REPORT ON FULL SCALE LABORATORY TESTS ON TRIPSTOP™ PVC JOINERS FOR CONCRETE FOOTPATH OF 75 mm THICKNESS

by

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1. Introduction

This report presents the findings of laboratory tests on TripStop™ PVC joiners. These tests were conducted in the Heavy Structures Laboratory of the School of Civil and Chemical Engineering at RMIT University, Melbourne, Australia. A full scale prototype concrete footpath 5m long, 1.5m wide and 75mm thick was cast on a steel frame. The testing frame was designed in such a way that the formwork can be removed from underneath the concrete slabs and the slabs can be jacked up from virtually any point – to simulate various scenarios of tree root invasion and soil expansion/movement.

Four TripStop™ PVC joiners were installed in the prototype footpath. They were 1.5m apart from each other. The two ends of the footpath were restrained by steel angles. The locations of the PVC joiners and their cross-sectional shape are shown in Figure 1.

A series of tests was conducted - with loading on the slabs ranging from 0 to 490 kg. Extensive data have been recorded from these tests. This report will focus on stepping displacement (the difference between the vertical movements of adjoining slabs) which is the main cause of tripping hazards in footpaths and therefore the most critical measurement for assessing the adequacy and performance of TripStop™. The Australian Standard AS 3727 (1993): *Guide to Residential Pavements* [1] is used to determine the appropriate level of loading on the slabs and the maximum allowable stepping displacement between adjacent slabs.

Figure 1. The locations and the cross-sectional shape of TripStop™ PVC joiners

2. Loading on Concrete Slab

According to Australian Standard AS 3727 (1993) : *Guide to Residential Pavements* [1], the minimum breaking load for concrete footpath of 75 mm thickness is 2 kN on one panel of the footpath which is approximately 200 kg.

The 200 kg load can be considered as the maximum allowable *design load* on the slab. The design load would be calculated by multiplying the **actual applied load** (known as *service load*) by a load factor of 1.2 for dead (or long-term) load or 1.5 for live (or short-term) load. Therefore the **expected service load** would be 200kg / 1.2 = 167kg (long-term load) or 200kg / 1.5 = 133 kg (short-term load).

3. Maximum Allowable Stepping Displacement / Vertical Movement

In various documents and guidelines, a stepping displacement of 5 - 6 mm is considered to be a threshold level for tripping hazard for a pedestrian. Voice of Safety International (VOSI) is an American private sector standards organization that specializes in public safety standards. In its *Standard for Slid & Trip Resistant Sidewalks and Swimming Pool Decks* [2], VOSI states that the "Maximum vertical mismatch of adjacent sidewalk panels, or utility access covers within walkways, is ¼ inch (6mm) maximum without edge treatment". The Australian standard AS 3727 [1] states that the relative surface level of adjacent paving elements within the expanse of the main pavement shall not be more than 5 mm. In this study, 5 mm will be considered as the maximum allowable stepping displacement.

4. Test Results

The concrete was ordered from a ready-mix supplier with a nominal strength of 40MPa. Prior to pouring concrete on the testing frame, the slump for the concrete was measured as 90mm. All tests were conducted after the standard cylinder strength of concrete of slabs exceeded 20MPa. The 7 days mean compressive strength of the concrete was found to be 22.9MPa. The specification in Australian Standard AS 3727 [1] for 75 mm slabs is 20MPa.

4.1 Jacking up at line AB

The plan of the testing frame is shown in Figure 2. In this test, the concrete slabs were pushed up from the bottom of Slab 2 along a long piece of solid timber (represented by line AB in Figure 2) using a hydraulic jack. The 1.4m long solid timber was placed between a solid timber cube (120mm x 120mm x 120mm) and the bottom surface of Slab 2 as shown in Figure 3. No additional load was applied to any of the slabs during the first test. Later, a uniformly distributed dead load of 200kg, 400kg and 490kg was added to Slab 1 in the second, third and fourth tests, respectively.

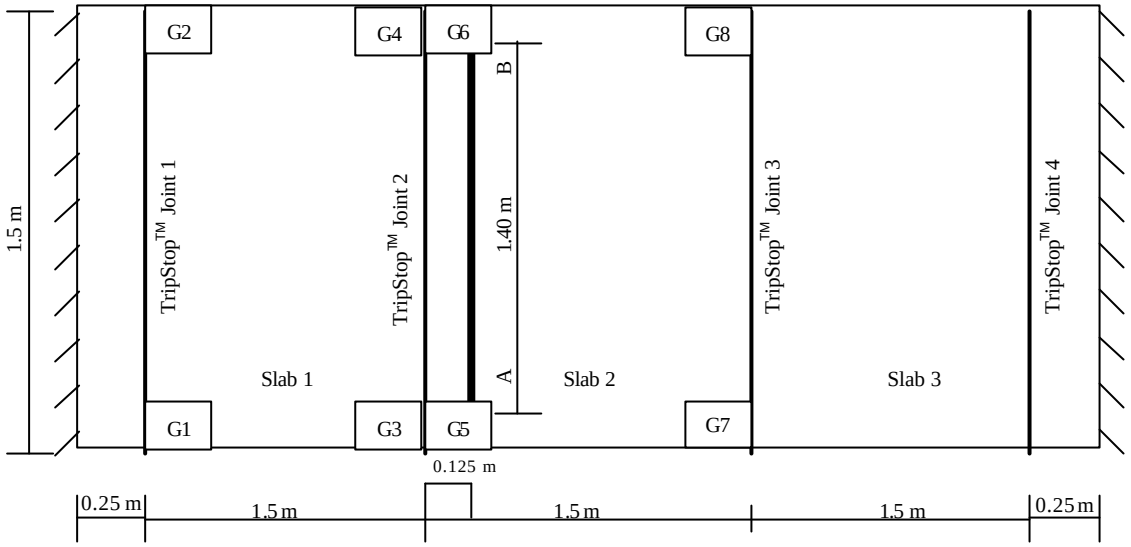


Figure 2. Plan of concrete testing bed

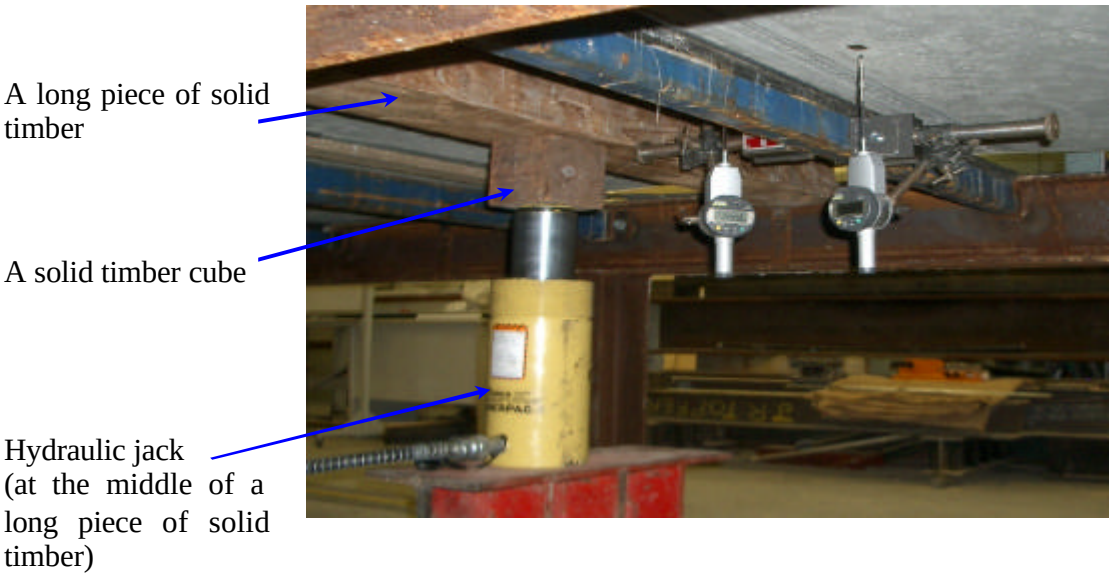
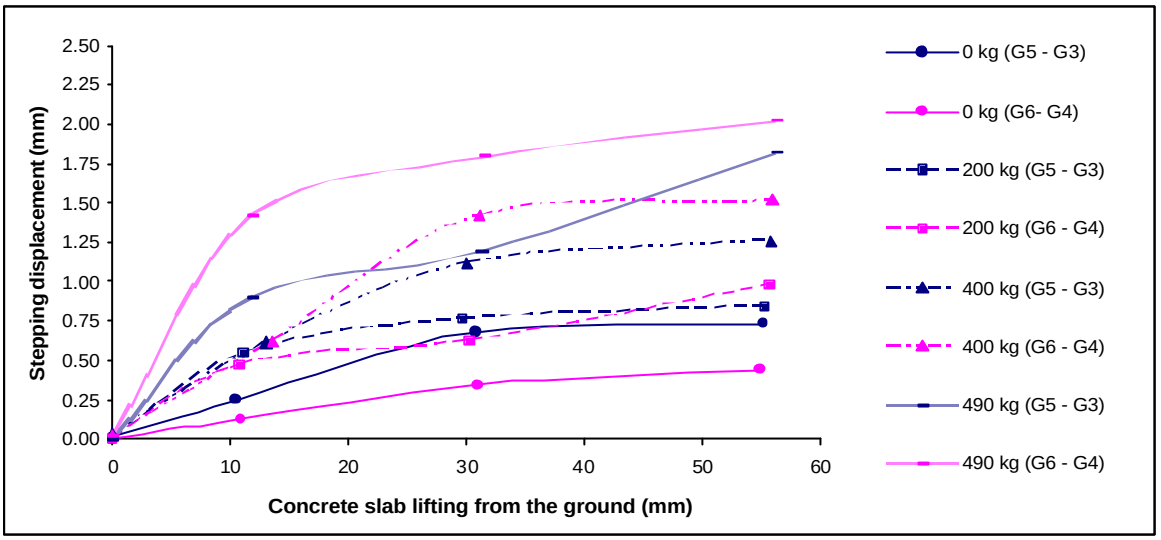


Figure 3 : Slabs being pushed up by a hydraulic jack

To measure the displacements, Linear Variable Differential Transformers (LVDTs) were mounted at critical points. As the slabs were pushed up, the displacements at the locations G3 to G6 were recorded by LVDTs. It is noted that in this test, the displacements at the locations G1, G2, G7 and G8 were negligible. The stepping displacement was obtained by subtracting displacement reading of G3 from that of G5 and similarly by subtracting displacement reading of G4 from that of G6. The results are shown in Figure 4.



	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Load \ Lift	0	10mm	30mm	50mm	0	10mm	30mm	50mm
No additional load	0.00	0.25	0.68	0.73	0.00	0.13	0.34	0.44
200 kg	0.00	0.55	0.76	0.84	0.00	0.47	0.62	0.98
400 kg	0.00	0.61	1.12	1.26	0.00	0.62	1.42	1.52
490 kg	0.00	0.91	1.20	1.82	0.00	1.42	1.80	2.03

Figure 4. Stepping displacement when jacking up at line AB

From Figure 4, it is seen the stepping displacement increased when additional dead load was added to the slab. The maximum stepping displacement recorded without additional load on slab was 0.73mm, which happened when the corresponding stepping displacement on the other side of the slab was 0.44mm. This indicates that the slabs were slightly tilted. It could be because the jacking force was not exactly at the centre or the slabs/joiners were not perfectly symmetrical. The self-weight of each slab was about 400kg. The maximum stepping displacement recorded in the test was 2.03mm when 490kg of dead load was put on Slab 1, as shown in Figure 5.

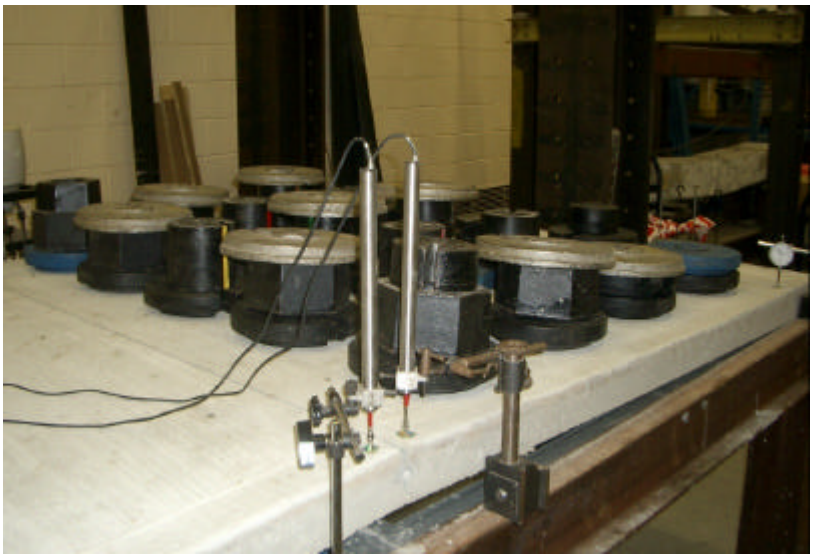


Figure 5. 490kg dead load added on the Slab 1

4.2 Jacking up at point C

With the previous tests, the slabs were moved up almost uniformly across the width, resulting in a uniform distribution of force on the TripStop™ PVC joiner. A more challenging case would be the one where Slab 2 is pushed up at a corner as shown in Figure 6.

Figure 6. Slab 2 being pushed up at a corner

In this test, Slab 2 was jacked up at point C as shown in Figure 7. No additional load was applied to any of the slabs during the first test. In the second test a uniformly distributed dead load of 200 kg was added on Slab 1. The results are shown in Figure 8.

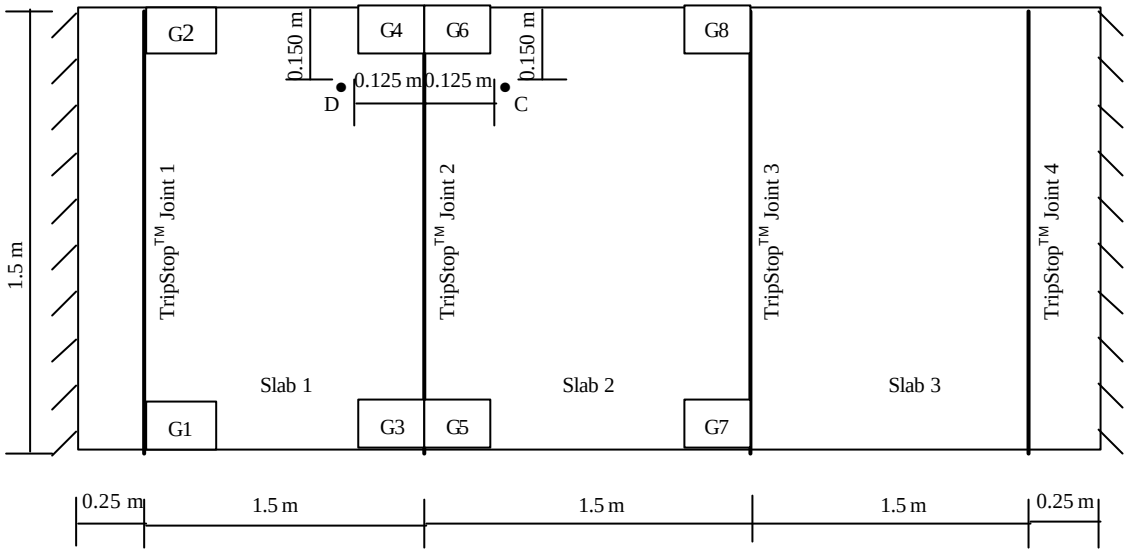
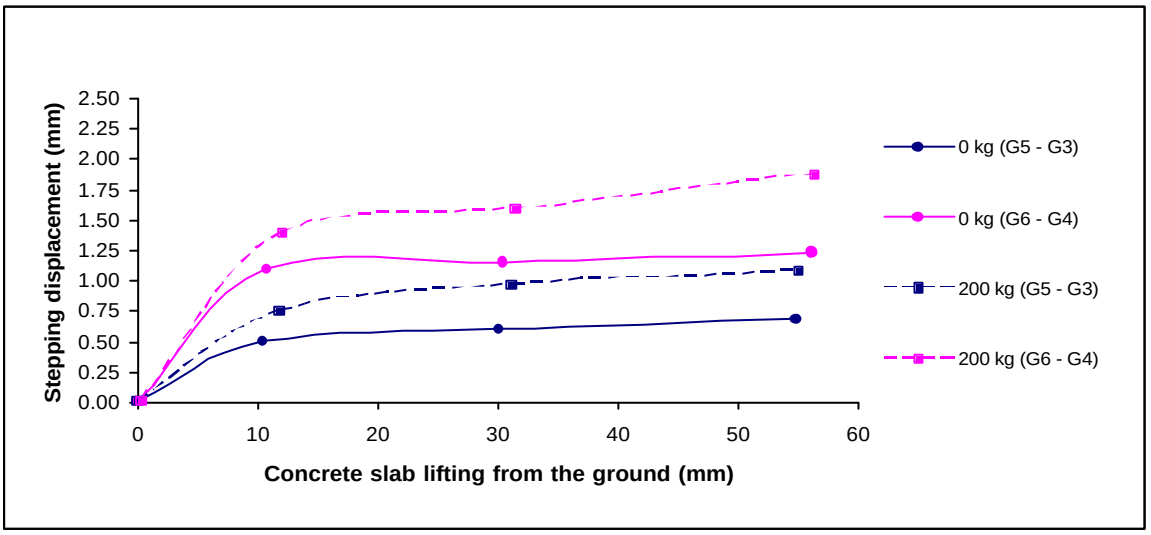


Figure 7. Plan of testing frame – Jacking up at point C.



	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Lift / Dead Load	0	10mm	30mm	50mm	0	10mm	30mm	50mm
No additional load on the slab	0.00	0.51	0.60	0.69	0.00	1.10	1.15	1.24
200 kg distributed on Slab 1	0.00	0.76	0.97	1.09	0.00	1.40	1.60	1.88

Figure 8. Stepping displacement - Slab 2 was jacked up at point C with no additional and 200kg dead load uniformly distributed on Slab 1

It is seen that the stepping displacement near G6 (where the jacking force was applied) varied from 1.24mm (with no additional load) to 1.88mm (with 200kg additional dead load). On the other side of the slab, the stepping displacements for both tests were much smaller - 0.69mm with no additional load and 1.09mm with 200kg load.

The third test was the same as the second test except that 200kg dead load was distributed on a quarter of Slab 1 near point D as shown in Figure 9. This photo was taken when point C was jacked up by approximately 50 mm. The results of this test are given in Figure 10. The maximum stepping displacement was 2.18mm.

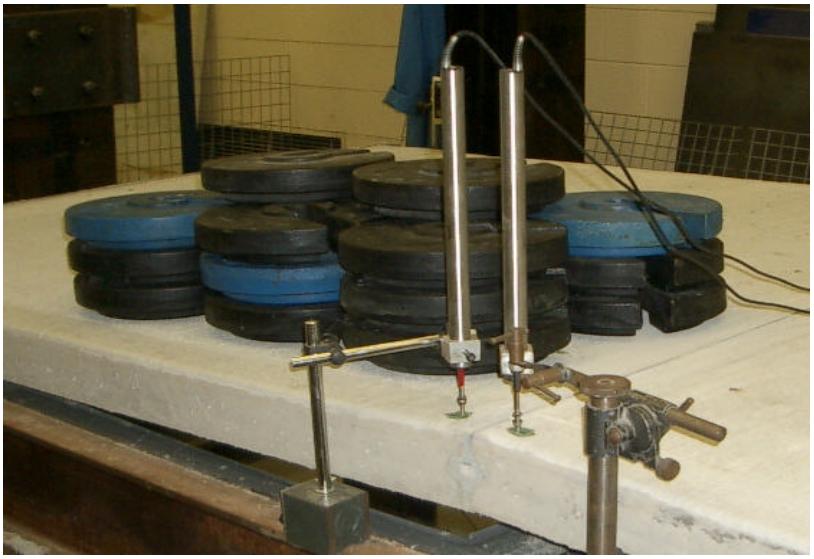
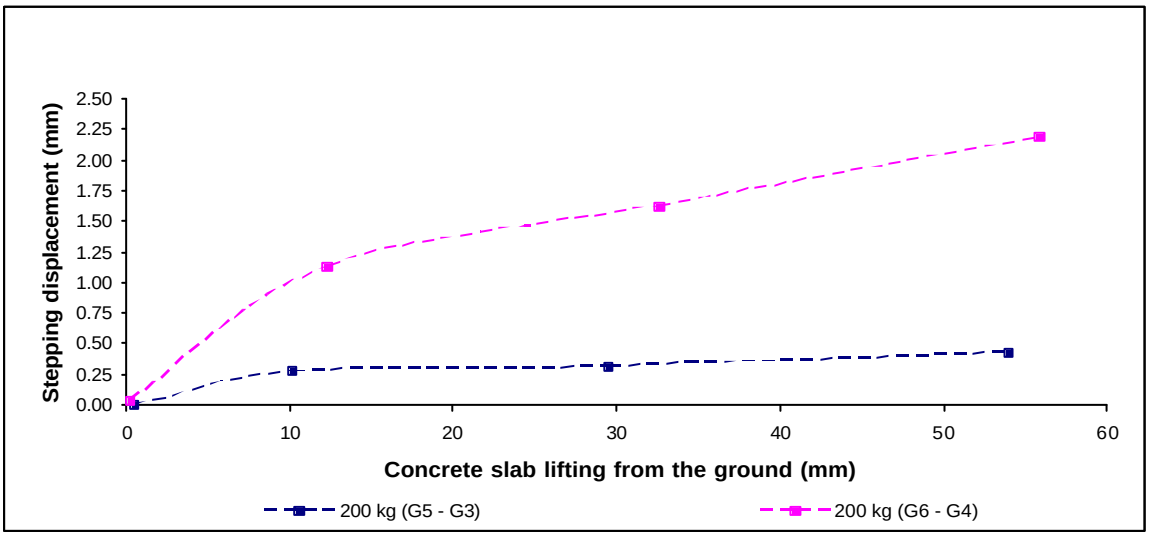


Figure 9. Slab jacked up at a corner with 200kg dead load distributed on quarter of Slab 1.



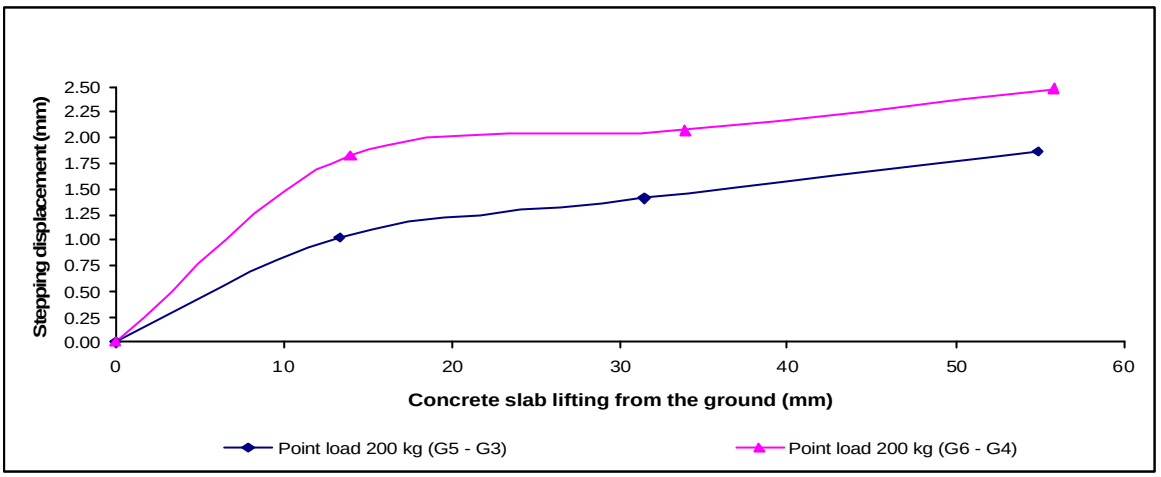
	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Lift / Dead Load	0	10mm	30mm	50mm	0	10mm	30mm	50mm
200 kg distributed on a quarter of Slab 1	0.00	0.28	0.31	0.43	0.00	1.14	1.63	2.18

Figure 10. Stepping displacement - the Slab 2 was jacked up at point C with 200kg dead load distributed on a quarter of Slab 1

The last test on Joint 2 was the most challenging one where a 200kg concentrated load was applied. Figure 11 shows such a set-up. The hydraulic jack pushed up Slab 2 at point C and the 200kg concentrated load was applied to point D (refer to Figure 7). To assess the performance of TripStop™, the 'worst scenario' load case was where one slab was pushed up at a corner while a concentrated load was applied next to it on the adjoining slab.

Figure 11. Slab jacked up at a corner with 200kg concentrated load applied to adjoining slab

The results of this test are given in Figure 12. The maximum stepping displacement at G6 was 2.49mm, while on the other side of the slab the stepping displacement was 1.87mm.



	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Lift / Dead Load	0	10mm	30mm	50mm	0	10mm	30mm	50mm
200 kg point load at Point B	0.00	1.03	1.41	1.87	0.00	1.83	2.08	2.49

Figure 12. Stepping displacement - Slab 2 was jacked up at point C and the 200kg of concentrated load was applied to point D

All the tests discussed so far were conducted on Joint 2. The same tests were repeated on Joint 3. These are presented below.

4.3 Jacking up at line EF

This test was the same as jacking up at line AB except that the test was carried out on Joint 3. It was to confirm the results of tests on Joint 2. The plan of the concrete testing bed is shown in Figure 13 and the results are shown in Figure 14.

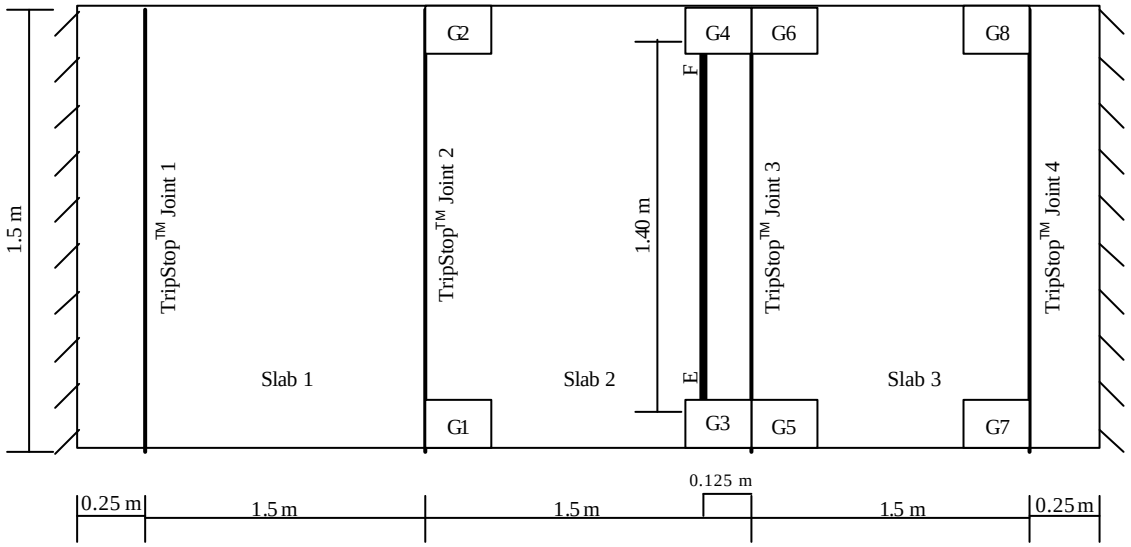
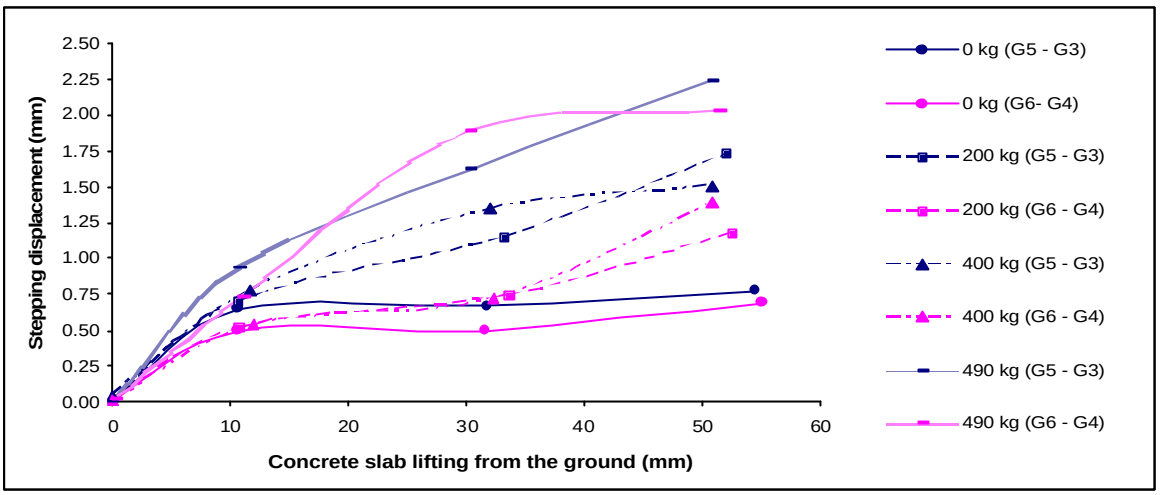


Figure 13. Plan of testing frame – jacking up at line EF



	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Load \ Lift	0	10mm	30mm	50mm	0	10mm	30mm	50mm
No additional load	0.00	0.65	0.67	0.78	0.00	0.50	0.50	0.69
200 kg	0.00	0.70	1.15	1.73	0.00	0.52	0.74	1.17
400 kg	0.00	0.78	1.35	1.51	0.00	0.54	0.72	1.39
490 kg	0.00	0.94	1.63	2.25	0.00	0.73	1.90	2.04

Figure 14. Stepping displacement when jacking up at line EF

The stepping displacement varied from 0.78mm to 2.25mm when the additional load on Slab 3 increased from zero to 490kg. The magnitude of the stepping displacement was similar to the result of the same test on Joint 2

4.4 Jacking up at point G

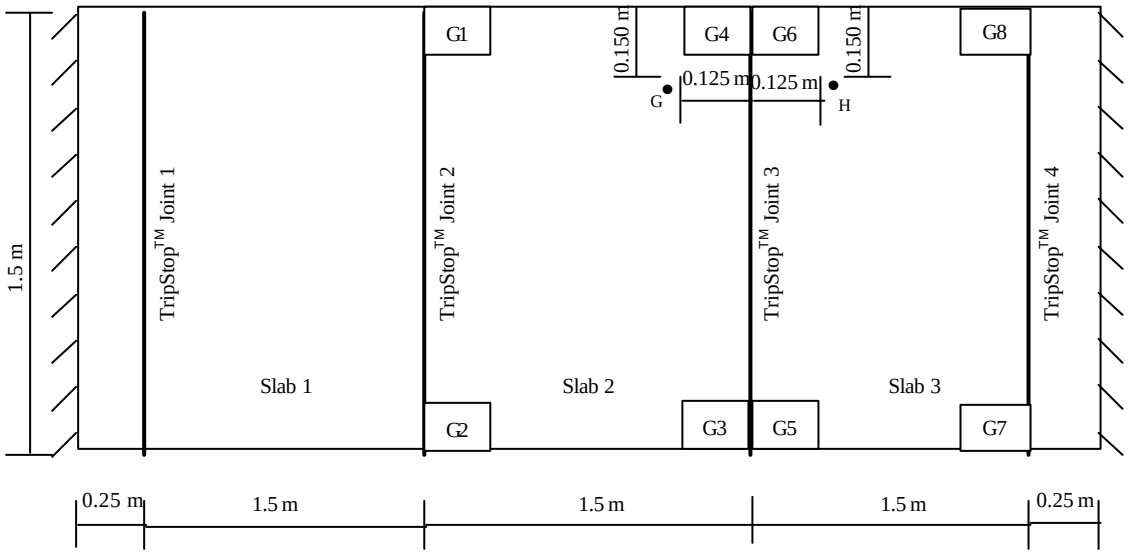
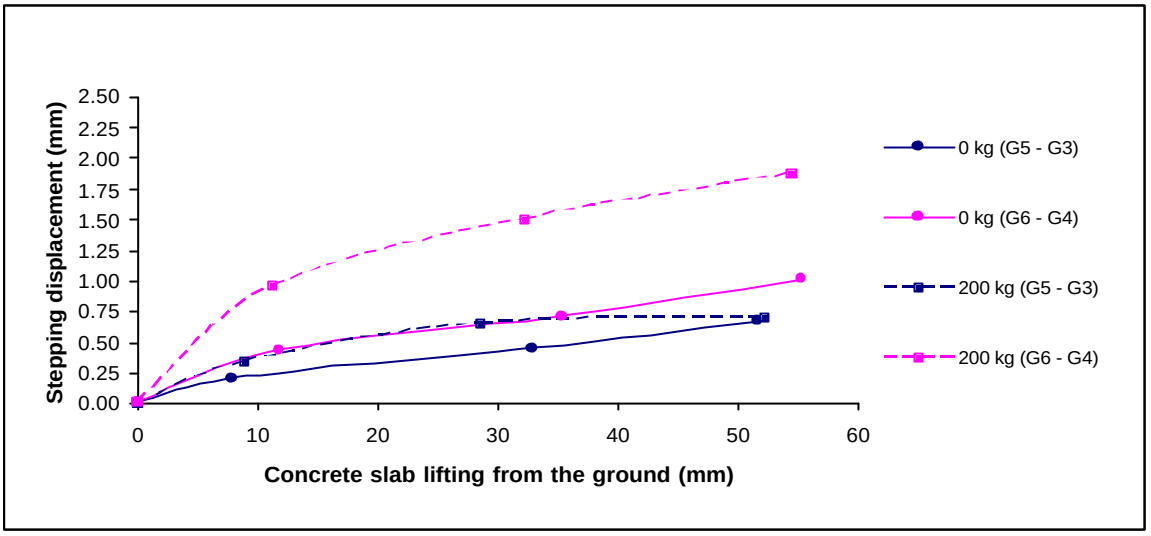


Figure 15. Plan of testing frame – jacking up at point G

In this test, Slab 2 was jacked up at point G shown in Figure 15. No additional load was applied to any of the slabs at the first test. In the second test a uniformly distributed load of 200kg was added on Slab 3. The results are shown in Figure 16.

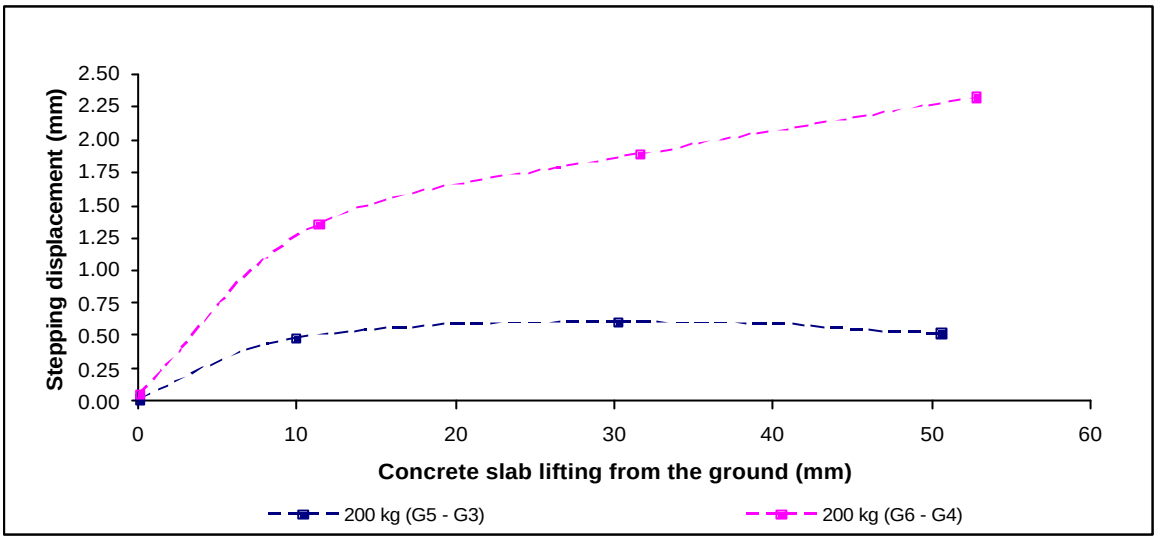


	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Lift / Dead Load	0	10mm	30mm	50mm	0	10mm	30mm	50mm
No additional load on the slab	0.00	0.21	0.45	0.67	0.00	0.44	0.71	1.01
200 kg distributed on Slab 3	0.00	0.34	0.66	0.70	0.00	0.96	1.51	1.88

Figure 16. Stepping displacement - Slab 2 was jacked up at point G with no additional and 200kg dead load distributed on Slab 3

When there was no additional dead load on the slabs, the maximum stepping displacement was 1.01mm which compared well with the result of test on Joint 2 (1.24mm). When 200kg load was added to Slab 3, the maximum stepping displacement was 1.88mm which was the same as the result of test on Joint 2.

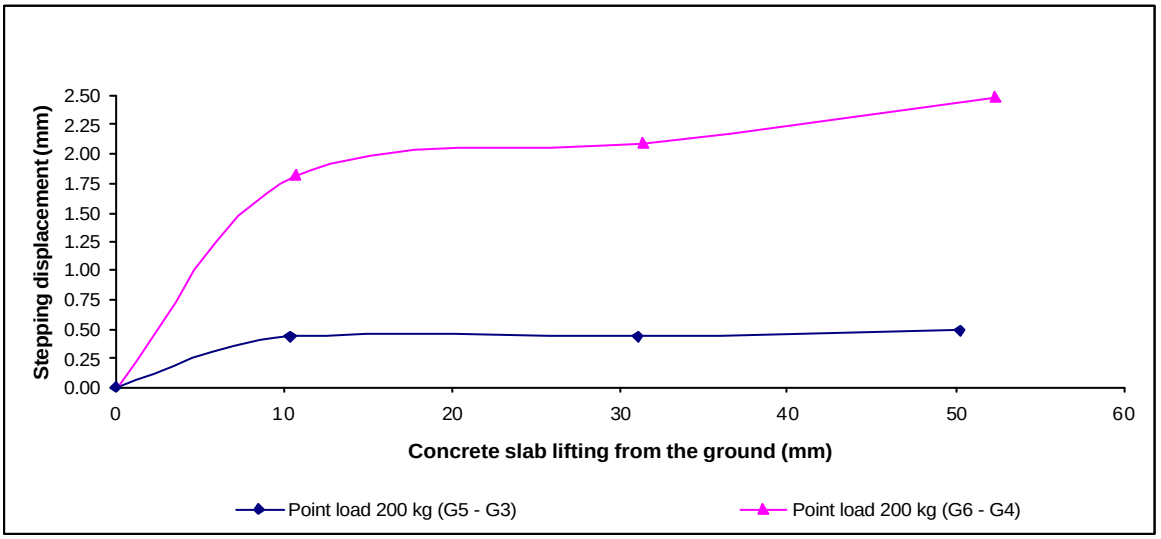
In the next test, 200kg dead load was applied to a quarter of Slab 3. The results of this test are given in Figure 17. The maximum stepping displacement was 2.32mm which compared well with the result of the same test on Joint 2 (2.18mm).



	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Lift / Dead Load	0	10mm	30mm	50mm	0	10mm	30mm	50mm
200 kg distributed on a quarter of Slab 3	0.00	0.48	0.61	0.52	0.00	1.35	1.88	2.32

Figure 17. Stepping displacement - Slab 2 was jacked up at point G with 200kg dead load distributed on a quarter of Slab 3

Finally the hydraulic jack pushed up Slab 2 at point G and a concentrated load of 200kg was applied to point H (refer to Figure 15). The results of this test are given in Figure 18. The maximum stepping displacement was 2.48mm which was similar to the result of the same test on Joint 2 (2.49mm).



	Stepping displacement G5 – G3				Stepping displacement G6 – G4			
Lift / Dead Load	0	10mm	30mm	50mm	0	10mm	30mm	50mm
200 kg point load at Point H	0.00	0.44	0.44	0.50	0.00	1.81	2.10	2.48

Figure 18. Stepping displacement - Slab 2 was jacked up at point G and 200kg concentrated load was applied to point H

4.5 Creep test

To examine the effect of sustained loading over a period of time, a creep test was carried out. In this test, Slab 2 was jacked up at line EF and two additional dial gauges BG9 and BG10 were placed to the bottom of Slabs 2 and 3 respectively. The plan of the testing frame is shown in Figure 19. A distributed load of 200 kg was applied on top of Slab 3 for the initial 28 days, followed by an additional period of 35 days with no load applied to any of the slabs.

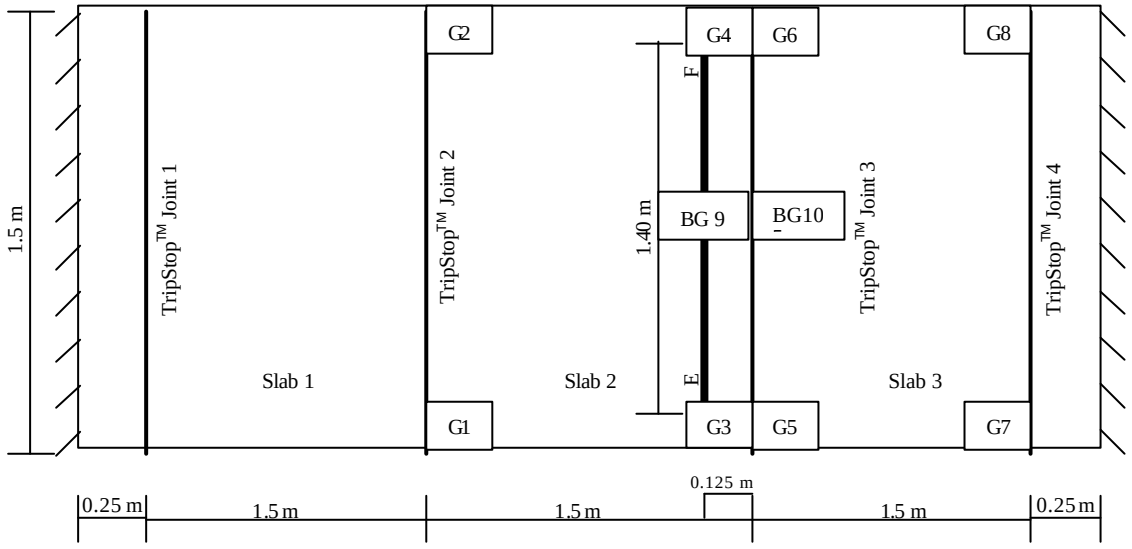


Figure 19. Plan of testing frame for the creep test

The creep results were recorded over a period of 9 weeks from 24 February 2005 to 28 April 2005 and the details are given in Appendix 1. Figure 20 shows the additional stepping displacement due to creep. The maximum creep displacement measured over the period of 9 weeks was 0.21 mm.

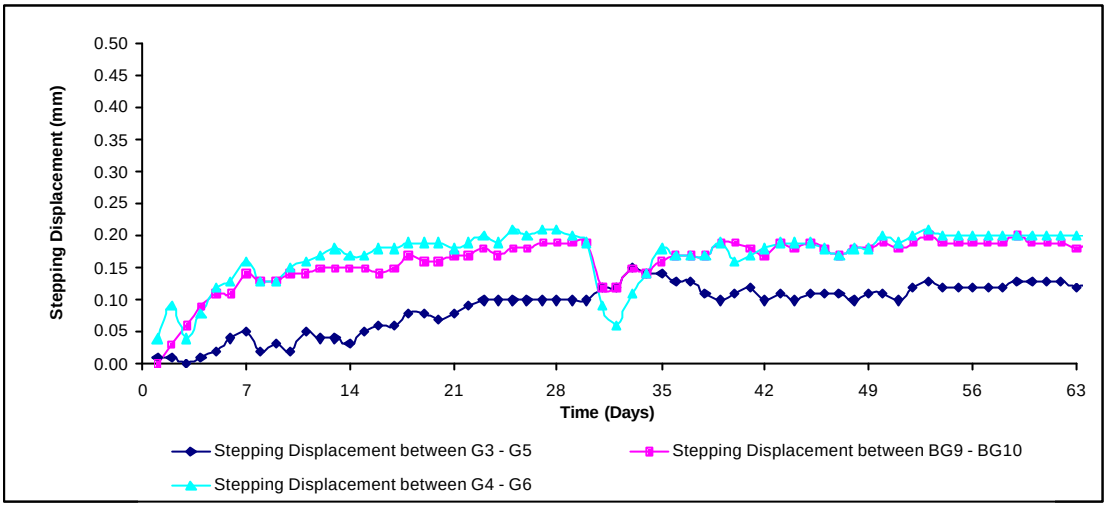


Figure 20. Stepping displacement due to creep

5. Conclusions

A comprehensive series of tests was conducted on the TripStop^{TM} PVC joiners under various loading conditions. In many cases, the levels of loading were far greater than the design load specified in AS3727 for concrete footpaths of 75mm thickness. The maximum stepping displacement of all tests was 2.49mm which was recorded in the worst scenario load case of one slab being jacked up at a corner while a concentrated load being applied next to it on the adjoining slab.

The maximum creep displacement measured over the period of 9 weeks was 0.21 mm. After about 8 weeks, a steady state was reached (i.e. the creep stopped).

The test results clearly demonstrate that the current TripStop^{TM} PVC joiners satisfy the performance criterion of 5mm maximum allowable stepping displacement as specified in AS 3727.

6. References

[1] Standards Australia, *Australian Standard AS3727: Guide to Residential Pavements*, 1993.

[2] Voice of Safety International (VOSI), *Standard for Slid & Trip Resistant Sidewalks and Swimming Pool Decks*, 2002 – see website http://www.voicesofsafety.com/t1-sf-v41-23e.htm [accessed on 14/04/05]

7. Certification

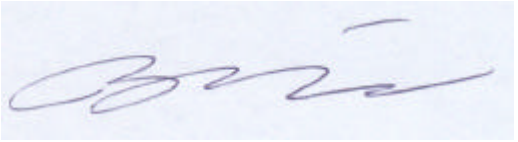
The tests have been conducted in the Heavy Structures Laboratory of RMIT University by the following qualified Civil Engineers:

Professor Mike Xie *BEng, PhD, Fellow of Institution of Engineers Australia.*

Dr Sujeeva Setunge *BEng, PhD, Senior Member of Institution of Engineers Australia.*

Mr Yew-Chin Koay *BEng, MEngSc.*

Signed on behalf of the above RMIT University team:



Professor Mike Xie
Discipline Head, Civil Engineering
RMIT University

Date : 19/05/2005

Appendix 1 Results of the creep test

		Stepping Displacement (mm) - G3 to G6 based on LVDTs and G1, G2, G7, G8, BG9 and BG10 based on Gauges												
Date	Day (s)	G1	G2	G3	G4	G5	G6	G7	G8	BG9	BG10	***G3-G5***	***BG9-BG10***	***G4-G6***
24/02/05	0	0.00	0.00	0.05	0.07	0.04	0.03	0.00	0.00	0.02	0.02	***0.01***	***0.00***	***0.04***
25/02/05	1	0.02	0.09	0.05	0.15	0.04	0.06	0.02	0.08	0.08	0.05	***0.01***	***0.03***	***0.09***
26/02/05	2	0.03	0.12	0.02	0.14	0.02	0.10	0.03	0.08	0.12	0.06	***0.00***	***0.06***	***0.04***
27/02/05	3	0.04	0.15	0.04	0.18	0.03	0.10	0.04	0.07	0.15	0.06	***0.01***	***0.09***	***0.08***
28/02/05	4	0.06	0.19	0.05	0.22	0.03	0.10	0.05	0.07	0.19	0.08	***0.02***	***0.11***	***0.12***
01/03/05	5	0.05	0.06	0.09	0.25	0.05	0.12	0.07	0.07	0.22	0.11	***0.04***	***0.11***	***0.13***
02/03/05	6	0.06	0.12	0.07	0.31	0.02	0.15	0.08	0.07	0.23	0.09	***0.05***	***0.14***	***0.16***
03/03/05	7 (1^{st} Wk)	0.07	0.12	0.04	0.31	0.02	0.18	0.08	0.07	0.22	0.09	***0.02***	***0.13***	***0.13***
04/03/05	8	0.07	0.12	0.06	0.31	0.03	0.18	0.09	0.07	0.22	0.09	***0.03***	***0.13***	***0.13***
05/03/05	9	0.08	0.13	0.05	0.33	0.03	0.18	0.09	0.07	0.23	0.09	***0.02***	***0.14***	***0.15***
06/03/05	10	0.08	0.13	0.07	0.33	0.02	0.17	0.09	0.07	0.23	0.09	***0.05***	***0.14***	***0.16***
07/03/05	11	0.08	0.13	0.07	0.34	0.03	0.17	0.10	0.07	0.25	0.10	***0.04***	***0.15***	***0.17***
08/03/05	12	0.09	0.13	0.07	0.36	0.03	0.18	0.10	0.07	0.26	0.11	***0.04***	***0.15***	***0.18***
09/03/05	13	0.09	0.13	0.06	0.34	0.03	0.17	0.10	0.07	0.26	0.11	***0.03***	***0.15***	***0.17***
10/03/05	14 (2^{nd} Wk)	0.09	0.13	0.09	0.35	0.04	0.18	0.10	0.07	0.27	0.12	***0.05***	***0.15***	***0.17***
11/03/05	15	0.09	0.13	0.11	0.35	0.05	0.17	0.10	0.07	0.27	0.13	***0.06***	***0.14***	***0.18***
12/03/05	16	0.10	0.13	0.10	0.36	0.04	0.18	0.10	0.07	0.28	0.13	***0.06***	***0.15***	***0.18***
13/03/05	17	0.10	0.13	0.11	0.38	0.03	0.19	0.11	0.07	0.30	0.13	***0.08***	***0.17***	***0.19***
14/03/05	18	0.10	0.13	0.11	0.37	0.03	0.18	0.11	0.07	0.29	0.13	***0.08***	***0.16***	***0.19***
15/03/05	19	0.10	0.13	0.11	0.38	0.04	0.19	0.11	0.07	0.29	0.13	***0.07***	***0.16***	***0.19***
16/03/05	20	0.10	0.13	0.12	0.36	0.04	0.18	0.11	0.06	0.29	0.12	***0.08***	***0.17***	***0.18***
17/03/05	21 (3^{rd} Wk)	0.10	0.14	0.13	0.37	0.04	0.18	0.11	0.06	0.30	0.13	***0.09***	***0.17***	***0.19***
18/03/05	22	0.10	0.15	0.15	0.39	0.05	0.19	0.11	0.06	0.31	0.13	***0.10***	***0.18***	***0.20***
19/03/05	23	0.10	0.15	0.15	0.38	0.05	0.19	0.11	0.06	0.30	0.13	***0.10***	***0.17***	***0.19***
20/03/05	24	0.11	0.15	0.16	0.41	0.06	0.20	0.11	0.06	0.32	0.14	***0.10***	***0.18***	***0.21***
21/03/05	25	0.11	0.15	0.16	0.40	0.06	0.20	0.11	0.06	0.32	0.14	***0.10***	***0.18***	***0.20***
22/03/05	26	0.11	0.15	0.16	0.42	0.06	0.21	0.12	0.06	0.33	0.14	***0.10***	***0.19***	***0.21***

Date	Day (s)	G1	G2	G3	G4	G5	G6	G7	G8	BG9	BG10	***G3-G5***	***BG9-BG10***	***G4-G6***
23/03/05	27	0.11	0.15	0.16	0.42	0.06	0.21	0.12	0.05	0.33	0.14	***0.10***	***0.19***	***0.21***
24/03/05	28 (4^{th}Wk)	0.11	0.15	0.16	0.41	0.06	0.21	0.12	0.05	0.33	0.14	***0.10***	***0.19***	***0.20***
24/03/05	28 (4^{th}Wk)	0.10	0.35	0.12	0.56	0.02	0.37	0.12	0.05	0.26	0.07	***0.10***	***0.19***	***0.19***
25/03/05	29	0.10	0.35	0.19	0.50	0.07	0.41	0.13	0.05	0.22	0.10	***0.12***	***0.12***	***0.09***
26/03/05	30	0.10	0.35	0.18	0.49	0.06	0.43	0.13	0.05	0.22	0.10	***0.12***	***0.12***	***0.06***
27/03/05	31	0.10	0.35	0.17	0.52	0.02	0.41	0.14	0.06	0.24	0.09	***0.15***	***0.15***	***0.11***
28/03/05	32	0.10	0.35	0.17	0.53	0.03	0.39	0.14	0.05	0.24	0.10	***0.14***	***0.14***	***0.14***
29/03/05	33	0.10	0.35	0.15	0.54	0.01	0.36	0.14	0.04	0.25	0.09	***0.14***	***0.16***	***0.18***
30/03/05	34	0.10	0.35	0.15	0.54	0.02	0.37	0.14	0.04	0.26	0.09	***0.13***	***0.17***	***0.17***
31/03/05	35 (5^{th}Wk)	0.10	0.35	0.15	0.54	0.02	0.37	0.14	0.05	0.27	0.10	***0.13***	***0.17***	***0.17***
01/04/05	36	0.10	0.35	0.14	0.55	0.03	0.38	0.15	0.05	0.27	0.10	***0.11***	***0.17***	***0.17***
02/04/05	37	0.10	0.35	0.12	0.56	0.02	0.37	0.12	0.05	0.26	0.07	***0.10***	***0.19***	***0.19***
03/04/05	38	0.10	0.35	0.16	0.56	0.05	0.40	0.15	0.05	0.28	0.09	***0.11***	***0.19***	***0.16***
04/04/05	39	0.10	0.35	0.17	0.57	0.05	0.40	0.15	0.05	0.29	0.11	***0.12***	***0.18***	***0.17***
05/04/05	40	0.10	0.35	0.16	0.57	0.06	0.39	0.15	0.04	0.28	0.11	***0.10***	***0.17***	***0.18***
06/04/05	41	0.10	0.35	0.16	0.57	0.05	0.38	0.15	0.04	0.29	0.10	***0.11***	***0.19***	***0.19***
07/04/05	42 (6^{th}Wk)	0.10	0.35	0.15	0.56	0.05	0.37	0.15	0.04	0.27	0.09	***0.10***	***0.18***	***0.19***
08/04/05	43	0.11	0.35	0.16	0.55	0.05	0.36	0.15	0.04	0.27	0.08	***0.11***	***0.19***	***0.19***
09/04/05	44	0.10	0.35	0.16	0.54	0.05	0.36	0.16	0.04	0.27	0.09	***0.11***	***0.18***	***0.18***
10/04/05	45	0.10	0.35	0.15	0.53	0.04	0.36	0.16	0.04	0.27	0.10	***0.11***	***0.17***	***0.17***
11/04/05	46	0.10	0.35	0.14	0.55	0.04	0.37	0.16	0.04	0.26	0.08	***0.10***	***0.18***	***0.18***
12/04/05	47	0.10	0.35	0.15	0.55	0.04	0.37	0.16	0.04	0.26	0.08	***0.11***	***0.18***	***0.18***
13/04/05	48	0.10	0.35	0.15	0.56	0.04	0.36	0.16	0.04	0.27	0.08	***0.11***	***0.19***	***0.20***
14/04/05	49 (7^{th}Wk)	0.10	0.35	0.15	0.55	0.05	0.36	0.16	0.04	0.27	0.09	***0.10***	***0.18***	***0.19***
15/04/05	50	0.10	0.35	0.16	0.56	0.04	0.36	0.16	0.04	0.28	0.09	***0.12***	***0.19***	***0.20***
16/04/05	51	0.10	0.35	0.17	0.56	0.04	0.35	0.16	0.04	0.28	0.08	***0.13***	***0.20***	***0.21***
17/04/05	52	0.10	0.35	0.16	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.12***	***0.19***	***0.20***
18/04/05	53	0.10	0.35	0.16	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.12***	***0.19***	***0.20***

Date	Day (s)	G1	G2	G3	G4	G5	G6	G7	G8	BG9	BG10	***G3-G5***	***BG9-BG10***	***G4-G6***
19/04/05	54	0.10	0.35	0.16	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.12***	***0.19***	***0.20***
20/04/05	55	0.10	0.35	0.16	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.12***	***0.19***	***0.20***
21/04/05	56 (8^{th}Wk)	0.10	0.35	0.16	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.12***	***0.19***	***0.20***
22/04/05	57	0.10	0.35	0.17	0.55	0.04	0.35	0.16	0.04	0.28	0.08	***0.13***	***0.20***	***0.20***
23/04/05	58	0.10	0.35	0.17	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.13***	***0.19***	***0.20***
24/04/05	59	0.10	0.35	0.17	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.13***	***0.19***	***0.20***
25/04/05	60	0.10	0.35	0.17	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.13***	***0.19***	***0.20***
26/04/05	61	0.10	0.35	0.16	0.55	0.04	0.35	0.16	0.04	0.27	0.09	***0.12***	***0.18***	***0.20***
27/04/05	62	0.10	0.35	0.17	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.13***	***0.19***	***0.20***
28/04/05	63 (9^{th}Wk)	0.10	0.35	0.17	0.55	0.04	0.35	0.16	0.04	0.28	0.09	***0.13***	***0.19***	***0.20***