External Assistance
23	2016-05-10	4	SCI100	69%	Shear Pins	41	1xLBA + External Assistance
24	2016-05-22	17	SCI100	54%	Shear Pins, Delineator Panel	66	1xLBA + External Assistance



25	2016-05-29	1	SCI100	14%	Shear Pins, Sled Panel	41	2xLBA + External Assistance
26	2016-06-16	1	SCI100	40.0%	Shear Pins, Delineator Panel	95	2xLBA + Training
27	2016-06-20	10	SCI100	60.0%	Shear Pins, Delineator Panel	55	2xLBA
28	2016-06-30	1	SCI100	52%	Shear Pins	49	1xLBA
29	2016-07-04	18	SCI100	87%	Shear Pins, Delineator Panel	113	1xLBA
30	2016-07-12	19	SCI100	69%	Shear Pins	66	1xLBA
31	2016-07-15	10	SCI100	21%	Shear Pins	29	1xLBA
32	2016-07-22	7	SCI100	45%	Shear Pins, Delineator Panel	40	2xLBA + External Assistance
33	2016-08-10	1	SCI100	40.0%	Shear Pins	36	1xLBA + External Assistance
34	2016-08-30	20	SCI100	58%	Shear Pins, Delineator Panel	32	1x LBA
35	2016-09-21	3	SCI100	44%	Shear Pins, Delineator Panel	65	1xLBA
36	2016-10-13	21	SCI100	81%	Shear Pins	54	1xLBA
37	2016-11-02	11	SCI70	44%	Shear Pins	45	2xLBA + Training
38	2016-11-14	22	SCI100	77%	Shear Pins, Delineator Panel	60	2xLBA + Training
39	2016-11-21	23	SCI100	58%	Shear Pins, Delineator Panel	57	1xLBA
40	2016-11-23	24	SCI100	30.0%	Shear Pins	74	1xLBA
41	2016-12-01	4	SCI100	50.0%	Shear Pins	90	1xLBA
42	2017-02-01	25	SCI100	19%	Shear Pins	80	1xLBA
43	2017-02-13	2	SCI100	50.0%	Shear Pins	116	1xLBA
44	2017-02-14	5	SCI100	60.0%	Shear Pins	90	2xLBA
45	2017-02-16	12	SCI100	19%	Shear Pins, Sled Panel	88	2xLBA
46	2017-02-20	26	SCI100	4%	Shear Pins, Sled Panel	51	2xLBA
47	2017-03-21	27	SCI100	50.0%	Shear Pins, Delineator Panel	60	1xLBA
48	2017-03-25	28	SCI100	58%	Shear Pins, Delineator Panel	37	1xLBA
49	2017-03-28	2	SCI100	33%	Shear Pins	57	1xLBA
50	2017-04-13	12	SCI100	58%	Shear Pins, Delineator Panel	40	1xLBA
51	2017-04-19	2	SCI100	71%	Shear Pins, Delineator Panel	40	1xLBA
52	2017-05-07	2	SCI100	51%	Shear Pins	36	1xLBA
53	2017-05-07	9	SCI100	52%	Shear Pins	36	1xLBA
54	2017-05-09	29	SCI70	10.0%	Shear Pins	38	1xLBA
55	2017-05-22	30	SCI100	15%	Shear Pins	35	1xLBA
56	2017-06-06	6	SCI100	15%	Shear Pins, Delineator Panel, Sled Pannel	49	2xLBA
57	2017-06-07	11	SCI70	86%	Shear Pins	54	1xLBA
58	2017-06-15	31	SCI70	100%	Shear Pins, Delineator Panel	48	2xLBA + Training
59	2017-06-16	2	SCI100	50.0%	Shear Pins, Delineator Panel	45	1xLBA