TRAM RECOVERY STRATAGIES - DUBLIN STREET NETWORK, EDINBURGH

Below is a description of the strategies used along the Dublin Street network, comprising of junctions:

- **York Place Stop Peds – 1BBC1/2**
- **York Place / Elder Street – 1BCC1**
- **York Place / Queen Street – 1BDC1**

This network runs at a 112s cycletime with some junctions double cycling. The cycle times and linking are retained to ensure the linking is maintained with the surrounding junctions. There are no serious issues in the network.

York Place Stop Peds

There are no specific problems but the Gbit monitor does show occasional missing of ped windows. Strategies have been coded and tested which overcome this. The WB direction has very little preemption from the York Place tram stop so a simple ped hold is used.

EB there is good preemption and a strategy has been implemented that gives an early ped window as the tram is at the Queen Street junction. This allows a ped demand to be served and moved back to the tram stage.

York Place / Elder Street

A 4 stage junction with tram priority phases satisfied in stage 1 and 4. The Gbit logger showed there was stage skipping into and out of LRT priority, in particular stage 2 (right turn to Elder Street). The SPRUCE strategy starts the priority earlier than LRT and ensures that the junction is in stage 4 or 1 for an approaching tram.

WB trams don't have a lot of preemption but it was noted that the tram drivers are able to judge when to activate the TRTS so they are certain of holding their green.

In the EB direction there is plenty of pre-emption and the strategy is initiated as the tram leaves the St Andrews Stop. On exiting the junctions in either direction the strategy will move immediately to stage 2 and 3 if there has been a long stage 1 (currently set to 40s) and sync back into the Dublin Street 112s cycletime on the next cycle. The 'before' and 'after' Gbit logs below clearly show the improvements to the stage skipping:

Gbit logger output - Before

27 - York Place / Elder Street								1BCC1	
G1		G2		G3		G4		C	Log Time
EndTime	Duration	EndTime	Duration	EndTime	Duration	EndTime	Duration		
66	34	84	13	107	11	15	8	112	01/09/2014 08:17
66	43	84	13	107	11			141	01/09/2014 08:19
95	92			108	4			###	01/09/2014 10:26
		68	7576					26	01/09/2014 10:26
94	6			0	9	18	6	83	01/09/2014 10:28
65	39	85	12	0	15	18	6	112	01/09/2014 10:30
65	39	85	14	107	10	15	9	113	01/09/2014 10:32
66	43	78	6			15	35	112	01/09/2014 10:33
66	43	78	6			15	35	112	01/09/2014 10:35
65	43	84	12	107	11			112	01/09/2014 10:37
65	63	84	12	107	11	15	8	137	01/09/2014 10:39
91	68			107	7			87	01/09/2014 10:41
66	63	84	12	103	7	16	14	112	01/09/2014 10:43
66	42	84	12	107	11	14	7	112	01/09/2014 10:45

Numerous Skipped stages

Gbit logger output - After

27 - York Place / Elder Street								1BCC1	
G1		G2		G3		G4		C	Log Time
EndTime	Duration	EndTime	Duration	EndTime	Duration	EndTime	Duration		
66	43	84	12	102	6			112	01/09/2014 15:00
66	68	84	12	107	11	15	8	112	01/09/2014 15:02
66	43	84	12	107	11	15	8	112	01/09/2014 15:04
66	43	84	12	107	11	15	8	112	01/09/2014 15:06
66	43	84	12	106	10	15	8	112	01/09/2014 15:08
66	43	84	12	102	6	37	35	112	01/09/2014 15:10
66	21	83	11	107	12	15	8	112	01/09/2014 15:12
66	43	84	12	107	11			112	01/09/2014 15:13
66	63	84	12	107	11			112	01/09/2014 15:15
66	63	84	12	107	11	15	8	112	01/09/2014 15:17
66	43	84	12	107	11	15	8	112	01/09/2014 15:19
66	43	84	12	107	11			125	01/09/2014 15:21
79	76	93	6	111	6	17	6	99	01/09/2014 15:23
66	41	84	12	102	6			112	01/09/2014 15:25
66	69	84	12	107	13	44	37	112	01/09/2014 15:26
66	14	84	12	107	11	14	7	112	01/09/2014 15:28
66	43	84	12	107	11	15	8	112	01/09/2014 15:30

York Place / Queen Street

A simple 2 stage junction which has two windows for stage 2 (peds and tram) every 112s cycle. Being 2 stages there is no problem with stage skipping and there are no reported problems under LRT. However it has been noted that there can be a bottleneck for traffic progression along Dublin Street after a tram priority call. The Gbit logger shows that the main road stage 1 can sometimes only run a minimum green before or after a tram priority stage because of how it syncs back into the UTC plan. Therefore a SPRUCE strategy has been implemented which ensures that after a tram stage there is a minimum of a 20s stage 1 green afterwards (unless there is another tram which could call immediately back to stage 2).

The Gbit log below shows the problem 'before' with regular minimum greens given to the main road following a long stage 2 priority green:

Gbit logger output - Before

28 - York Place / Dublin Street ST1				1BDC1	
G1		G2		C	Log Time
EndTime	Duration	EndTime	Duration		
88	7	18	32	59	01/09/2014 17:01
35	6	83	38	80	01/09/2014 17:02
3	24	19	6	55	01/09/2014 17:03
58	32	74	6	57	01/09/2014 17:04
3	34	19	6	55	01/09/2014 17:05
58	32	74	6	57	01/09/2014 17:06
3	34	19	6	55	01/09/2014 17:07
58	32	74	6	57	01/09/2014 17:08
3	34	19	6	55	01/09/2014 17:09
58	32	74	6	37	01/09/2014 17:10
95	14	52	59	93	01/09/2014 17:11
76	6	16	42	120	01/09/2014 17:13
84	58	101	8	86	01/09/2014 17:15
58	62	74	6	57	01/09/2014 17:16
3	34	19	6	55	01/09/2014 17:16
58	32	74	6	57	01/09/2014 17:17
3	34	18	5	30	01/09/2014 17:18
33	7	102	59	137	01/09/2014 17:20
58	46	74	6	57	01/09/2014 17:21

Main Road minimum greens

Gbit logger output - After

28 - York Place / Dublin Street ST1				1BDC1	
G1		G2		C	Log Time
EndTime	Duration	EndTime	Duration		
89	21	24	37	109	08/10/2014 17:02
86	41	102	6	57	08/10/2014 17:03
31	34	47	6	112	08/10/2014 17:05
31	89	47	6	112	08/10/2014 17:07
31	89	47	6	112	08/10/2014 17:09
31	89	47	6	30	08/10/20
81	27	53	74	137	08/10/20
86	26	102	6	57	08/10/20
31	34	47	6	55	08/10/20
86	32	102	6	58	08/10/2014 17:14
32	35	48	6	54	08/10/2014 17:15
86	31	102	6	112	08/10/2014 17:17
86	89	102	6	57	08/10/2014 17:18
31	34	80	39	112	08/10/2014 17:20
31	43	47	6	38	08/10/2014 17:20
69	15	21	54	129	08/10/2014 17:23
86	57	102	6	57	08/10/2014 17:23

Trams give long G2, now with no mins on G1