Abstract

This White Paper details how the Lane Closure Database holds, collates and calculates the Lane Closure Charges that form part of the A19 DBFO Contract. The notes are given as a detailed technical description and are not intended as being a User Manual on the utility application.

This document is intended as a technical briefing on HighStone database definitions and usage - it is not written as a User Manual for the day to day operation of HighStone.

Document Summary

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Introduction

The Lane Closure Calculation facilities are based on the following details:

- Details of Traffic Flow data that has been loaded and collated from traffic counter loops located at 34 sites along the A19 network. The method of upload, collation and handling of missing or rogue traffic counter values does not form the subject of this briefing document.

- A log of actual Lane Closure layouts that have been entered in to the Red Book database and transferred in to the utility that calculates lane closures. Lane Closure records detail type of closure, location, lanes closed and length, date / time of placement and lifting, and authority instigating each closure.

- Details of Special Events, Holidays and other events that may have contributed to unusual levels of traffic flow (high or low) across the network. These events are identified so as to be excluded from costing calculations.

- Internally held representations of the table matrices that define the costing rates for various classes of Lane Closure. These tables are taken from Annex 1 to Part 3 (Lane Closure Charge) of Schedule 9 (Payments) of the Master Contract Documents.

Basic Calculation Method

Lane Closure Charges are built up from individual Hourly Charges that are calculated for each hour (or part hour) in which a lane closure is carried by a Traffic Recording Section of the Network - there are 34 sections on the network, each corresponding to a separate loop counter.

The data processing calculates an individual charge for each hour element / network section over which each Lane Closure is applied. Total charges are collated by a direct sum of the individual charge elements. The application gives a report that lists the individual charge elements and can be used to check calculation values.

Network Layout	The contract definition gives a separate charge table for Dual Three Lane and Dual Two Lane sections of the network.
	Dual Four Lane sections are not specifically identified and for such instances the Dual Three Lane charge matrix is adopted.
Lanes Closed by TM	**Dual Three Lane sections**
	A separate charge matrix is given for: only a single lane closed on a three lane section, and for 2/3 lanes closed on a three lane section.
	Dual Two Lane sections
	Only one charge matrix is given and this is applied for both one lane and two lane (i.e. full closures) closures.
	This is an apparent anomaly as there is no penalty applied for a full closure of a carriageway compared to a single lane closure.
	Dual Four Lane sections
	There is no direct provision for four lane sections and calculation has taken on a logical application of charges based on the Dual Three Lane matrix - being adjusted to reflect the lanes left open by the applied TM.
Main Carriageway / Slips affected	Charges are applied only on closures applied to the main carriageway. Closures applied to slip / access roads are not charged.
Contra-Flow Layouts	The use of Contraflow layouts is not directly addressed in the Contract Definitions. This is particularly relevant on Dual Two Lane sections where this is no distinction between a single lane closure and a full carriageway closure. Thus:
	• If each carriageway direction is considered separately - each side carries a single lane reduction in available traffic flow. Therefore a full charge is applied in each direction (two units of charge)
	• Alternatively, the charge could be based on one carriageway being fully closed (one unit of charge) - but the other being left fully open [albeit running both directions] (incurring no charge). In this instance only one unit of charge is applied overall.
	Current practice is to apply the second option - recording a full

	closure on the carriageway closed, and no closure applied on the side carrying all traffic. Contra-flow on three lane sections are not subject to this anomaly to the same degree.
Instigating Authority	Closure Charges are not applied against lane closures laid out as a direct consequence of an accident or other safety issue. Charges are also not applied when a closure is laid out at the request of a third party authority.
Date of Closure	The date of closure is used as the basis for determining the traffic flow that would be expected at the target location. As live traffic values at the time of the closure are not available / reliable as being truly representative, the application looks back one week to pick the traffic flow for the same weekday / hour at the same location. In order to ensure the chosen data is representative the lookup will not select the following: • Dates where Lane Closures are in place • Dates where traffic flows have been 'patched' for reason of lost / partial data • Dates declared as Special Events or Holiday periods The lookup will step back through weekly intervals until a valid date can be picked up. The selected date is included on the final calculation data report.
Traffic Flow Values	The Traffic Flow is taken as the sum of individual traffic flows for all live lanes at the target site. The calculation is based on the following values: • Gross hourly traffic flow for all vehicles • Percentage of these vehicles that are classified as HGVs. The gross traffic flow can be taken from the monthly spread sheets of traffic flows. Note that the Charge Matrix values given in the contract are extremely punitive. Once the minimum threshold is reached the charges ramp up very steeply as the gross traffic flow increases. It is this aspect that sees gross charges running away in to very high values when the network is busy.
Gross Traffic Flow Thresholds	The matrix used to determine closure charges defines a minimum traffic flow below which charges are not levied, and a maximum traffic flow above which the charge is fixed. The low / no charge traffic flows are: • Dual Two Lane - All instances - 1200 v/hr • Dual Three Lane - 1 lane closed - 2400 v/hr • Dual Three Lane - 2 or 3 lanes closed - 1200 v/hr The high / maximum charge traffic flows are: • Dual Two Lane - All instances - 3055 v/hr

	• Dual Three Lane - 1 lane closed - 4199 v/hr
	• Dual Three Lane - 2 or 3 lanes closed - 4199 v/hr
	Charges for hourly traffic flows between these ranges are determined by linear interpolation between columns on the relevant table.
Lane Closure Length	The matrix tables provide charge costs for lane closure lengths at 1 km (this is a minimum charge), 3 km and 5 km (this is a maximum charge).
	Charges for closure lengths between 1km and 3km within any one section are determined by linear interpolation between listed values.
Percentage HGV Traffic	The matrix tables provide different charge costs depending on the percentage of HGVs within the target hourly flow. The tables list percentage values of between 10% (a minimum threshold) and an upper limit of either 25% [for Dual 2 lane sections] or 30% [for Dual 3 lane sections].
	Charges for HGV percentage values between 10% and the upper limit are determined by linear interpolation between listed values.
Part Hour Adjustment	All charge calculations above are based on a closure over a full hour.
	Where a closure is in place for only part of an hour the charge raised is proportioned in line with the actual time the closure applies.

Validation of Lane Closure Calculation

Closure Reference Number

Date of Closure	Hour of Closure
Network Section No	Length of Closure
Road Number	Direction of Traffic
No Lanes Available	Mins in Hr of Closure

Closure Position   Carriageway / Slip / Off Network

Lanes Closed   L1 - L2 - L3 - L4

Closure is Chargeable   Yes / No

Date of Source Traffic
Gross Traffic Flow /Hr   Percentage HGV

Source Traffic Data

	Non HGV	HGV	Total	% HGV
L1				
L2				
L3				
L4				
Total				

Charge Table Used

T 1 (Dual 3 - 1 Closed) / **T 2** (Dual 3 - 2/3 Closed) / **T 3** (Dual 2 lane)

Nearest Charge Values from Table Matrix for Full Hour Charge	Closure Length	Expected Hourly Flow	% HGV in Hour	Specified Charge

Estimated Hour Charge   Est Charge if Part Hour

Actual Calculated Charge   Charge Calc Seems Valid