

2006 Nachs Tables Stations

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Explanatory Notes

Introduction

The NACHS system (Nominally Accumulated Customer Hours) enables the impact of incidents that occur on the network to be estimated in terms of increased passenger journey time. The impact of an incident will depend upon factors such as the type of incident, time it occurs, the duration and location. NACHS values can be assigned by comparing the incident details with a set of look-up tables. The unit of passenger impact is the NAX where one NAX corresponds to an additional 100 hours of passenger perceived journey time. NAX may then be converted to social disbenefit or lost revenue (see text section 6).

NACHS captures both the direct and knock-on effects of an incident. Therefore, estimates should only be applied to an initial delay, else there would be double-counting. NACHS values should be considered as pre-estimates of loss based upon "typical" pre-conditions and response.

NACHS data is presented as a series of tabulations for each incident category and have been produced through bulk modelling. The tabulations, together with these explanatory notes and worked examples, form the subject matter of this document.

This document is divided into sections according to incident type:

- a) Escalator out of service (ESC)
- b) Lifts out of use (L)
- c) Full Station Closures (FSC)
- d) Platform Closures (PC)
- e) Travelator out of service (TR)

It is important that the reader understands the worked examples in order to ensure the tables are not misused. Readers familiar with NACHS 1995 will notice some differences to the format of the tables and methods of computation. NACHS 2006 is a little more complicated to apply, but produces a more rational estimate.

The NACHS 2006 system was developed during 1999 for the London Underground Public Private Partnership (PPP) requirements.

For further information or copies of this document please contact Alan Dowton of LUL Marketing and Planning Journey Time on auto 40866.

1 Escalator Failures

An escalator failure, either partial – can be used as a fixed stair way- (fail type F) or total (fail type O), will add to each passengers overall journey time. The impact may simply be difference between walking or riding on an escalator, but would also include the wider congestion effects in the station where this occurs. It is assumed that if an escalator is out of action other escalators in the bank will be configure to minimise disruption. The NACHS estimate include the “value of time weightings which reflect passengers’ dislike for time spent queuing, walking up stairs ect.

- Tables 1.1, 1.2, & 1.3 contain the NACHS values for escalator failures
- There are separate tables for weekdays, Saturdays, Sundays
- NACHS figures are provided by hour. Values are accumulated across hours and applied pro-rata within hourly bands
- Fail type ‘F’ represents available as a fixed staircase
- Fail type ‘O’ represents no access possible
- Remaining escalators in bank assumed to be reconfigured to minimise cost
- Where failures are in excess of those offered as options in the escalator tables then the value for “Full Station Closures” in section 3 should be applied (regardless of whether OPSCO close the station or not), or, where the station has more than one bank of escalators, the “Full Station Closure” divided by the number of banks should be used.

Flow chart ESC illustrates the method of calculation.

FLOW CHART ESC

QUERY STATEMENT

* INCIDENT CATEGORY:- Escalator downtime
 * LOCATION:- Angel station, Northern line
 * DAY:- Tuesday
 * DETAIL:- Esc1 10:15-11:00hrs failure mode "O"; Esc2 09:30-12:00hrs failure mode "F"; Esc3 09:30-10:30hrs failure mode "F"

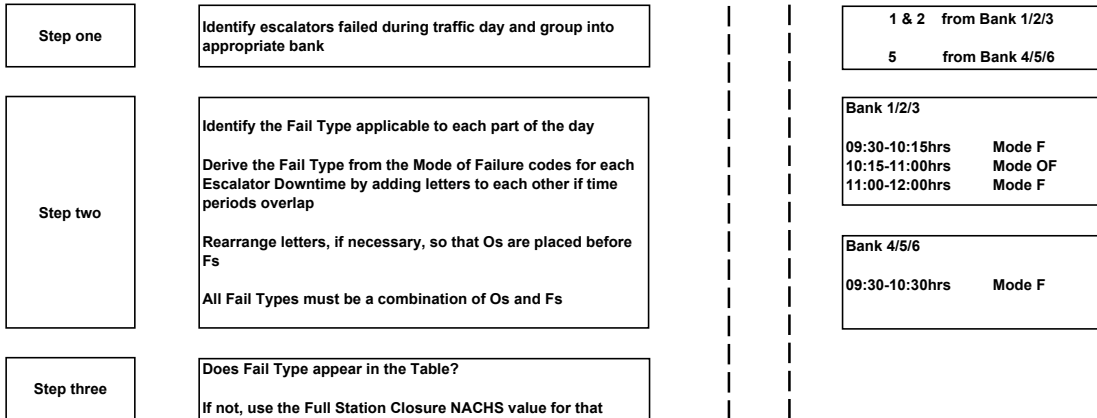
SOLUTION STATEMENT

Table 1.1 NACHS per Hour during Escalator Failure for all Stations 2006
 (units are in NACHS = 100 Customer hours)

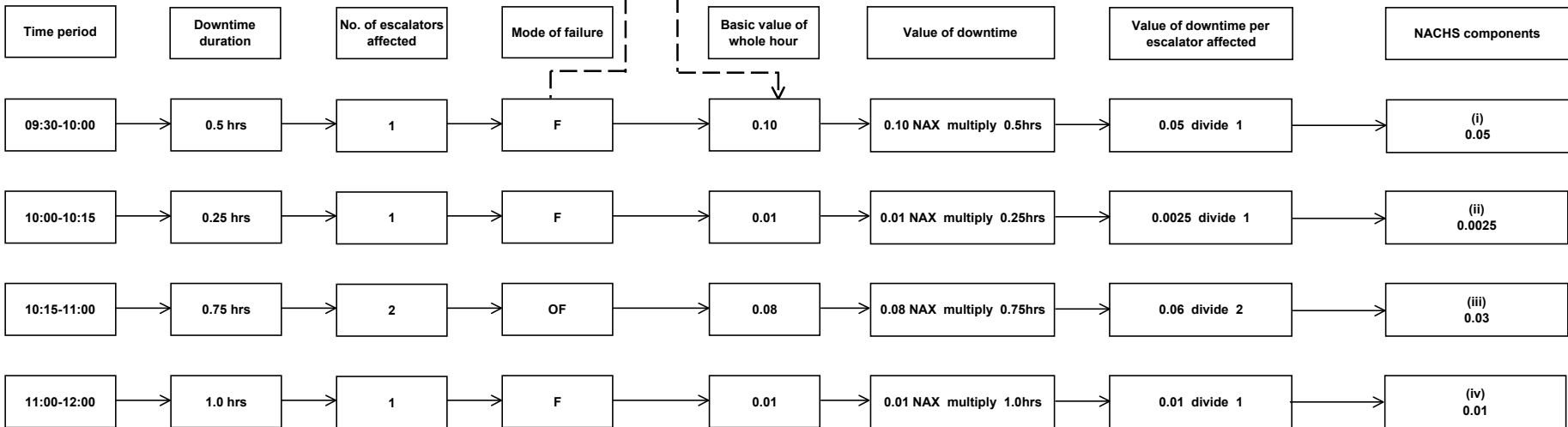
MONDAY - FRIDAY

Ownership	Station	Na Fail Type	Esc Nos	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	00:00	All Day
		(F=partial, O=total)		06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	01:00	Total
N	ANGEL	F	1 2 3	0.00	0.00	0.04	0.11	0.10	0.01	0.01	0.01	0.00	0.35
N	ANGEL	O	1 2 3	0.00	0.00	0.10	0.29	0.28	0.01	0.01	0.01	0.00	0.78
N	ANGEL	OFF	4 5 6	0.01	0.07	2.01	5.68	5.58	0.66	0.56	0.65	0.06	26.84
N	ARCHWAY	F	1 2	0.00	0.00	0.10	0.10	0.28	0.00	0.06	0.06	0.01	2.01

PART ONE:- ORGANISING THE INFORMATION

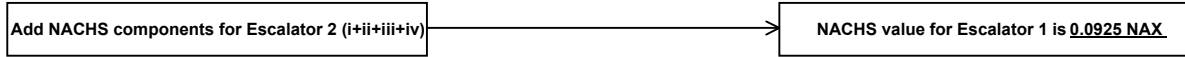
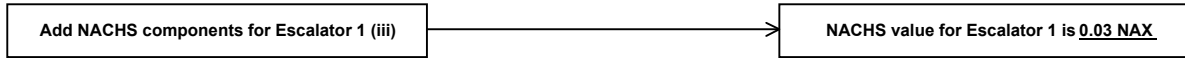


PART TWO:- CALCULATION OF NACHS VALUES FOR BANK 1/2/3



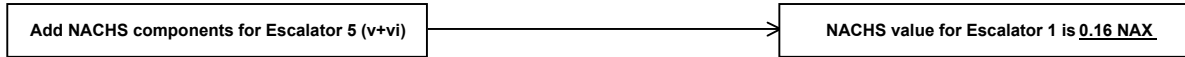
PART TWO CONTINUED ON THE NEXT PAGE

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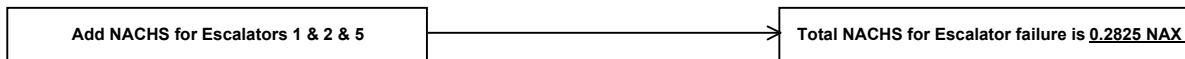


PART THREE:- CALCULATION OF NACHS VALUES FOR BANK 4/5/6

Time period	Downtime duration	No. of escalators affected	Mode of failure	Basic value of whole hour	Value of downtime	Value of downtime per escalator affected	NACHS components
09:30-10:00	0.5 hrs	1	F	0.31	0.31 NAX multiply 0.5hrs	0.155 divide 1	(v) 0.155
10:00-10:30	0.5 hrs	1	F	0.01	0.01 NAX multiply 0.5hrs	0.005 divide 1	(vi) 0.005



PART FOUR:- CALCULATION OF TOTAL NACHS FOR ESCALATOR FAILURE



2 Lift Failures

A lift failure will add to passengers' overall journey time. The impact is most likely to be due to the additional waiting times for the lifts were lifts available, but the estimate would also include the wider congestion effects in the station where this occurs. The NACHS estimates include the "value of time weightings which reflect passengers' dislike for time spent queuing, walking up stairs ect.

- Tables 2.1, 2.2, & 2.3 contain the NACHS values for lift failures
- There are separate tables for weekdays, Saturdays, Sundays
- NACHS figures are provided by hour. Values are accumulated across hours and applied pro-rata within hourly bands
- Fail type 'O' represents a lift unavailable
- Where failures are in excess of those offered as options in the lift tables then the value for "Full Station Closures" in section 3 should be applied (regardless of whether LUL close the station or not)
- Table 2.4 provides a lookup for the additional penalty that is applied if passengers are trapped in a lift.. Values should be interpolated between these durations. The values apply to all lifts at any time of day and week. For clarity they are represented in units of NACHS per 100 passengers trapped, but should be adjusted proportionally for the numbers of passengers actually trapped.

The method of calculation is analogous to that of escalators (See flow chart ESC).

3 Full Station Closures

A station closure is defined as the station being closed for passenger access, egress and interchange on all lines. It is assumed that the train service is non stopping at the affected station but otherwise unaffected. The impact is calculated for all passengers who would normally be expected to use the station in question at the time of its closure but have to reroute themselves instead. The penalty per passenger is higher for the outer zone stations due to the lesser proximity of public transport alternatives. However, the central area stations tend to produce higher NAX values due to their high usage.

- Tables 3.1, 3.2, & 3.3 contain the NACHS values for full station closures
- There are separate tables for weekdays, Saturdays, Sundays
- NACHS figures are provided by hour. Values are accumulated across hours and applied pro-rata within hourly bands

FLOW Chart FSC illustrates the method of calculation.

FLOW CHART FSC

QUERY STATEMENT

- * INCIDENT CATEGORY:- Full station closure
- * LOCATION:- Brixton Station, Victoria line
- * DAY:- Tuesday
- * DURATION:- 09:30-11:45hrs

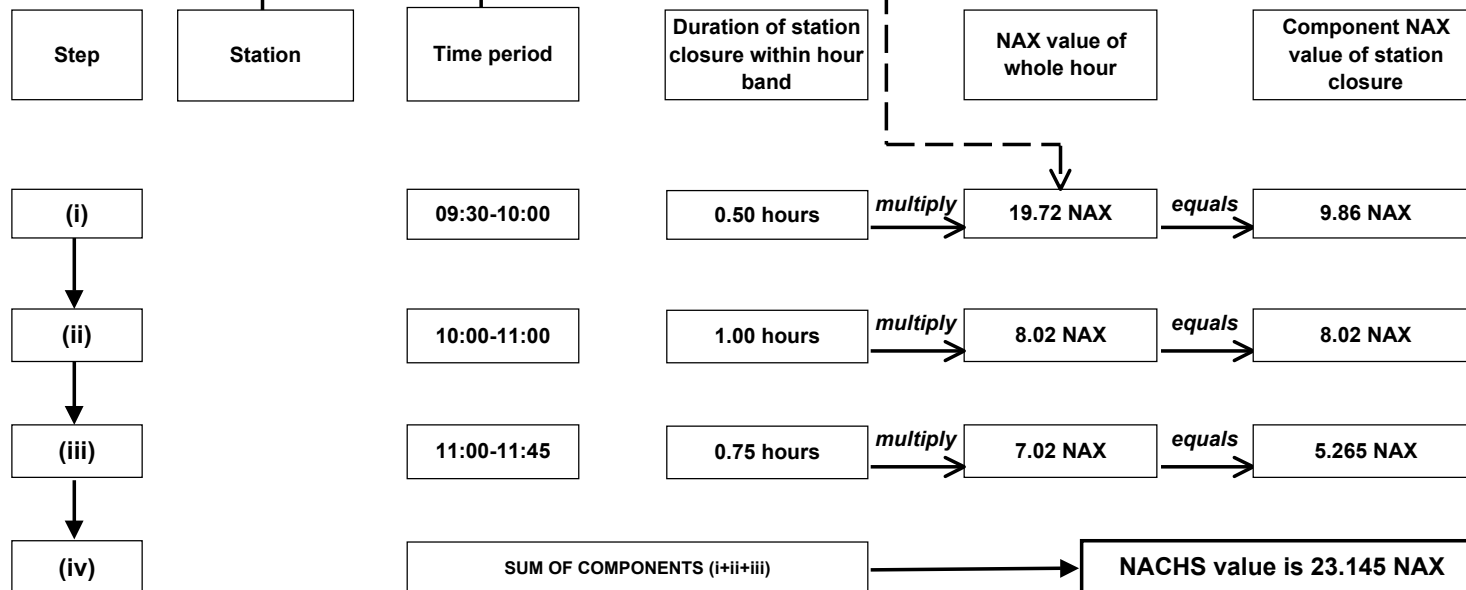
SOLUTION STATEMENT

Table 3.1 NACHS per Hour during Full Station Closure 2006

(units are in NACHS=100 customer hours)

MONDAY-FRIDAY		05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00
Ownership	Station	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00
P	ACTON TOWN	0.56	2.31	9.67	20.02	9.01	4.85	4.05	4.84
M&C	ALDGATE	0.08	0.45	1.77	6.69	6.22	2.40	1.72	2.08

D	BOW ROAD	0.18	0.71	1.83	3.56	2.06	1.05	1.16	1.07
N	BRENT CROSS	0.04	0.32	2.46	5.02	2.56	0.76	0.79	0.71
V	BRIXTON	1.04	3.17	13.13	26.02	19.72	8.02	7.02	7.45
D	BROMLEY BY-BOW	0.16	0.93	2.51	3.08	1.56	1.03	0.90	0.89
C	BUCKHURST HILL	0.18	1.31	3.92	4.64	1.37	1.05	0.83	0.71



4 Platform Closures

A platform closure is defined as the platform being closed for boarding and alighting. It is assumed that the train service is “non stopping” at the affected platform but otherwise unaffected. The impact is calculated for all passengers who would normally be expected to use the platform in question at the time of its closure but have to reroute themselves instead (usually by approaching from other direction). The penalty per passenger is higher for the outer zone stations due to the lesser frequency of service and proximity of adjacent stations. However, the central area stations tend to produce higher NAX values due to their high usage.

- Tables 4.1, 4.2, & 4.3 contain the NACHS values for single platform closures
- Platforms are denoted by line & direction
- NACHS figures are provided by hour. Values are accumulated across hours and applied pro-rata within hourly bands
- Island platforms are considered as two separate platforms (although unusual, it is possible that one “half” of an island could be closed). Similarly terminus platforms are considered as separate entities.
- If more than one platform is closed, but the station is not fully closed, the NACHS value can be calculated by formula using results from Table 3 and 4. The formula respects that the platform closures are not simply additive (as disallowed interchange might be double counted, or the option of approaching from the other direction may be removed) and progressive single platform closures would converge to the full station result.

Let p_i = The value for a single platform closure ($i=1.....n$) for station X with n platforms

Let F = the full station closure value for station X

Let P = sum of p_i ($i=1.....n$)

Then

$$p_{i\&j} = p_i + p_j \star (F-p_i) / (P-p_i) \text{ where } p_i > p_j$$

Similarly

$$p_{i\&j\&k} = p_{i\&j} + p_k \star (F-p_{i\&j}) / (P-p_{i\&j}) \text{ where } p_i > p_j > p_k$$

Flow chart PC illustrates the method of calculation.

FLOW CHART PC

QUERY STATEMENT

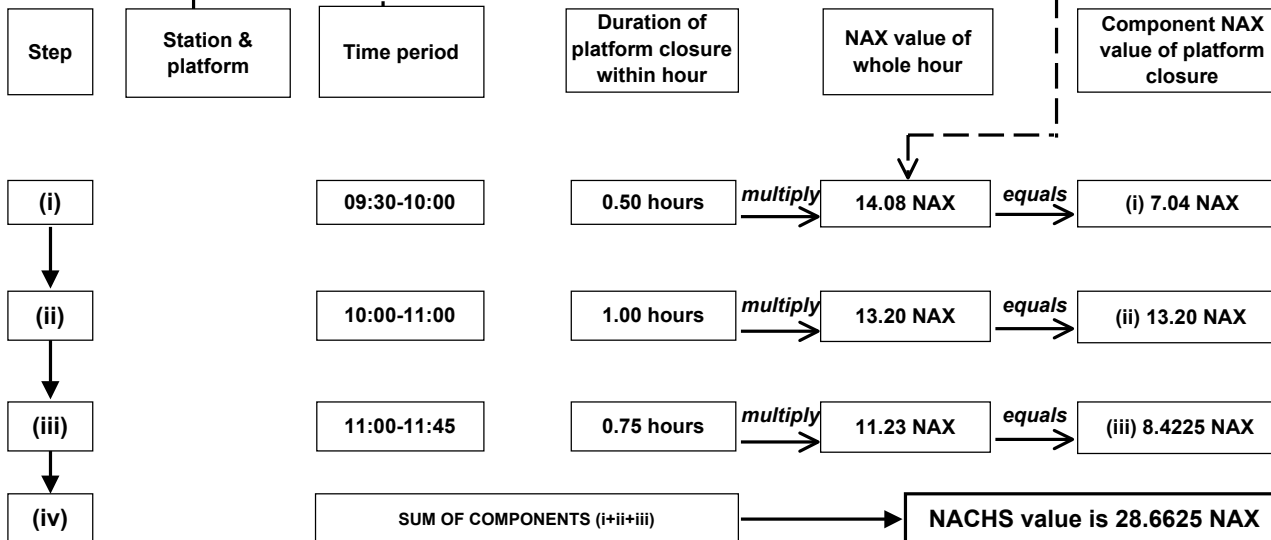
- * INCIDENT CATEGORY:- Platform closures
- * LOCATION:- SB Platform, Victoria Station, Victoria line
- * DAY:- Tuesday
- * DURATION:- from 09:30 to 11:45hrs.

SOLUTION STATEMENT

Table 4.1 NACHS per Hour during Single Platform Closures 2006

(units are in NACHS=100 customer hours)

Ownerst	Station	Line	Dir.	No	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri	Mon-Fri
					05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
P	ACTON TOWN	District	EB	3	0.04	0.16	1.47	3.05	1.37	0.33	0.28	0.33	0.37	0.31
P	ACTON TOWN	District	WB	1	0.07	0.30	0.69	1.43	0.64	0.64	0.53	0.64	0.72	0.60
V	VAUXHALL	Victoria	SB	2	0.16	0.61	3.16	6.98	5.23	1.94	1.30	1.62	1.78	1.45
V	VICTORIA	District	EB	2	0.44	2.01	11.28	27.21	17.25	10.40	8.85	9.69	10.64	9.55
V	VICTORIA	District	WB	1	0.51	2.36	10.02	24.18	15.32	12.21	10.39	11.37	12.49	11.21
V	VICTORIA	Victoria	NB	3	0.58	2.70	14.01	33.80	21.42	13.96	11.88	13.00	14.29	12.82
V	VICTORIA	Victoria	SB	4	0.55	2.55	9.21	22.22	14.08	13.20	11.23	12.29	13.50	12.12
V	WALTHAMSTOW CE	Victoria	SB	1	0.20	1.27	4.08	6.78	3.00	2.03	1.68	1.68	1.86	1.33
V	WALTHAMSTOW CE	Victoria	SB	2	0.20	1.27	4.08	6.78	3.00	2.03	1.68	1.68	1.86	1.33



5 Travelator Closures

Calculated for Bank and Waterloo stations (the only two sets of travelators on the Underground network) the format and application of the tables is identical to the escalator category (see 1).