



# Traffic Signal Maintenance – Going Alone

An insight into setting up an  
in-house First-line Traffic  
Signal Maintenance Service

Robert Dean  
Via East Midlands  
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[www.viaem.co.uk](http://www.viaem.co.uk)  
Tel: 0115 804 2100

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## Introduction

This report shares our experience of setting up a first-line traffic signal maintenance contract and challenges met in the first year of operation. What do you need to Go Alone?

Via East Midlands Ltd was created in 2016 and is a private company wholly owned by Nottinghamshire County Council (NCC). Many of the staff and highway services provided by Nottinghamshire County Council transferred over to Via in 2016, specifically, in this case, traffic signal design and installation.

## Starting Point

As of July 2020, we maintained 475 traffic signal installations across the County of Nottinghamshire. The first line maintenance of traffic signals was maintained via a third-party (Dylniq) using an attend and fix contract across three main fault categories:

- Emergency – 1hr attend, 1hr Fix (24hrs)
- Urgent – 2hr Attend, 2hr Fix (05:00 – 23:59)
- Non-urgent – 8hr Attend, 8hr Fix (06:30 – 18:30)

The contractor was also responsible for the switch on / off service, of which there were over 300 such requests in the year ending 30<sup>th</sup> June 2020. The first line maintenance contractor is also responsible for over 500 vehicle activated signs. The maintenance contract also included an annual inspection at each site. Dylniq had provided a good service, always meeting contractually set KPIs. Bringing the service in-house would enable Via to better complement the existing signal maintenance and installation activities, providing better value for money and flexibility.

Second line maintenance, including pole, equipment and RTC repairs, was carried out by our dedicated in-house traffic signal installation team. Via has provided this second line maintenance for many years (previously as NCC Highways Operations) as well as carrying out a full traffic signal installation service. In recent years the scope has widened to include the installation of VAS, CCTV and communication networks for traffic signals.

The Via Traffic Signals Design and Network management team was responsible for the day to day running of all ITS systems across the county as well as performing the client role for maintenance and works on behalf of NCC. Over the years the team has been fortunate to retain a core of engineers providing the full traffic signal design package as well as specialisms such as traffic signal controller configurations (including FAT's/ Green Conflicts on our in house test bed), MOVA and SCOOT design/validation, and CCTV / IP Communications system installations.

Nottingham City Council run the joint Nottingham / Nottinghamshire Urban Traffic Control Centre (UTCC) based at Loxley house, Nottingham. The UTCC monitors traffic conditions via our network of CCTV cameras and make alterations to timings where necessary. The UTCC also monitor faults coming in on RMS / UTC and interrogate them before passing to the relevant contractor via the Fault Management System (FMS). The UTCC act as a central hub for all traffic signal operations as well as administering the SOSO requests.

In support of the 4 main operations above we have a separate contract with a slot cutting contractor (EMDD Universal) for the repair of detector loops and with Swarco for further repairs of VAS. A controller supply contract is also in place.

## History 2016-2020

We were first asked to look at bringing maintenance back in house when Via was created in 2016. At this point the project was not progressed due to the following issues:

- Lack of Asset Data
- Lack of a Via owned Fault Management System (FMS)
- Lack of day to day experience of fault-finding and running a contract
- Lack of spare parts for legacy traffic signals equipment

Without a Fault Management System and asset management system it is incredibly difficult to correctly assess the condition of the assets owned out on street. The incumbent First-line maintenance contractor provided an FMS as part of the traffic signal maintenance contract but the data was not owned by Via.

The lack of a suitable asset management database also gave rise to extra work when being asked to provide info for all kinds of traffic signal data to central government. Our database consisted of several lengthy spreadsheets, not ideal!

## Imtrac

In 2017 we purchased the Imtrac fault management system from Ian Routledge Consultancy (IRC). With help from Peter Routledge we were able to import all our current data into the system and built up a picture of the current condition of our asset. The system allowed us to store an accurate site and pole based record of all equipment. It should be noted that to achieve this a considerable effort was put in by the design team to get data from every piece of equipment of the 475 signal sites into the system. The fault management system was also set up in parallel and the incumbent maintenance contractor began to use it in 2017.

The use of Imtrac enabled us to record KPI's accurately, record PI's accurately on site and access a whole range of data out on street which had not previously been available.

Fault ID	Site ID	Address	Type	Fault Description	Severity	Reported By	Reported To	Reported	Status	Attended By	Attended	Close By	Actions
F-013550	J18211	Radclyffe Road / Regatta Way / Ambleside - Gamston	Signals	Vehicle phase lamp fail, phase 1 Red T5R - Vehicle Red Lamp Out	Non-Urgent	Donna Bradley	VIA,EM - Maintenance	05/08/2021 - 07:08	Sam Chapman due on site TBC	05/08/2021 - 15:08	-	Within 8 hours of att.	On Site, Review ETA, Cancel, Recategorise, Add Note, Add/Get Photo, Add/Edit Photos
F-013549	J51431	Kings Mill Rd East/Kirkby Rd/Sutton Rd - Sutton in As...	Signals	Detection fault T550 - Detection Faults	Non-Urgent	Donna Bradley	VIA,EM - Maintenance	05/08/2021 - 06:30	Steve Harrison due on site TBC	05/08/2021 - 14:20	-	Within 8 hours of att.	On Site, Review ETA, Cancel, Recategorise, Add Note, Add/Get Photo, Add/Edit Photos
F-013548	J51351	Kings Mill Rd East/Hospital Entrance - Dalethorpe	Signals	Lamp fault TS10 - Single Lamp Out	Non-Urgent	Donna Bradley	VIA,EM - Maintenance	05/08/2021 - 09:28	Steve Harrison due on site TBC	05/08/2021 - 14:30	-	Within 8 hours of att.	On Site, Review ETA, Cancel, Recategorise, Add Note, Add/Get Photo, Add/Edit Photos
F-013546	J82191	Cipstone Rd/Pump Hollow Rd/Old Mill Lane - Forest	Signals	Vehicle absence fail detector 171C7X T556 - Detection Faults	Non-Urgent	Syd Shaw	VIA,EM - Maintenance	04/08/2021 - 14:17	Temporary Clear	05/08/2021 - 10:17	04/08/2021 - 15:08	05/08/2021 - 11:08	On Site, Review ETA, Cancel, Recategorise, Add Note, Add/Get Photo, Add/Edit Photos

## Project team

In 2018 we were again asked by senior management to investigate Going Alone with the first line traffic signal maintenance. This time we were better prepared and had already addressed some of the issues that had stopped us before. We now had an FMS with data we trusted. We had saved up a considerable stock of spares. We had also recently employed additional staff with experience.

A project team was created to further develop the plans which included:

Myself – Responsible for traffic signal maintenance on the client side

Chris Ashton – Team Manager, Traffic Signals Design

Mark Howarth – Traffic Signals Manager (Installation)

Adrian Foster – Team Manager Signals and Lighting (Operations)

The project team was able to draw on over 80 years experienced combined in the field of Traffic Signal Design, Installation and Maintenance.

The addition of Adrian Foster, who had recently joined us, gave us the experience in first line maintenance that we had been lacking back in 2016. Adrian previously started his career as an engineer back in the 1990's working for the Traffic Signals Cooperative, Siemens and Peek/Dynniq.

## Project Plan

The project team identified a number issues that would need to be addressed before the service could be delivered including:

- Cost – A key requirement - what would the service cost to run? What was the expected income/expenditure?
- Vehicles – Suitably racked-out vans would need to be supplied.
- Personnel – Engineers would need to be employed and job descriptions written.
- Spares – An inventory of our existing equipment on site and in stock would need to be taken.
- Repairs – who would carry out board and parts repairs?
- ICT – tablets, laptops and mobile phones would need to be provided.
- Tools and Equipment – ladders, multi-meters, hand tools etc.
- Storage – Safe and secure storage area would be required as well as a controller test bed.
- Call-Out – rotas and a call-out procedures had to be produced.





*Test Bed, Spares and Vehicles, All Part of The Jigsaw*

The project team met monthly to discuss progress the many issues above. After looking at most of the items, we were able to put together a fully costed business plan that was presented to the Via East Midlands senior management team. Permission and finance was given to proceed with the project was given in late 2018.

## Personnel

As we began to look in detail at project risk register, we began to realise that there was significant risk – Personnel, especially maintenance engineers that would be carrying out the work.

The current contract, with Dynniq, was subject to TUPE regulations, this meant that we had the potential of receiving all three of the current engineers or zero! Receiving all three would have given us a serious headache on the finances of the project and receiving none would've made it impossible to deliver the service.

TUPE is always difficult to predict, so, in order to mitigate the risk and protect the service level, we employed a Senior Engineer / Supervisor a few months before the contract start date. We also transferred a member of staff from our installation team to maintenance hoping that his experience with signal installation and controller wiring would be a good base.



*Engineers at work!*

It is important to point out at this point that fully qualified domestic / street lighting engineers are NOT traffic signal installers / engineers. It can take an experienced electrician years to become an experienced traffic signal installer and similarly with an installer moving on to an engineer's role. Getting these two members of staff in place allowed Via to manage the

contract should the worse happen and receive zero members of staff on TUPE.

To further mitigate the risk of personnel shortages other members of the design and installation team (including myself) were on standby to pick up our tools and get out on site.

Two weeks before the contract started, we were given the news that we would be receiving one engineer bringing our numbers up to three for the contract start date, perfect.

## Contract Start

On 1<sup>st</sup> July 2020 Via East Midlands took over the first line-maintenance of all traffic signal, CCTV and VAS equipment within Nottinghamshire. At this point we were amid the COVID-19 outbreak and much of the initial preparation had been delayed meaning that engineers started without properly racked out vans, a bespoke storage unit or a full complement of engineers.

Notwithstanding the above the first month's results were good (see below). NCC's 90% target for KPIs had been met in all but one category, the attendance time for urgent faults. Although compared with the same month the previous year the figures are a little lower mainly down to teething problems at the start of the contract.

### FAULT DATA & KPIS FOR THE FIRST MONTH OF VIA'S IN-HOUSE TRAFFIC SIGNAL FAULT MANAGEMENT SERVICE

	Fault Category	VIA (July 2020)	Previous Contractor (July 2019)
Number of Faults Attended	Emergency	0	1
	Urgent	35	26
	Non-Urgent	242	174
	<b>Total</b>	<b>277</b>	<b>201</b>

KPIs (Target 90%)			%	%
	Site Attendance	Emergency		N/A
Urgent			82.86	100.00
Non-Urgent			96.69	98.85
Full Clear	Emergency		N/A	100.00
	Urgent		91.43	96.15
	Non-Urgent		93.80	90.00

	First Fix	Emergency	N/A	100.00
		Urgent	94.12	100.00
		Non-Urgent	93.28	87.86

To address some of the attendance issues we were able to advertise and recruit an additional maintenance engineer to the team a few weeks later.

## Challenges

### *Covid-19 Pandemic*

The Covid-19 pandemic was a challenge that none of us expected , a decision was made by our leadership team in late March 2020 to suspend all non-essential activities one such activity was deemed to be full inspections (PI's) This resulted in a backlog of over 200 signal sites and Vehicle Activated Signs at the start of the contract which would now need to be completed by Via.

Staff isolation and quarantine affected service standards. We were also not immune to this and have had engineers off many times, but we worked flexibly to achieve the KPIs.

### *Nottingham Express Transit Tram System Installations*

Nottinghamshire County Council accepted maintenance responsibilities for the traffic signal junctions along the Nottingham Express Transit (NET) tramway in Nottinghamshire at the start of the contract. A new procedure had to be produced to maintain these traffic signal junctions in discussion with NET operators. Many of the works at tram sites must be carried out overnight or in pairs with specific training and equipment required.



## *EU Working Time Directive*

Our initial thoughts on working hours for the service revolved around the 4 engineers working a day shift Mon – Fri with an engineer on standby to cover faults that may come in overnight and at the weekend. A standby engineer could pick up any programmed works including switch off / ons. The maintenance engineers would be on standby once every 4 weeks.

Following discussions with our HR team it was noted that our engineers must comply with the company's fatigue policy. This uses part of the 1998 Working Time Regulations which lays down minimum conditions relating to weekly working time, rest entitlements and annual leave.

This means that if the standby engineer is called out at 3am and their rest period is broken that they must take a further rest break (of at least the amount of time they lost) at the earliest opportunity meaning that the next day's shift would start later – possibly after lunch!

The above means that the standby engineer could not take on the switch on / offs, as this is classed as planned work, as it would likely put them over their working limit if they worked a busy Saturday/Sunday. In order to overcome this issue, the planned works, switch off/ ons etc, must be carried out by another maintenance engineer.



## **1st Year Results**

A complete project review has been undertaken at the end of our first year of first line maintenance. The review has had extremely positive outcomes.

As shown below Via exceeded all the contractual KPIs for our client, NCC. Via also showed an improved performance on the previous contractor in the 'Full Clear' and 'First Fix' categories but were fractionally lower in 'Site Attendance'.

This is a fantastic achievement considering that the service was set up from scratch and we are not a large nationwide contractor running multiple contracts, nor do we have our own



manufactured equipment. Nationwide contractors are able to mobilise additional personnel if cover is needed and have a large stock of equipment and spares on which they can draw on. In comparison, Via needed to recruit the necessary qualified personnel and bring in all the parts needed for repairs.

**FAULT DATA & KPIS FOR THE FIRST YEAR OF VIA'S IN-HOUSE TRAFFIC SIGNAL FAULT MANAGEMENT SERVICE**

		<b>VIA (01/07/2020 - 30/06/2021)</b>	<b>Previous Contractor (01/07/2019 - 30/06/2020)</b>
Number of Faults Attended	Emergency	14	15
	Urgent	347	332
	Non-Urgent	2182	1722
	<b>Total</b>	<b>2543</b>	<b>2069</b>

			%	%
KPIs (Target 90%)	Site Attendance	Emergency	78.57	60.00
		Urgent	96.83	94.58
		Non-Urgent	95.88	97.04
	Full Clear	Emergency	100.00	100.00
		Urgent	95.80	92.38
		Non-Urgent	94.73	92.47
	First Fix	Emergency	93.33	86.67
		Urgent	94.24	91.94
		Non-Urgent	92.29	90.30

In particular, the 'First Fix' performance (fault assessed and repaired in the first visit) gives a

clear indication that the right equipment and spares are being carried on the vehicles and that the engineers have the correct skill set to complete the repair on a single visit. Traffic signals are being repaired more quickly and the public / councilors are provided an improved service. Via dealt with almost 500 more faults than the previous year (23% increase), mainly due to a pre-existing batch of failing lamps.

Overall an excellent set of results for the first year.

## Cost

A direct cost comparison of the service is very difficult to do, previously Via would have paid a maintenance contractor quarterly a value calculated on how many sites were being maintained. It is not possible, at this point, to put a "per site" value together as Via's current costs include first year initial set-up and equipment/spares.

We have been able to make savings to the overall signals maintenance cost due to more efficient working i.e. an attending engineer will carry out other minor repairs that previously would have been carried. Having personnel who have vision of the full site ownership ensures a right first-time fix mentality.

The income from providing the traffic signal Switch-on/Switch-off service (SOSO) can be reinvested into the traffic signals section. This has enabled some offset of the initial set-up costs.

## Advantages / Disadvantages of Going Alone

### Advantages

- Greater flexibility
- Cost Savings and SOSO plough back
- Full ownership
- One Team mentality

The addition of the first line maintenance and fault management service now gives Via a complete service for traffic signals from concept to ongoing maintenance. This allows movement of personnel between the teams to reflect peaks and troughs in workload and staff progression.

Examples of this more flexible working include: First line engineers staying on site with installers to repair damaged equipment; Engineers assisting the design engineers in setting up detectors and CCTV pre-commissioning making site commissioning run more smoothly; Installation operatives have been trained-up to carry out PIs when required.

### Disadvantages

- No nationwide back up for extenuating circumstances
- Spares stock needs to be well managed
- No one else to blame!

## Conclusion

Going Alone **IS** possible!

- Preparation is Key – manage the risks
- Personnel is No.1 priority
- Simple issues take time to overcome – devil is in the detail

## Future

We will be continuing with First line Traffic Signal, CCTV and VAS Maintenance for Nottinghamshire County Council into the future.

To continually improve our service to Nottinghamshire County Council we are always looking at innovative ways to improve the way we do things and the services we can offer.

We are currently expanding first line maintenance into other areas such as Speed Enforcement / Safety cameras.

Where next?