

NACHS 2006

BCV Trains NACHS

Tables

October 1999

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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 7).

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) Train Delays (TD)
- b) Signal Delays (SD)
- c) Train Cancellations (TC)
- d) Depot Late Start-up (DLS)
- e) Partial and Full Line Closures (PLS/FLS)
- f) Slow Running / Speed Restrictions (SR)

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. Train Delays

A train delay length is defined as the additional time that a train is stationary (wheel stop to wheel start). This is sometimes referred to as the "initial" delay. The impact of a train delay affects passengers on that train, passengers along the line waiting for a train, and passengers on trains behind which may be delayed as a consequence. There is also an impact while the service recovers. All of these impacts are included in the Nachs value and attributed to the **initial** train delay. The user should not combine estimates for the accumulated delay or knock-on effects as this would result in double-counting.

- Train delay tables (section a).) contain the Nachs values for train delays greater than 2 minutes.

- There are separate tables for weekdays, Saturdays and Sundays, and for each direction of travel.

- For each location the Nachs calculation uses the letter code applicable to the location (i.e., station platform) and the start time of the initial delay. If the delay is greater than 15 minutes the numerical hourly value(s) for the location and hour(s) spanned by the delay will be required also.

- The Nachs result is calculated using the Cost Table (table a.vii)) as follows:

- i) In the simplest case, for a delay of *less than or equal to 15 minutes* duration, a straightforward table lookup completes the evaluation for the incident. The user simply traces along the "2-20 min delay" row associated with the required location (station & platform) until the hourly interval containing the delay is found. The letter code returned at this intersection is then used in conjunction with the number of minutes delayed in order to "look-up" the correct NAX cost in the appropriate cost table for the line. One should note that where the *2-20 min delay* spans time periods, the *2-20 min letter category* for the first time period is used throughout. The flow diagram EXAMPLE TD 1 illustrates this for a 12 train delay.

- ii) If the delay lasts for *more than 15 minutes* it is assumed that service effectively becomes suspended in the vicinity of the location and passengers will transfer to other lines or modes to complete their journeys. For such occurrences, there is an "*Additional Factor*" row in the Cost Table, along with the hourly Nachs value(s) appropriate to the location, time and duration. The computation is performed in one of the following ways:

First, if the delay is *between 16 and 20 minutes* the user calculates a NAX cost as in i), above, plus an additional NAX cost element. To calculate this the "*Additional Factor*" appropriate to the duration is multiplied by the hourly Nachs rate applicable to the delay start time, which may be found in the ">15 min." row for the required location, and the result is divided by 60 [as the additional factor applies to Nachs per minute]. The flow diagram EXAMPLE TD2 illustrates this for a 16 min. delay.

Second, for delays *greater than 20 minutes*, the first 20 minutes of delay are calculated as above. For the minutes of delay greater than 20 minutes the "Additional Factor" for 20 minutes is used as above, with the hourly Nachs values being applied *pro-rata* within each hourly band and accumulated across hourly bands. The flow diagram EXAMPLE TD3 illustrates this for a 40 min. delay.

EXAMPLE TD1

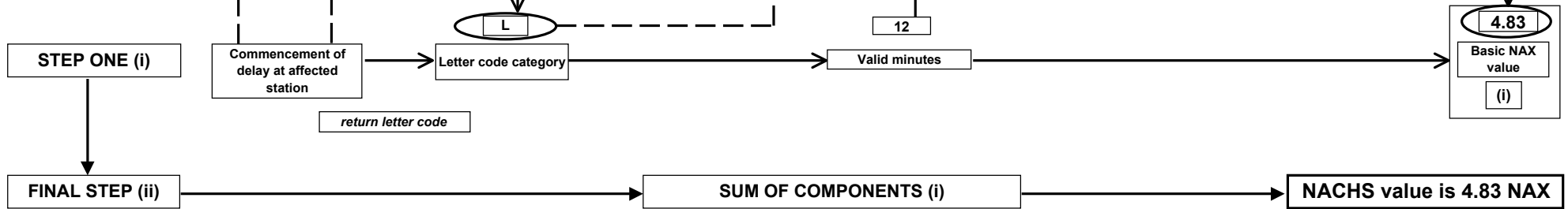
QUERY STATEMENT

- * INCIDENT CATEGORY:- Train delays
- * LOCATION (STATION):- Brixton, Victoria line
- * DIRECTION / PLATFORM:- Northbound, Platform 1
- * DAY:- Tuesday
- * TIME FRAME:- 10:30-10:42 hrs (12 min. delay)

SOLUTION STATEMENT

VICTORIA LINE Northbound		TRAIN DELAYS									
Monday-Friday		Delay (mins.)	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	
Station		06:00	07:00	08:00	09:00	10:00	11:00	12:00			
Brixton (P1&2)	2-20	N	K	I	J	L	L	M			
	>15	6	28	103	211	139	14	12			
Stockwell (P1)	2-20	M	I	D	C	F	G	G			
	>15	6	28	103	211	139	14	12			
Vauxhall (P1)	2-20	M	I	D	C	F	G	G			
	>15	6	28	103	211	139	14	12			
Pimlico (P1)	2-20	M	I	E	C	F	H	G			
	>15	6	28	103	211	139	14	12			

VICTORIA LINE		Cost of Train Delays By Letter Code And Duration - in NAX					
Letter Code	2		11			12	
	3	13	12	13	13		
A	4.39	9.88	132.10	155.12	178.14		
B	3.46	7.78	104.04	122.17	140.30		
K	0.19	0.43	5.71	6.71	7.71		
L	0.14	0.31	4.11	4.83	5.55		
M	0.09	0.20	2.69	3.16	3.63		
N	0.06	0.13	1.76	2.07	2.38		
O	0.03	0.06	0.80	0.94	1.07		
Additional Factor	0.00	0.00	0.00	0.00	0.00		



EXAMPLE TD2

QUERY STATEMENT

- * INCIDENT CATEGORY:- Train delays
- * LOCATION (STATION):- Brixton, Victoria line
- * DIRECTION / PLATFORM:- Northbound, Platform 1
- * DAY:- Tuesday
- * TIME FRAME:- 10:30-10:46 hrs (16 min. delay)

SOLUTION STATEMENT

VICTORIA LINE Northbound		TRAIN DELAYS									
Monday-Friday		Delay (mins.)	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	
Brixton (P1&2)	2-20	N	K	I	J	L	I	M			
	>15	6	28	103	211	139	14	12			
Stockwell (P1)	2-20	M	I	D	C	F	G	G			
	>15	6	28	103	211	139	14	12			
Vauxhall (P1)	2-20	M	I	D	C	F	G	G			
	>15	6	28	103	211	139	14	12			
Pimlico (P1)	2-20	M	I	E	C	F	H	G			
	>15	6	28	103	211	139	14	12			

VICTORIA LINE		Cost of Train Delays By Letter Code And Duration - in NAX							
Letter Code	2	3	16	17	18	19	20	Each Minute	
									> 20 mins
A	4.39	9.88	235.94	243.71	246.45	246.97	247.01		
B	3.46	7.78	185.83	191.94	194.10	194.51	194.54		
K	0.19	0.43	10.21	10.54	10.66	10.68	10.69		
L	0.14	0.31	7.35	7.59	7.68	7.69	7.69		
M	0.09	0.20	4.81	4.97	5.02	5.03	5.03		
N	0.06	0.13	3.15	3.25	3.29	3.30	3.30		
O	0.03	0.06	1.42	1.47	1.49	1.49	1.49		
Additional Factor	0.00	0.00	0.51	1.46	2.68	3.90	5.00	1.00	

STEP ONE (i)

Commencement of delay at affected station (10-11:00hrs)

Letter code category

Valid minutes

Basic NAX value

return letter code

STEP TWO (ii)

14.0

0.2333

0.51

0.119

Basic value (per hour)

Basic value (per minute)

Additional factor

Basic value (total)

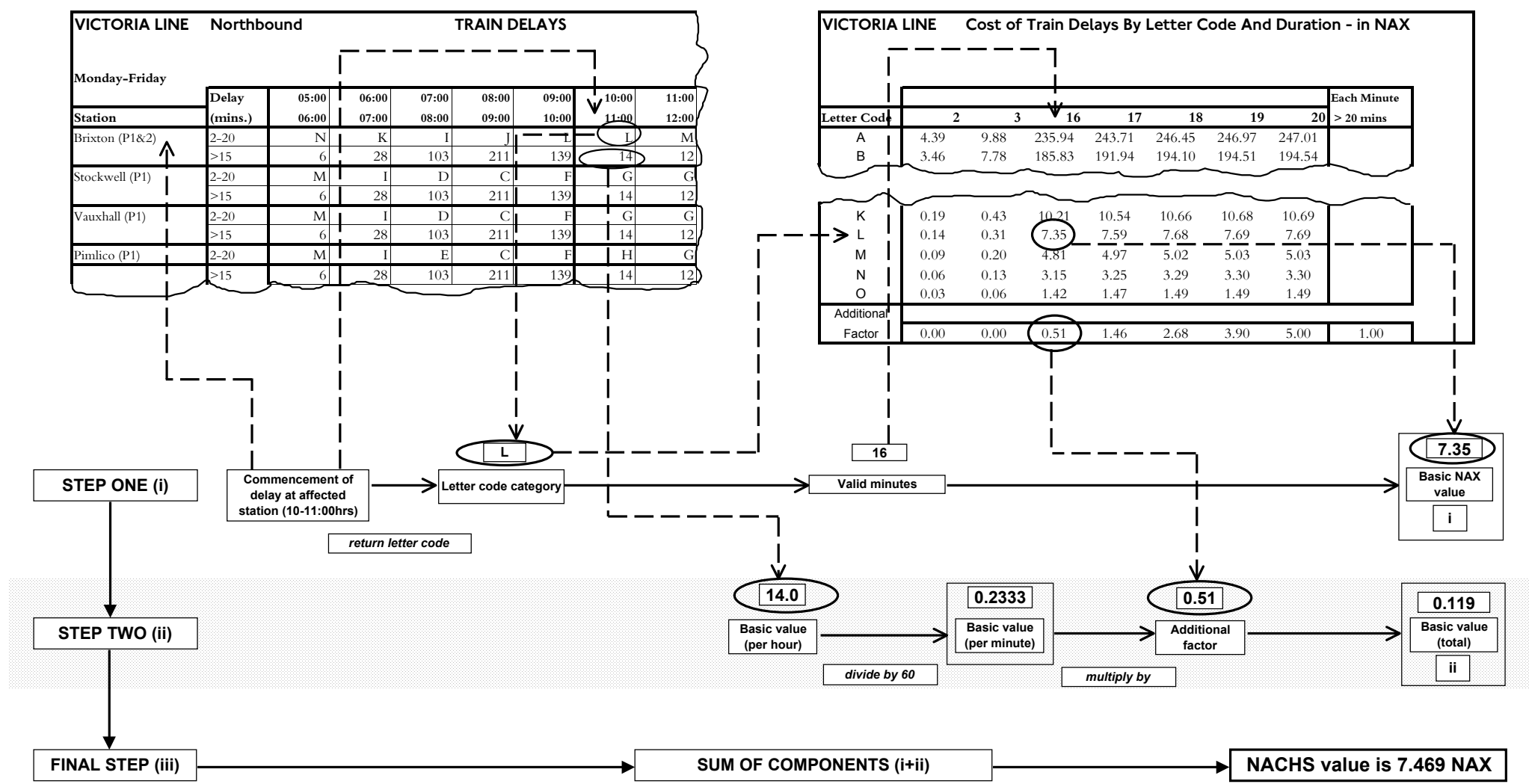
divide by 60

multiply by

FINAL STEP (iii)

SUM OF COMPONENTS (i+ii)

NACHS value is 7.469 NAX



EXAMPLE TD3

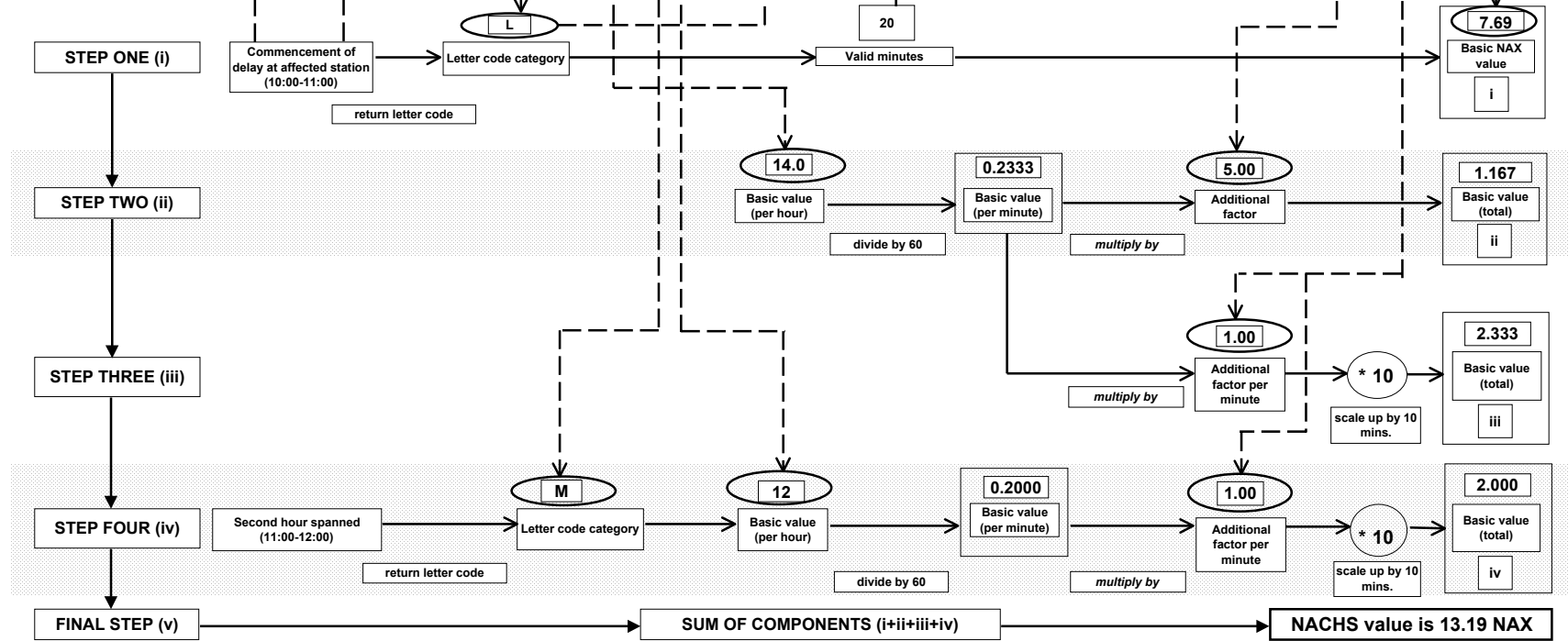
QUERY STATEMENT

- * **INCIDENT CATEGORY:-** Train delays
- * **LOCATION (STATION):-** Brixton, Victoria line
- * **DIRECTION / PLATFORM:-** Northbound, Platform 1
- * **DAY:-** Tuesday
- * **TIME FRAME:-** 10:30-11:10 hrs (40 min. delay)

SOLUTION STATEMENT

VICTORIA LINE Northbound		TRAIN DELAYS									
Monday-Friday		Delay (mins.)	05:00-06:00	06:00-07:00	07:00-08:00	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00		
Brixton (P1&2)	2-20	>15	N	K	I	J	L	L	M		
Stockwell (P1)	2-20	>15	M	I	D	C	F	G	G		
Vauxhall (P1)	2-20	>15	M	I	D	C	F	G	G		
Pimlico (P1)	2-20	>15	M	I	E	C	F	H	G		

VICTORIA LINE		Cost of Train Delays By Letter Code And Duration - in NAX							
Letter Code	Each Minute	2	3	16	17	18	19	20	> 20 mins
		A	4.39	9.88	235.94	243.71	246.45	246.97	247.01
B	3.46	7.78	185.83	191.94	194.10	194.51	194.54		
K	0.19	0.43	10.21	10.54	10.66	10.68	10.69		
L	0.14	0.31	7.35	7.59	7.68	7.69	7.69		
M	0.09	0.20	4.81	4.97	5.02	5.03	5.05		
N	0.06	0.13	3.15	3.25	3.29	3.30	3.30		
O	0.03	0.06	1.42	1.47	1.49	1.49	1.49		
Additional Factor	0.00	0.00	0.51	1.46	2.68	3.90	5.00	1.00	



2. Signal Failures

Signal failures differ from straight forward train delays in that they are characterised by an initial delay followed by period of restricted running, where trains are permitted to pass through the affected area but at restricted speed. This will continue until such time that the signal is fully restored and normal operations resume. NACHS is able to provide an estimate which captures both of these affects in a single incident type. The method of computation reflects these two stages.

The initial delay component is calculated in much the same way as simple train delay (see 1). However, with a normal train delay, the service is allowed to recover from the moment the initial delay finishes. With a signal delay the recovery from the initial delay is hindered by possible capacity restrictions. This is accounted for in NACHS by first adjusting the initial delay length (using an initial delay factor). This factor will be highest when the normal scheduled service is high (e.g. on the trunk section and during the peaks) and reflects the inevitable "logjam" that ensues in these circumstances.

The subsequent disruption after the adjusted initial delay represents the period after the "logjam" has been cleared, and the service is running at a degraded frequency. This is defined as the "steady state" period, because it is assumed that Line Control will reconfigure the service subject to the constraints. Again, the rate of NACHS accrual during the steady state period will depend upon the difference between what is normally scheduled compared to the restricted frequency.

- Tables 2.1 - 2.12 contain the nachs values for signal failures and multiple signal failures. These incidents are characterised by an initial delay followed by a period of restricted running through the affected area. Multiple signal failures are defined as incidents where two or more consecutive signals fail and/or operation is restricted on more than one road.
- There are separate tables for Weekdays, Saturdays and Sundays, each directions of travel and for both single and multiple failures.
- The method of calculation is identical for single and multiple failures and is performed as follows:
 - i) multiply the initial delay duration by the initial delay factor ("ID Factor") appropriate to the start of the delay to derive an adjusted initial delay. However, if the adjusted initial delay duration exceeds the duration of the whole incident (i.e. spans beyond the signal restoration time) then set the adjusted initial delay duration to be equal to the incident duration.
 - ii) using the adjusted initial delay calculate the nachs value using the same method used for train delays (using the letter code appropriate to the start of the delay, the hourly nachs row, and train delay cost table).

iii) for the remaining duration beyond the adjusted initial delay time, apply the "Steady State" hourly nachs row. Like the hourly rates, the steady state values are applied pro-rata within each hourly band and accumulated across hours where necessary.

The total nachs value for the incident is sum of the above results.

EXAMPLE SF

QUERY STATEMENT

- * INCIDENT CATEGORY:- Multiple signal failure
- * LOCATION:- Brixton (platform 2), NB Victoria line
- * DAY:- Tuesday
- * INITIAL DELAY:- 06:45-07:05hrs (20mins.)
- * DURATION:- 06:45-08:45 (=120mins.)

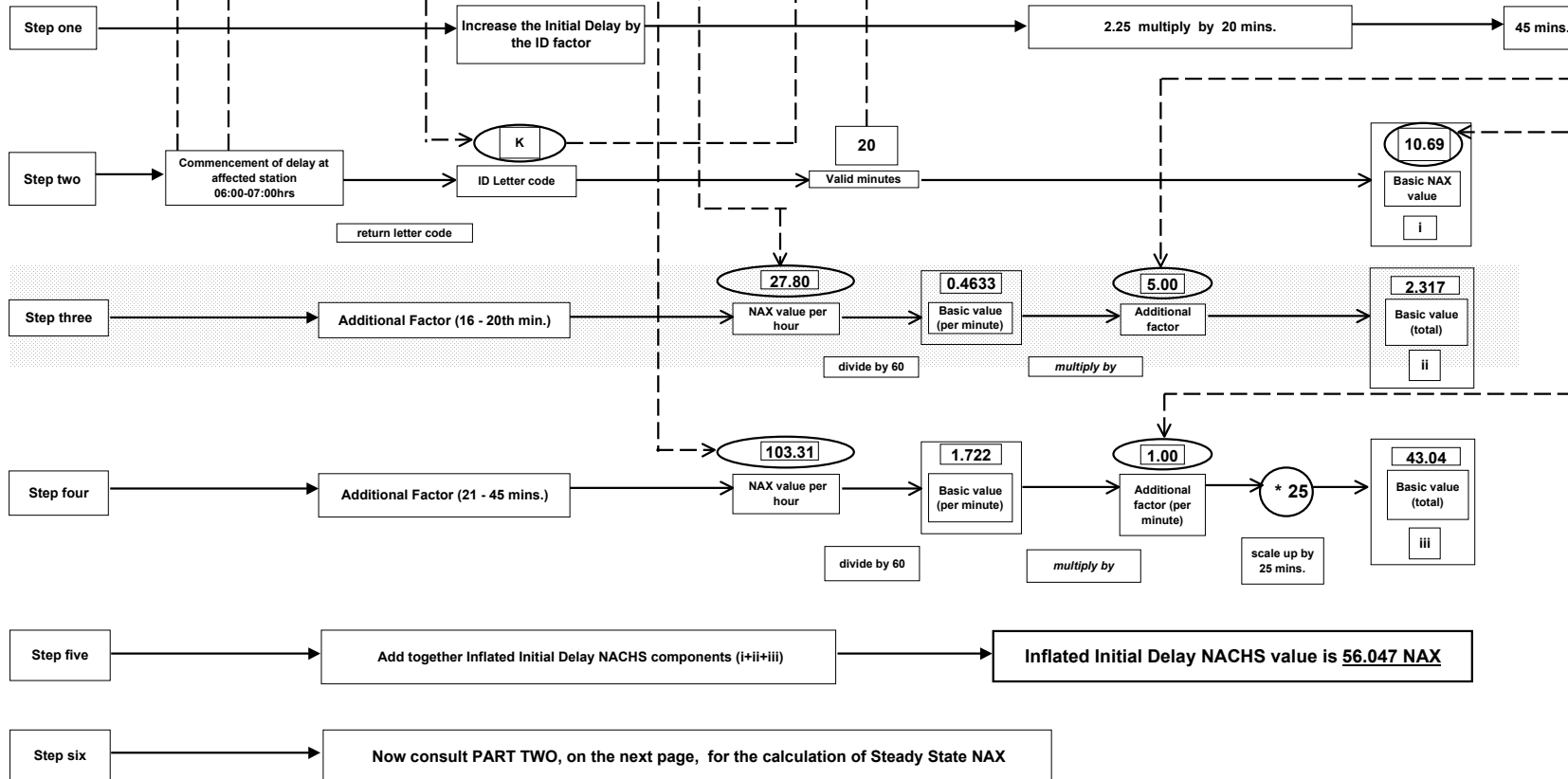
SOLUTION STATEMENT

PART ONE:- INFLATED INITIAL DELAY NACHS VALUE CALCULATION

VICTORIA LINE Northbound		SIGNAL FAILURES											
		Multiple Failure											
Monday-Friday	Station	Delay (mins)	Nach code	05:00-06:00	06:00-07:00	07:00-08:00	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00
Brixton (P1&2)		2-20	ID Factor	1.00	2.25	4.85	7.88	8.42	4.50	3.86	3.86	3.86	3.86
		>15	ID letter code	N	K	I	J	L	L	M	K	L	L
		>15	Nax per hr	6.20	27.80	103.31	210.88	138.53	14.13	11.52	12.45	13.75	12.06
			Steady State Nax	0.00	11.47	74.08	174.66	114.74	11.83	9.31	10.06	11.11	9.74
Blackhorse Road (P1)		2-20	ID Factor	1.00	1.38	2.74	3.56	3.00	3.00	3.00	3.00	3.00	
		>15	ID letter code	O	O	K	I	L	M	L	L	L	
		>15	Nax per hr	2.81	12.60	46.84	95.61	62.81	6.05	4.93	5.32	5.88	5.16
			Steady State Nax	0.00	1.48	23.43	60.53	34.22	4.51	3.67	3.97	4.38	3.85

VICTORIA LINE Cost of Train Delays By Letter Code And Duration - in NAX

Letter Code	Minutes of Delay									Each Minute > 20 mins
	2	3	4	5	6	7	8	9		
H	0.61	1.37	2.44	3.81	5.49	7.47	9.76	12.36	34.32	
I	0.41	0.92	1.63	2.55	3.67	4.99	6.52	8.25	22.91	
J	0.28	0.62	1.11	1.73	2.50	3.40	4.44	5.62	15.61	
K	0.19	0.43	0.76	1.19	1.71	2.33	3.04	3.85	10.69	
L	0.14	0.31	0.55	0.85	1.23	1.68	2.19	2.77	7.69	
M	0.09	0.20	0.36	0.56	0.81	1.10	1.43	1.81	5.03	
N	0.06	0.13	0.23	0.37	0.53	0.72	0.94	1.19	3.30	
O	0.03	0.06	0.11	0.17	0.24	0.32	0.42	0.54	1.49	
Additional Factor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	1.00



EXAMPLE SF

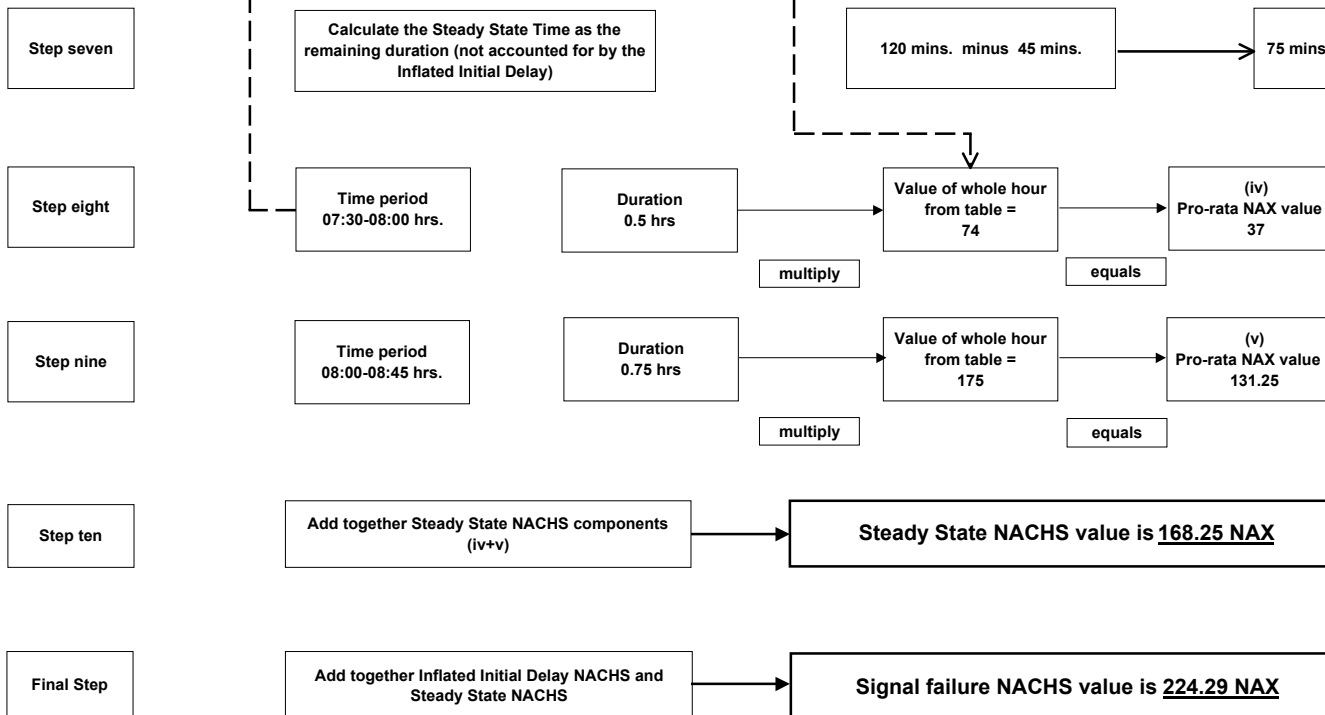
QUERY STATEMENT

- * INCIDENT CATEGORY:- Multiple signal failure
- * LOCATION:- Brixton (platform 2), NB Victoria line
- * DAY:- Tuesday
- * INITIAL DELAY:- 06:45-07:05hrs (20mins.)
- * DURATION:- 06:45-08:45 (=120mins.)

SOLUTION STATEMENT

PART TWO:- STEADY STATE NACHS VALUE CALCULATION

VICTORIA LINE Northbound		SIGNAL FAILURES Multiple Failure											
Monday-Friday		Delay (mins.)	Nach code	05:00-06:00	06:00-07:00	07:00-08:00	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00
Brixton (P1&2)	ID Factor			1.00	2.25	4.85	7.88	8.42	4.50	3.86	3.86	3.86	3.86
	2-20 ID letter code			N	K	I	J	L	L	M	K	L	L
	>15 Nax per hr			6.20	27.80	103.31	210.88	138.53	14.13	11.52	12.45	13.75	12.06
	Steady State Nax			0.00	11.47	74.08	174.66	114.74	11.83	9.31	10.06	11.11	9.74
Blackhorse Road (P1)	ID Factor			1.00	1.38	2.74	3.56	3.00	3.00	3.00	3.00	3.00	3.00
	2-20 ID letter code			O	O	K	I	L	M	L	L	L	L
	>15 Nax per hr			2.81	12.60	46.84	95.61	62.81	6.05	4.93	5.32	5.88	5.16
	Steady State Nax			0.00	1.48	23.43	60.53	34.22	4.51	3.67	3.97	4.38	3.85



3. Train Cancellations

Train cancellations result in extended service intervals and consequently impact upon passengers' waiting times and congestion. The impact of train cancellations varies by time of day. Train cancellations tables (section c.i)-iii.) represent the cost, in nachs per hour, of train cancellations over different time periods. No distinction has been made between cancellations on different routes, so the figures represent an average of all trains.

- Tables c.i)-iii). contain the nachs values for train cancellations.
- There are separate tables for weekdays, Saturdays and Sundays.
- nachs values are given for the number of trains cancelled during each hourly band. Apply the hourly nachs values pro-rata within each hourly band, and accumulate across bands for the total duration of the cancellation.
- Where the number of train cancellations is high, the number has been represented as a percentage of the number of trains scheduled to be in service.
- In order to calculate the nachs value for any individual cancellation during a period of multiple cancellations it is necessary to know the details of other cancellations during the same period. The nachs value for the multiple cancellations over a given time interval can then be allocated to each contributing incident in proportion to the number of cancellations.

EXAMPLE TC

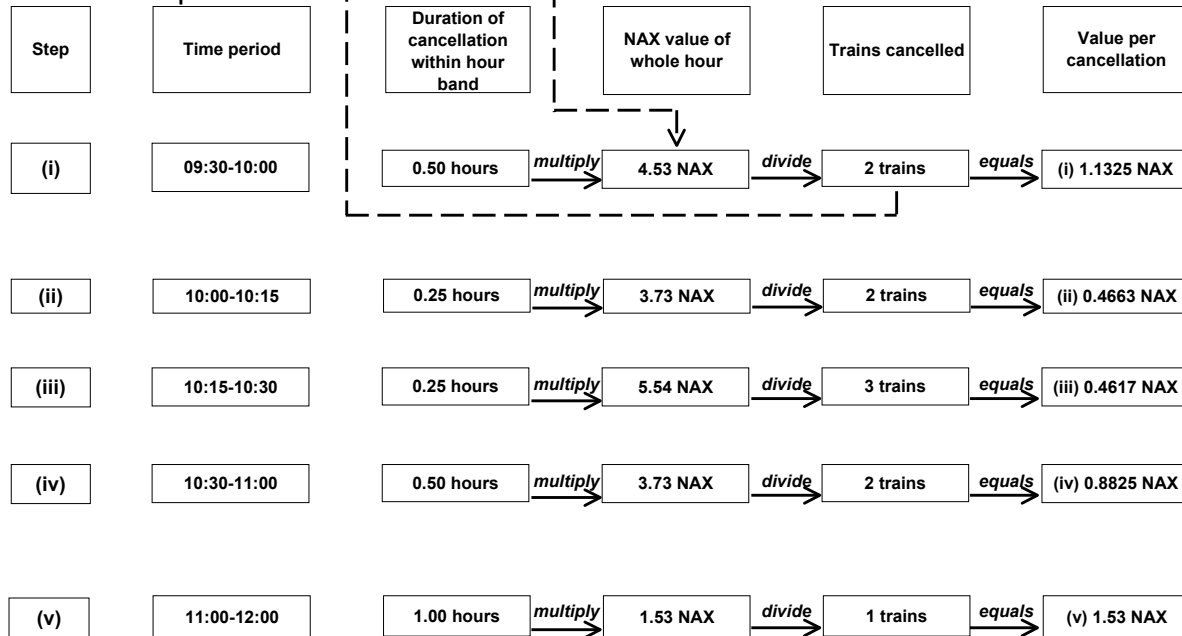
QUERY STATEMENT

- * INCIDENT CATEGORY:- Train cancellations
- * LINE:- Victoria line
- * DAY:- Tuesday
- * TIME FRAME:- Cancellation ONE 10:15-11:00hrs; Cancellation TWO 09:30-12:00 hrs; Cancellation THREE 09:30-10:30 hrs

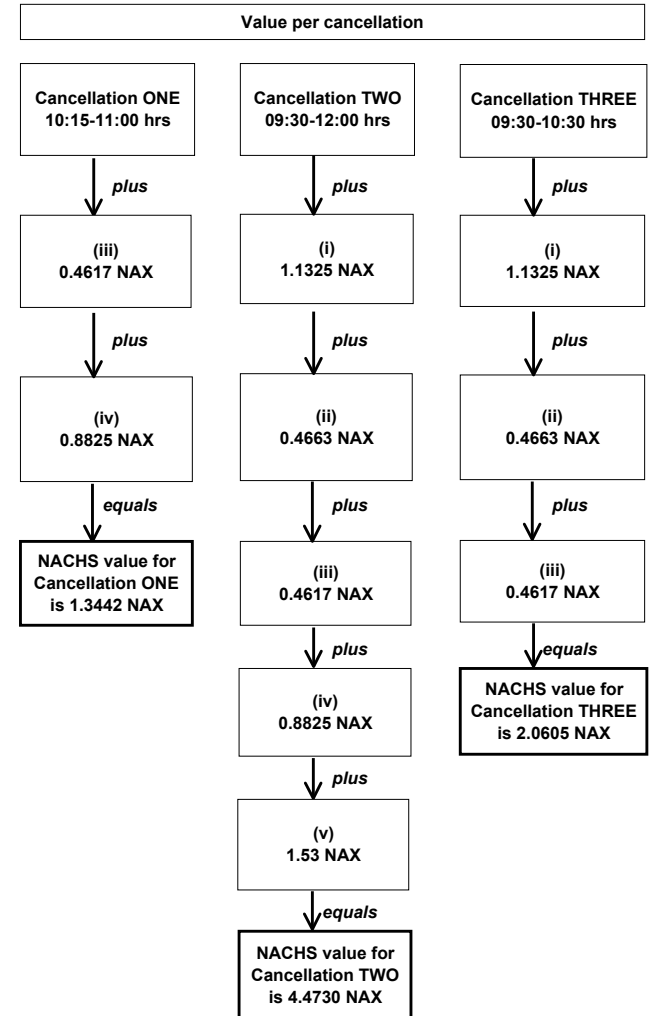
SOLUTION STATEMENT

PART I: CALCULATE NACHS VALUES PER CANCELLATION FOR HOURS SPANNED

VICTORIA LINE		NACHS TABLE													TRAIN CANCELLATIONS	
Monday-Friday																
		05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	
Cancellations		06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	
1		0.22	0.49	1.38	2.73	2.09	1.88	1.53	1.65	1.83	1.54	1.44	1.80	2.55	2.21	
2		0.52	1.06	2.95	5.84	4.53	3.73	3.04	3.28	3.62	3.06	2.86	3.85	5.46	4.73	
3	↑	0.92	1.75	4.75	9.38	7.36	5.54	4.51	4.88	5.38	4.55	4.26	6.18	8.78	7.60	
4		1.46	2.55	6.80	13.41	10.64	7.31	5.96	6.44	7.11	6.00	5.64	8.83	12.54	10.86	
5		2.15	3.50	9.13	17.97	14.41	9.03	7.36	7.96	8.79	7.43	6.99	11.84	16.81	14.55	
6			4.61	11.78	23.12	18.75	10.71	8.73	9.43	10.42	8.81	8.32	15.23	21.63	18.72	



PART II: CALCULATE TOTAL NACHS VALUE FOR EACH CANCELLATION



PART III: SUM OVER CANCELLATIONS

Grand total NACHS for cancellations is 7.8776 NAX

4. Depot Late Start-up

Depot late start-ups result in numerous trains being cancelled and entering service late. The late start-up time is defined as the time a train is first able to enter service, and assumes that trains can subsequently enter service subject to capacity constraints and the operators ability to path and crew the trains. The NACHS value captures both the disruption before the actual start-up time, and subsequent to the start up time whilst normal service is being re-established.

- Tables d).i)-iii). contain the nachs values for depot late start-ups.
- There are separate tables for weekdays, Saturdays and Sundays.
- Each table contains values for the most significant stabling locations. Other locations should be dealt with simply by cancellations (see 3).
- Values are shown for the actual start up time occurring on the hour (e.g. 06:00, 07:00 etc.). In most cases it will be necessary to interpolate between two hourly values to obtain an estimate for the given start-up time.

The flow diagram example, EXAMPLE DLS, illustrates this.

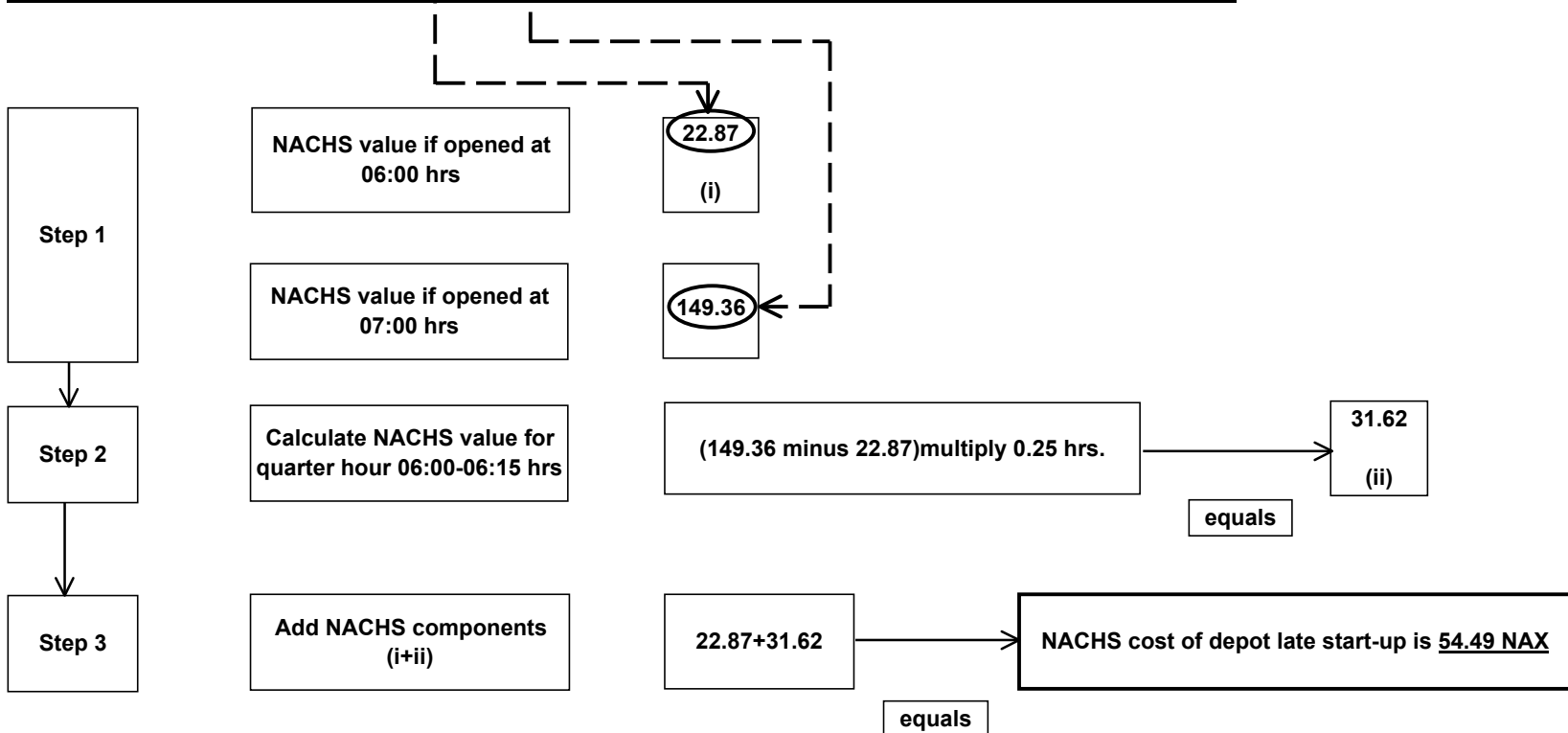
EXAMPLE DLS

QUERY STATEMENT

- * INCIDENT CATEGORY:- Depot Late Start-up
- * LOCATION:- Northumberland Park Depot, Victoria line
- * DAY:- Tuesday
- * DURATION:- from start of traffic day to 06:15hrs.

SOLUTION STATEMENT

VICTORIA LINE		Nachs Cost Of Depot Late Start								
		Did Start Time								
Depot		06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
Monday-Friday	Northumberland Park Depo	22.87	149.36	418.65	695.82	878.13	893.05	917.88	944.42	973.28
Saturday	Northumberland Park Depo	1.80	15.15	28.48	48.43	72.21	100.05	129.66	161.06	193.45
Sunday	Northumberland Park Depo	0.00	0.04	8.03	18.14	33.35	49.37	67.26	86.84	107.15



5. Full and Partial Line Closure

A partial line closure results in passengers being unable to use the line for their intended journey. As a result, passengers experience additional journey time as they transfer to other lines or modes in order to travel to their intended destination. Other lines may experience additional congestion as a result.

- FLS & PLS tables (section e). i-iii.) contain the nachs values for partial line suspensions between two or more locations, and full line suspensions.
- There are separate tables for weekday, Saturdays and Sundays.
- For partial line suspensions the incident must be described as one of the "allowable suspensions". Where the actual partial line suspension does not match exactly one of the "allowable suspensions", the closest approximation will be selected and used. **Under no circumstances should the values for two or more partial line closures be added to approximate the value for a larger single suspension.**
- Apply the hourly nachs values pro-rata within each hourly band, and accumulate across bands for the total duration of the suspension. The flow diagram examples, EXAMPLE FLS and EXAMPLE PLS, illustrate this for a suspension of the Victoria line and a suspension of services between Warren Street and Seven Sisters on the Victoria line respectively.

EXAMPLE FLS

QUERY STATEMENT

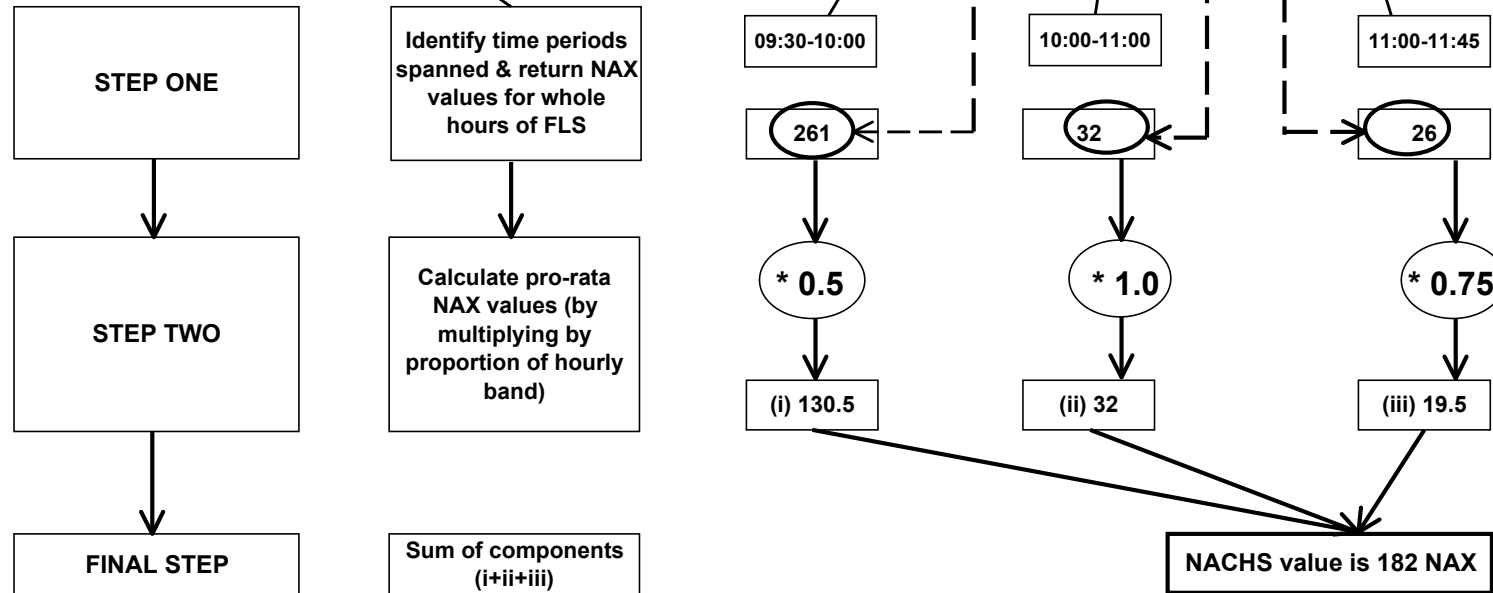
- * INCIDENT CATEGORY:- Full line suspension
- * LINE:- Victoria line
- * DAY:- Tuesday
- * TIME FRAME:- 09:30-11:45 hrs

SOLUTION STATEMENT

VICTORIA LINE **Nachs tables for Full Line Suspension, Allowable Partial Line Suspensions**

Monday-Friday

Allowable Suspensions	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00
Brixton-Seven Sisters	11	51	190	388	255	32	26	28	31	27
Brixton-Highbury & Islington	11	48	178	364	239	31	25	27	30	26
Highbury & Islington-Seven Sisters	5	22	82	167	110	16	13	14	16	14
Seven Sisters-Walthamstrow Central	3	13	47	96	63	6	5	5	6	5
Full Line Suspension	12	52	195	397	261	32	26	28	31	27



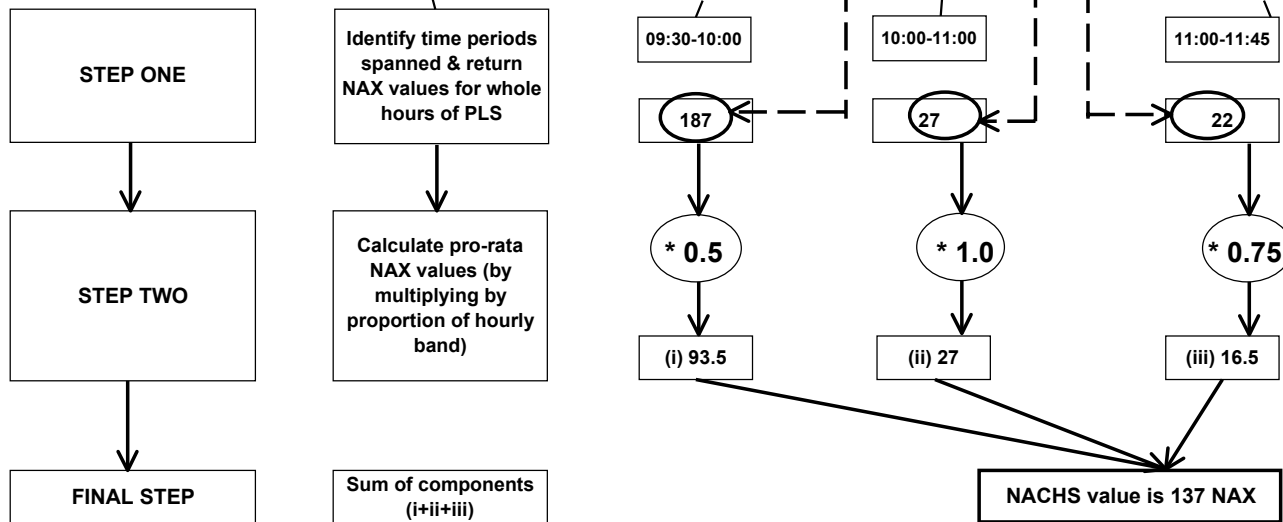
EXAMPLE PLS

QUERY STATEMENT

- * INCIDENT CATEGORY:- Partial line suspension
- * LOCATION:- Warren Street-Seven Sisters, Victoria line
- * DAY:- Tuesday
- * TIME FRAME:- 09:30-11:45 hrs

SOLUTION STATEMENT

VICTORIA LINE										
Nachs tables for Full Line Suspension, Allowable Partial Line Suspensions										
Monday-Friday										
	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
Allowable Suspensions	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00
Brixton-Seven Sisters	11	51	190	388	255	32	26	28	31	27
Warren Street-Walthamstrow Central	9	42	155	317	208	28	23	24	27	24
Warren Street-Seven Sisters	8	38	140	285	187	27	22	23	26	23
Warren Street-Highbury & Islington	6	26	96	195	128	21	17	18	20	18
Warren Street-Kings Cross	3	14	53	109	72	12	10	10	11	10
Kings Cross-Walthamstrow Central	8	37	137	280	184	25	20	22	24	21
Kings Cross-Seven Sisters	7	30	113	231	152	23	19	20	22	20
Kings Cross-Highbury & Islington	3	15	54	111	73	14	11	12	13	12
Highbury & Islington-Walthamstrow Central	7	30	112	229	150	19	16	17	19	17
Highbury & Islington-Seven Sisters	5	22	82	167	110	16	13	14	16	14
Seven Sisters-Walthamstrow Central	3	13	47	96	63	6	5	5	6	5
Full Line Suspension	12	52	195	397	261	32	26	28	31	27



6. Speed Restrictions

Speed restrictions are defined by the additional running time caused between two adjacent stations on the line. This may arise as a result of a track, infrastructure or power problem. The impact of a speed restriction is twofold. Firstly, extra journey time is caused for all passengers travelling on the affected link. Secondly, there may be an impact on the line capacity which will affect the NACHS value if the headway restriction constrains the normal scheduled service frequency. Both elements are added to produce the final NACHS estimate (although the second element may be zero).

The extent to which a restriction affects the line capacity can not easily be estimated without train performance curves and details of track and signalling configuration. However for purposes of simply arriving at a pre-estimate of loss, NACHS presents two just two alternatives to choose from, one optimistic (headways restricted flag=no) and the other pessimistic (headway restricted flag=yes). If the flag is set to "yes" then it is assumed that the additional running time directly affects the runin/runout time at the station (i.e. typically occurs within a train length of the platform edge).

- Speed Restriction tables (section f).i-iii.) contain the nachs values for temporary speed restrictions.
- There are separate tables for weekdays, Saturdays and Sundays. The nachs values apply equally to speed restrictions in either direction of operation.
- Speed restrictions are described in terms of the additional inter-station running time imposed upon an unimpeded train. nachs values are given per day for various running time increments between 10 seconds and 2 minutes. nachs values can be interpolated between these running time increments, and applied pro-rata for periods of less than one day (assuming a 20 hour traffic day Monday to Saturday, and 18 hours on a Sunday).
- The nachs value has two components. The extra running time component is the penalty that directly accrues to passengers travelling on the affected link and is always applied. The second component reflects the impact upon line capacity. If the "tph restricted" flag is set to "yes" then it is assumed that the additional running time directly affects the runin/runout time at the station (i.e. typically occurs within a train length of the platform edge). If the "tph restricted" flag is set to "no" then the restriction is assumed to be further from the station and therefore has a lesser impact on line capacity. The flow diagram example, EXAMPLE SR, illustrates this.

EXAMPLE SR

QUERY STATEMENT

- * INCIDENT CATEGORY:- Speed restrictions
- * EXTRA RUNNING TIME:- 50 secs.
- * HEADWAY RESTRICTION:- Yes
- * LINK:- Seven Sisters to Finsbury Park, Victoria line
- * DAY:- Tuesday
- * TIME FRAME:- Speed restriction from 08:00 to 16:30hrs

SOLUTION STATEMENT

VICTORIA LINE		SPEED RESTRICTIONS								
Monday-Friday		Extra Running Time (secs)								
Link	Tph restricted	10	20	30	40	50	60	90	120	
Brixton-Stockwell	Extra running time	0.80	1.60	2.40	3.20	4.00	4.80	7.20	9.60	
	Yes	6.39	19.64	40.27	67.13	99.98	121.31	238.65	353.46	
	No	0.00	0.00	0.00	6.39	19.64	40.27	121.31	238.65	
Finsbury Park-Seven Sisters	Extra running time	1.29	2.58	3.86	5.15	6.44	7.73	11.59	15.45	
	Yes	0.00	1.11	15.43	43.46	72.03	92.89	217.33	356.63	
	No	0.00	0.00	0.00	0.00	1.11	15.43	92.89	217.33	
Seven Sisters-Tottenham Hale	Extra running time	0.98	1.96	2.94	3.92	4.90	5.88	8.82	11.76	
	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.62	
	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Tottenham Hale-Blackhorse Road	Extra running time	0.64	1.29	1.93	2.57	3.21	3.86	5.79	7.72	
	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.62	
	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Blackhorse Road-Walthamstow Central	Extra running time	0.46	0.93	1.39	1.86	2.32	2.79	4.18	5.57	
	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.62	
	No	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

