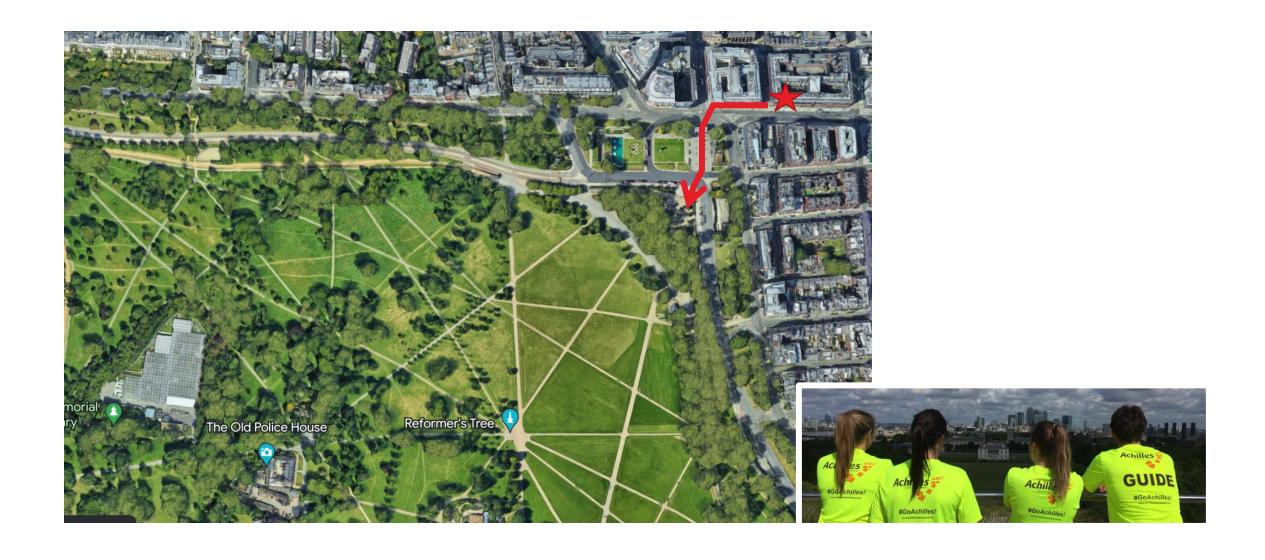


Station Planning: Modelling Wheelchair Accessibility

Christel Hengeveld



Introduction



Agenda

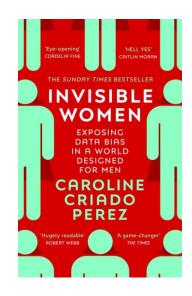
- Historical context
- Current guidance
- Compliant versus accessible
- How can we do better?



Historical Context

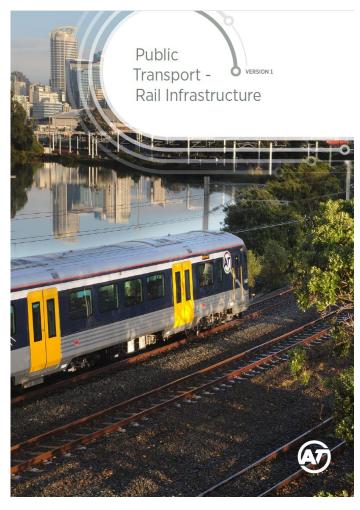
- Designing for "default"
- Call buttons on buses
- Walking speed measurements from 1960s NYC
- Planning for the peak

• Why does this matter?





Current guidance



Design for impaired customers

Stations and precincts must be designed following NZS 4121, Design for Access and Mobility – Buildings and Associated Facilities, to provide equitable access for all customers, including users with reduced mobility and other disabilities.





Current guidance

TfL Management System													
				Standard Category 1									
	S	13	71 A8	Station Planning									
	roO	ntent	s										
	1	Pur	pose	2									
	2	Sco	pe	2									
	3	Req	uirements	3									
	3 3 3 3	.2 .3 .4 .5 .6	Planning criteria and customer survey Ticket hall	nents									
	3	.8 .9 .10	Headroom										
	4	Res	ponsibilities										
	5	Per	son accountable	for this document									
	6	Abb	reviations										
	7												
	8	Doc	ument history										

6.6.10 Lifts should be located to minimise, as far as reasonably practicable, travel distances to the designated wheelchair areas within the trains.

CITY															
	AM peak		Inter peak			PM peak			Weekend			Average			
% Passengers by PRM Category	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)
A - Wheelchair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
B - Physical mobility Impairment	0.21	0.21	0.16	0.58	0.57	0.43	0.29	0.29	0.22	0.37	0.37	0.28	0.37	0.36	0.27
C - Medium encumbrance	2.03	1.46	1.94	5.38	3.87	5.16	8.23	5.92	7.89	9.24	6.64	8.86	6.11	4.39	5.86
D - Large encumbrance	0.77	0.54	0.73	1.59	1.11	1.50	2.09	1.46	1.97	2.37	1.66	2.24	1.68	1.18	1.59
E - Buggy	0.04	0.04	0.08	0.10	0.12	0.23	0.05	0.06	0.12	0.14	0.17	0.31	0.08	0.10	0.18
Total	3.05	2.25	2.91	7.65	5.67	7.32	10.67	7.75	10.20	12.13	8.83	11.68	8.24	6.03	7.90
INNER SUBURB															
		AM pea	k	I	nter pe	ak		PM peak			Weekend			Average	
% Passengers by PRM Category	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)
A - Wheelchair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B - Physical mobility Impairment	0.28	0.31	0.16	0.75	0.84	0.43	0.38	0.43	0.22	0.49	0.55	0.28	0.48	0.53	0.27
C - Medium encumbrance	1.65	2.02	1.94	4.38	5.37	5.16	6.71	8.22	7.89	7.52	9.23	8.86	4.98	6.10	5.86
D - Large encumbrance	0.62	0.77	0.73	1.28	1.59	1.50	1.68	2.09	1.97	1.91	2.38	2.24	1.36	1.68	1.59
E - Buggy	0.09	0.09	0.08	0.24	0.24	0.23	0.13	0.13	0.12	0.32	0.32	0.31	0.19	0.19	0.18
Total	2.64	3.19	2.91	6.66	8.05	7.32	8.90	10.87	10.20	10.25	12.47	11.68	7.00	8.51	7.90
OUTER SUBURB															
		AM pea	k	I	nter pe	ak		PM peak			Weekend			Average	
% Passengers by PRM Category	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)
A - Wheelchair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B - Physical mobility Impairment	0.49	0.56	0.16	1.32	1.51	0.43	0.67	0.77	0.22	0.86	0.98	0.28	0.84	0.96	0.27
C - Medium encumbrance	1.41	2.46	1.94	3.75	6.54	5.16	5.73	10.00	7.89	6.43	11.22	8.86	4.26	7.42	5.86
D - Large encumbrance	0.52	0.90	0.73	1.08	1.87	1.50	1.42	2.45	1.97	1.62	2.79	2.24	1.15	1.97	1.59
E - Buggy	0.15	0.12	0.08	0.42	0.32	0.23	0.22	0.17	0.12	0.57	0.44	0.31	0.33	0.25	0.18
Total	2.58	4.04	2.91	6.58	10.24	7.32	8.05	13.39	10.20	9.48	15.43	11.68	6.57	10.61	7.90
SHOPPING															
		AM pea			nter pe			PM peak			Weekend			Average	
% Passengers by PRM Category	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)	Entrance	Exit	Av (Int)
% Passengers by PRM Category A - Wheelchair	Entrance 0.00	0.00	Av (Int)	Entrance 0.00	0.00	Av (Int) 0.00	Entrance 0.00	0.00	Av (Int)	0.00	0.00	Av (Int) 0.00	0.00	Exit 0.00	0.00
% Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment	0.00 0.19	0.00 0.18	Av (Int) 0.00 0.16	0.00 0.52	0.00 0.48	Av (Int) 0.00 0.43	0.00 0.27	0.00 0.24	Av (Int) 0.00 0.22	0.00 0.34	0.00 0.31	Av (Int) 0.00 0.28	0.00	0.00 0.30	0.00 0.27
<pre>% Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance</pre>	0.00 0.19 3.41	0.00 0.18 1.35	Av (Int) 0.00 0.16 1.94	0.00 0.52 9.05	0.00 0.48 3.58	Av (Int) 0.00 0.43 5.16	0.00 0.27 13.85	0.00 0.24 5.47	Av (Int) 0.00 0.22 7.89	0.00 0.34 15.54	0.00 0.31 6.14	Av (Int) 0.00 0.28 8.86	0.00 0.33 10.28	0.00 0.30 4.06	0.00 0.27 5.86
Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance	0.00 0.19 3.41 1.22	0.00 0.18 1.35 0.50	Av (Int) 0.00 0.16 1.94 0.73	0.00 0.52 9.05 2.53	0.00 0.48 3.58 1.03	Av (Int) 0.00 0.43 5.16 1.50	0.00 0.27 13.85 3.32	0.00 0.24 5.47 1.35	Av (Int) 0.00 0.22 7.89 1.97	0.00 0.34 15.54 3.77	0.00 0.31 6.14 1.53	Av (Int) 0.00 0.28 8.86 2.24	0.00 0.33 10.28 2.67	0.00 0.30 4.06 1.08	0.00 0.27 5.86 1.59
% Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy	0.00 0.19 3.41 1.22 0.04	0.00 0.18 1.35 0.50 0.09	Av (Int) 0.00 0.16 1.94 0.73 0.08	0.00 0.52 9.05 2.53 0.12	0.00 0.48 3.58 1.03 0.25	Av (Int) 0.00 0.43 5.16 1.50 0.23	0.00 0.27 13.85 3.32 0.06	0.00 0.24 5.47 1.35 0.13	Av (Int) 0.00 0.22 7.89 1.97 0.12	0.00 0.34 15.54 3.77 0.16	0.00 0.31 6.14 1.53 0.34	Av (Int) 0.00 0.28 8.86 2.24 0.31	0.00 0.33 10.28 2.67 0.09	0.00 0.30 4.06 1.08 0.20	0.00 0.27 5.86 1.59 0.18
Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance	0.00 0.19 3.41 1.22	0.00 0.18 1.35 0.50	Av (Int) 0.00 0.16 1.94 0.73	0.00 0.52 9.05 2.53	0.00 0.48 3.58 1.03	Av (Int) 0.00 0.43 5.16 1.50	0.00 0.27 13.85 3.32	0.00 0.24 5.47 1.35	Av (Int) 0.00 0.22 7.89 1.97	0.00 0.34 15.54 3.77	0.00 0.31 6.14 1.53	Av (Int) 0.00 0.28 8.86 2.24	0.00 0.33 10.28 2.67	0.00 0.30 4.06 1.08	0.00 0.27 5.86 1.59
B Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total	0.00 0.19 3.41 1.22 0.04	0.00 0.18 1.35 0.50 0.09	Av (Int) 0.00 0.16 1.94 0.73 0.08	0.00 0.52 9.05 2.53 0.12	0.00 0.48 3.58 1.03 0.25	Av (Int) 0.00 0.43 5.16 1.50 0.23	0.00 0.27 13.85 3.32 0.06	0.00 0.24 5.47 1.35 0.13	Av (Int) 0.00 0.22 7.89 1.97 0.12	0.00 0.34 15.54 3.77 0.16	0.00 0.31 6.14 1.53 0.34	Av (Int) 0.00 0.28 8.86 2.24 0.31	0.00 0.33 10.28 2.67 0.09	0.00 0.30 4.06 1.08 0.20	0.00 0.27 5.86 1.59 0.18
% Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy	0.00 0.19 3.41 1.22 0.04 4.87	Exit 0.00 0.18 1.35 0.50 0.09 2.11	0.00 0.16 1.94 0.73 0.08 2.91	0.00 0.52 9.05 2.53 0.12 12.22	0.00 0.48 3.58 1.03 0.25 5.33	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32	0.00 0.27 13.85 3.32 0.06 17.49	Exit 0.00 0.24 5.47 1.35 0.13 7.19	0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16	0.00 0.31 6.14 1.53 0.34 8.32	0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09	0.00 0.30 4.06 1.08 0.20 5.65	0.00 0.27 5.86 1.59 0.18
% Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS	0.00 0.19 3.41 1.22 0.04 4.87	Exit 0.00 0.18 1.35 0.50 0.09 2.11	0.00 0.16 1.94 0.73 0.08 2.91	0.00 0.52 9.05 2.53 0.12 12.22	Exit 0.00 0.48 3.58 1.03 0.25 5.33	0.00 0.43 5.16 1.50 0.23 7.32	0.00 0.27 13.85 3.32 0.06 17.49	0.00 0.24 5.47 1.35 0.13 7.19	0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81	0.00 0.31 6.14 1.53 0.34 8.32	0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37	0.00 0.30 4.06 1.08 0.20 5.65	0.00 0.27 5.86 1.59 0.18 7.90
& Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS & Passengers by PRM Category	Entrance 0.00 0.19 3.41 1.22 0.04 4.87	0.00 0.18 1.35 0.50 0.09 2.11 AM pea	0.00 0.16 1.94 0.73 0.08 2.91	Entrance 0.00 0.52 9.05 2.53 0.12 12.22	0.00 0.48 3.58 1.03 0.25 5.33	0.00 0.43 5.16 1.50 0.23 7.32	0.00 0.27 13.85 3.32 0.06 17.49	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit	0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81	0.00 0.31 6.14 1.53 0.34 8.32	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37	0.00 0.30 4.06 1.08 0.20 5.65	0.00 0.27 5.86 1.59 0.18 7.90
Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Bugyy Total TERMINUS Passengers by PRM Category A - Wheelchair	0.00 0.19 3.41 1.22 0.04 4.87	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peal Exit 0.00	No (Int)	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 Internance 0.00	8xit 0.00 0.48 3.58 1.03 0.25 5.33 nter per 8xit 0.00	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 ak Av (Int) 0.00	0.00 0.27 13.85 3.32 0.06 17.49	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00	0.00 0.34 15.54 3.77 0.16 19.81	0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00	0.00 0.33 10.28 2.67 0.09 13.37	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int)
Brassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance F - Buggy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment	Entrance	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25	NV (Int)	0.00 0.52 9.05 2.53 0.12 12.22 In Entrance 0.00 0.65	8xit 0.00 0.48 3.58 1.03 0.25 5.33 nter per 8xit 0.00 0.68	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43	0.00 0.27 13.85 3.32 0.06 17.49	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34	N	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42	0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00 0.44	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27
Brasengers by PRM Category A - Wheelchair Fhysical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40	No (Int)	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 Internance 0.00 0.65 6.32	8xit 0.00 0.48 3.58 1.03 0.25 5.33 nter per 8xit 0.00 0.68 6.38	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 ak Av (Int) 0.00 0.43 5.16	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85	0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00 0.44 10.95	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86
Bassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS B Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40 0.92	NV (Int)	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 In Entrance 0.00 0.65 6.32 1.88	Exit 0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89	(Int) 0.00 0.43 5.16 1.50 0.23 7.32 ak Av (Int) 0.00 0.43 5.16 1.50	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81	### Reserved 0.00	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99	0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59
& Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS & Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy	Entrance	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peai Exit 0.00 0.25 2.40 0.92 0.08	0.00 0.16 1.94 0.73 0.08 2.91 Av (Int) 0.00 0.16 1.94 0.73 0.00 0.16 1.94	Entrance	0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89 0.23	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16 1.50 0.23	Entrance	PM peak Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81	0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00 0.44 10.95 2.82 0.31	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13	200 0.18 Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18
Bassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS B Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40 0.92	NV (Int)	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 In Entrance 0.00 0.65 6.32 1.88	Exit 0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89	(Int) 0.00 0.43 5.16 1.50 0.23 7.32 ak Av (Int) 0.00 0.43 5.16 1.50	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81	### Reserved 0.00	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99	0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59
& Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS & Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total	Entrance	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peai Exit 0.00 0.25 2.40 0.92 0.08	0.00 0.16 1.94 0.73 0.08 2.91 Av (Int) 0.00 0.16 1.94 0.73 0.00 0.16 1.94	Entrance	0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89 0.23	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16 1.50 0.23	Entrance	PM peak Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81	0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00 0.44 10.95 2.82 0.31	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13	200 0.18 Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18
& Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS & Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91 0.06 3.59	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40 0.92 0.08 3.65	Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 In Entrance 0.00 0.65 6.32 1.88 0.17 9.02	8xit 0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89 0.23 9.18	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 k Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56	PM peak Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81	### Bxit 0.00 0.31 6.14 1.53 0.34 8.32 #### Weekend Exit 0.00 0.44 10.95 2.82 0.31 14.52	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18 9.85	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18
Brassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance B - Buggy Total TOURIST	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91 0.06 3.59	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40 0.92 0.08 3.65	Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91 c Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 Entrance 0.00 0.65 6.32 1.88 0.17 9.02	Exit 0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89 0.23 9.18	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Auk Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22	### Bxit 0.00 0.31 6.14 1.53 0.34 8.32 #### Weekend Exit 0.00 0.44 10.95 2.82 0.31 14.52	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18 9.85	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18
& Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS & Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TOURIST & Passengers by PPM Category	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91 0.06 3.59	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40 0.92 0.08 3.65	Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91 c Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 Entrance 0.00 0.65 6.32 1.88 0.17 9.02	Exit 0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89 0.23 9.18	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 ak Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32	Entrance	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70 PM peak Exit	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22 14.30	Exit 0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00 0.44 10.95 2.82 0.31 14.52 Weekend Exit	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18 9.85	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18 7.90
Brassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Bugy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance E - Bugy Total TOURIST Passengers by PRM Category A - Wheelchair Passengers by PRM Category A - Wheelchair Passengers by PRM Category A - Wheelchair	Entrance	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peal Exit 0.00 0.25 2.40 0.92 0.08 3.65 AM peal Exit 0.00	Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91 c Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91	Entrance 0.00 0.52 9.05 2.53 0.12 12.22 Entrance 0.000 0.65 6.32 1.88 0.17 9.02	Exit 0.00 0.48 3.58 1.03 0.25 5.33 nter per Exit 0.00 0.68 6.38 1.89 0.23 9.18	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56 Entrance 0.03	PM peak Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70 PM peak Exit	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22 14.30	Exit	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18 9.85	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18 7.90
Brasengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance C - Large encumbrance E - Buggy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TOURIST B - Fassengers by PRM Category A - Wheelchair B - Physical mobility Impairment TOURIST B - Physical abolity Impairment B - Physical mobility Impairment B - Physical abolity Impairment	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91 0.06 3.59 Entrance 0.00 0.04	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM pea Exit 0.00 0.25 2.40 0.92 0.08 3.65 AM pea Exit 0.00 0.18	Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91 c Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91 c Av (Int) 0.00 0.16 0.73 0.08 2.91	### Refrance 0.00 0.52 9.05 2.53 0.12 12.22 #### In Particular 1.00 0.05 6.32 1.88 0.17 9.02 ###################################	Exit	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Ak Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Ak Av (Int) 0.00 0.43 0.43 0.43 0.43 0.43 0.43 0.43	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56	Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70 PM peak Exit 0.00	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 0.12 10.20 Av (Int) 0.00 0.22 7.89 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22 14.30	Exit	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 0.20 0.30 0.30 0.30 0.30	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18 9.85 Average Exit 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18 7.90
Brassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance E - Buggy Total TOURIST Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance C - Buggy Tourist Tourist Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance C - Medium encumbrance	Entrance	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peas Exit 0.00 0.25 2.40 0.00 8.65 AM peas Exit 0.00 1.45	Av (Int)	Entrance	Exit 0.00 0.48 3.58 1.03 0.25 5.33 exit 0.00 0.68 1.89 0.23 9.18 exit 0.00 0.33 9.18	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56 Entrance 0.03 0.43 0.49 7.58	PM peak Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70 PM peak Exit 0.00 0.35 5.58	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 0.02 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22 14.30 Entrance	### Reserved 1.53	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71 Entrance 0.01 0.61 5.63	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.18 9.85 Average Exit 0.00 0.31 4.37	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18 7.90
& Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS & Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TOURIST & Passengers by PPM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance C - Medium encumbrance D - Wheelchair DOURIST C - Medium encumbrance D - Large encumbrance	Entrance 0.00 0.19 3.41 1.22 0.04 4.87 Entrance 0.00 0.24 2.38 0.91 0.06 3.59 Entrance 0.00 0.355 1.87 0.69	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peas Exit 0.00 0.25 2.40 0.92 2.40 0.92 3.65 AM peas Exit 0.00 0.18 0.08 0.18 0.10 0.18	Av (Int) 0.00 0.16 1.94 0.73 0.08 2.91	Entrance	Exit	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Ak Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Ak Av (Int) 0.00 0.43 5.16 1.50 0.23	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56 Entrance 0.03 0.49 7.58	Exit	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22 14.30	Weekend Exit 0.00 0.31 6.14 1.53 0.34 8.32 Weekend Exit 0.00 0.44 10.95 2.82 0.31 14.52	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71 Entrance	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.43 7.24 2.00 0.18 9.85 Average Exit 0.00 0.31 4.37	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18 7.90
Brassengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance D - Large encumbrance E - Buggy Total TERMINUS Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance E - Buggy Total TOURIST Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance C - Buggy Tourist Tourist Passengers by PRM Category A - Wheelchair B - Physical mobility Impairment C - Medium encumbrance C - Medium encumbrance	Entrance	Exit 0.00 0.18 1.35 0.50 0.09 2.11 AM peas Exit 0.00 0.25 2.40 0.00 8.65 AM peas Exit 0.00 1.45	Av (Int)	Entrance	Exit 0.00 0.48 3.58 1.03 0.25 5.33 exit 0.00 0.68 1.89 0.23 9.18 exit 0.00 0.33 9.18	Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16 1.50 0.23 7.32 Av (Int) 0.00 0.43 5.16	Entrance 0.00 0.27 13.85 3.32 0.06 17.49 Entrance 0.00 0.33 9.67 2.47 0.09 12.56 Entrance 0.03 0.43 0.49 7.58	PM peak Exit 0.00 0.24 5.47 1.35 0.13 7.19 PM peak Exit 0.00 0.34 9.76 2.48 0.12 12.70 PM peak Exit 0.00 0.35 5.58	Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 1.97 0.12 10.20 Av (Int) 0.00 0.22 7.89 0.02 7.89 1.97 0.12 10.20	0.00 0.34 15.54 3.77 0.16 19.81 Entrance 0.00 0.42 10.85 2.81 0.22 14.30 Entrance	### Reserved 1.53	Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68 Av (Int) 0.00 0.28 8.86 2.24 0.31 11.68	0.00 0.33 10.28 2.67 0.09 13.37 Entrance 0.00 0.41 7.18 1.99 0.13 9.71 Entrance 0.01 0.61 5.63	Exit 0.00 0.30 4.06 1.08 0.20 5.65 Average Exit 0.00 0.18 9.85 Average Exit 0.00 0.31 4.37	0.00 0.27 5.86 1.59 0.18 7.90 Av (Int) 0.00 0.27 5.86 1.59 0.18 7.90



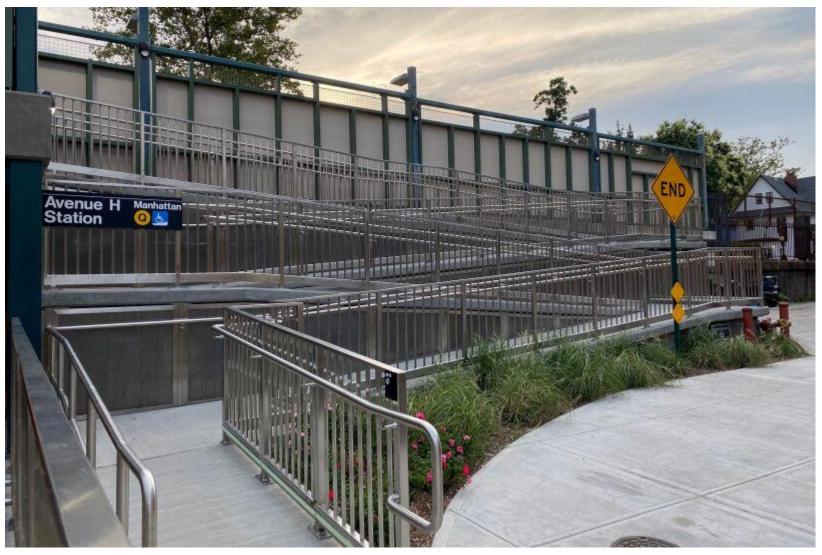
Compliant versus accessible



https://www.pocket-lint.com/gadgets/news/148832-amusing-and-frustrating-design-fails-from-around-the-world/

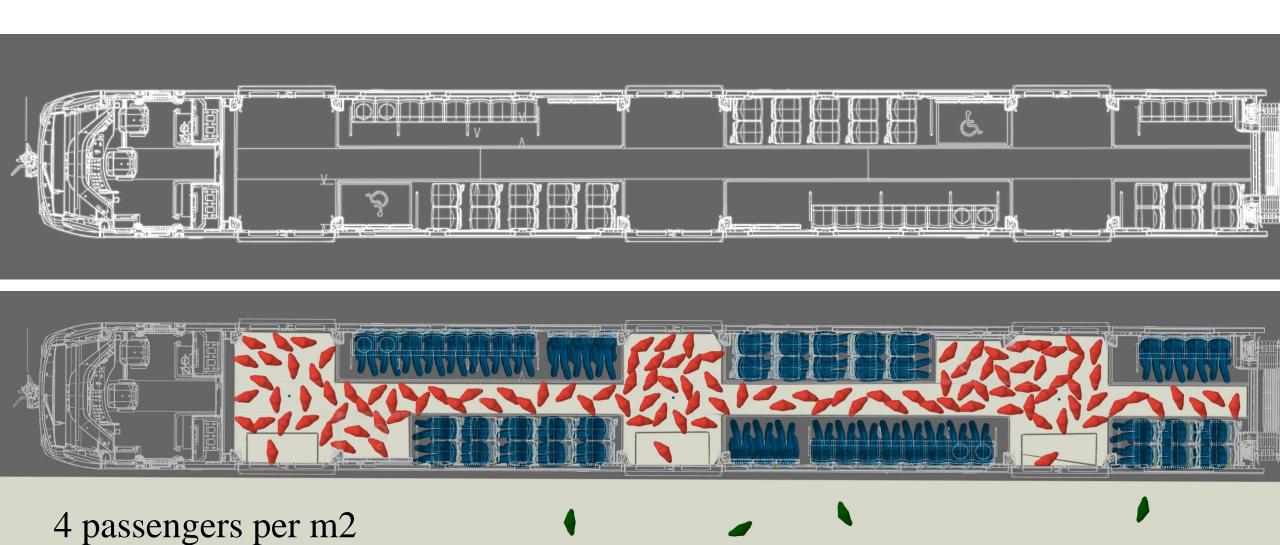


Compliant versus Accessible



https://www.thecity.nyc/2021/8/17/22629915/mta-looks-to-ramp-up-subway-accessibility-with-fewer-elevators where the contract of the contract

Compliant versus Accessible



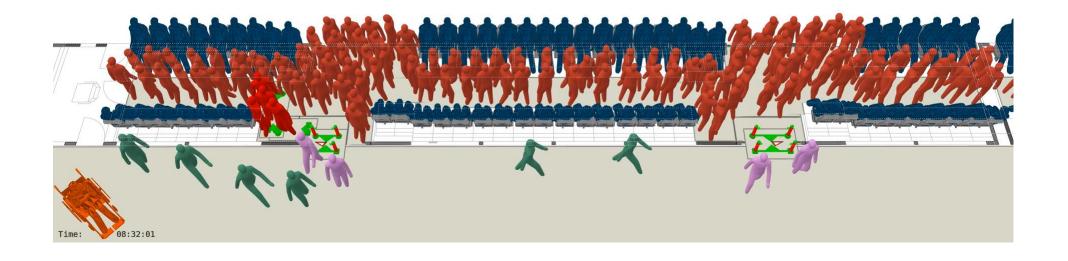


Compliant versus Accessible

Wheelchair access onto a train

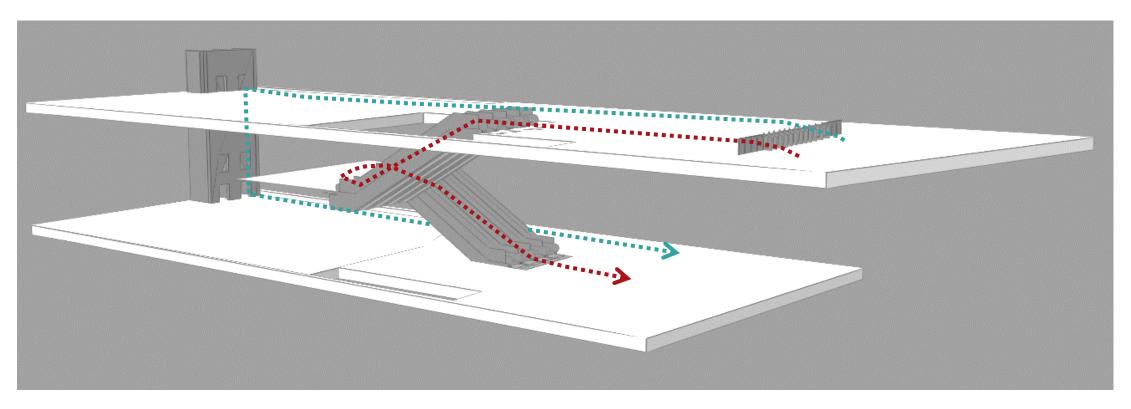
Design for impaired customers

Stations and precincts must be designed following NZS 4121,
Design for Access and Mobility – <u>Buildings</u> and Associated
Facilities, to provide equitable access for all customers, including users with reduced mobility and other disabilities.





Compliant versus Accessible



6.6.10 Lifts should be located to minimise, as far as reasonably practicable, travel distances to the designated wheelchair areas within the trains.



How can we do better?

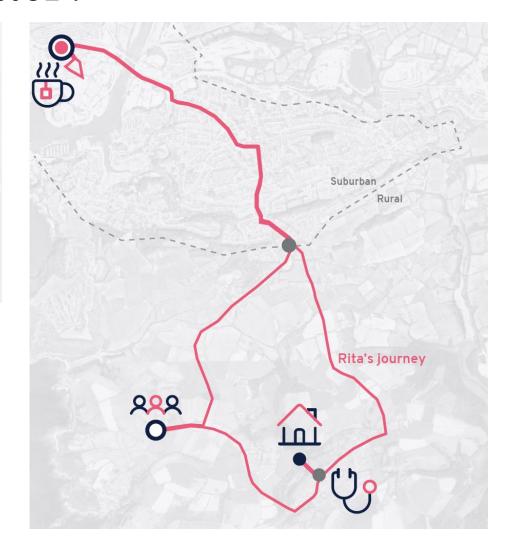
User Journeys

We have developed three characters and their user journeys to show how people will interact with the Future Mobility Hub Framework. These begin to explore the users' specific requirements and how each mobility hub needs to respond to context, scale and opportunity.

Rita's Profile

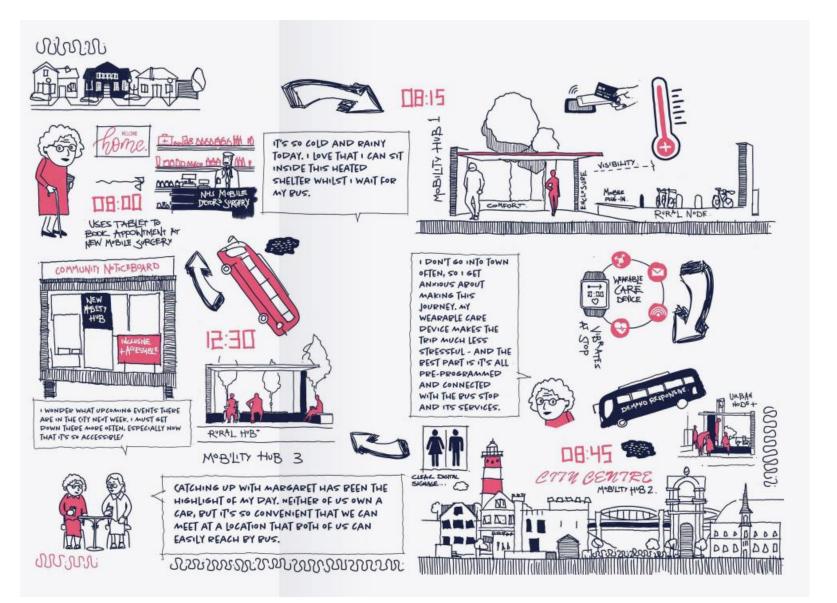
Rita is a retiree and lives on her own in a small, rural village. She doesn't have a car and relies heavily on the public transport network to get around. She is an anxious traveller and has a mobility impairment which limits her to walking short distances and avoiding stepped routes.







How can we do better?



How can we do better?

Research



Travel in London: Understanding our diverse communities 2019

A summary of existing research

TRANSPORT FOR LONDON

The 'all customer' gain points often have a more severe impact for disabled customers. There are also additional gain points for disabled people:



The barriers to greater public transport use that are most commonly mentioned by disabled Londoners are:

- Overcrowding and cramped conditions (51 per cent compared with 47 per cent non-disabled customers)
- Cost (36 per cent compared with 43 per cent non-disabled customers)
- Passengers pushing and shoving each other (33 per cent compared with 24 per cent non-disabled customers) [13]



How can we do better?

- Let's not stop at compliance
- Drive for innovation and user centric design
- Reconsider what value engineering does to all PT users