Okehampton Market Street Junction

Review of Operation and Potential for a Double-Mini Roundabout Layout

1. The Problem

1.1. There is a perception that the Okehampton Market Street/Fore Street traffic signals cause excessive queues and delays at busy times of the day. To quantify the problem observations of traffic flow were carried out over 4 days for 4 one-hour periods during February 2025. The survey involved taking videos of the operation of the signals and traffic queues. The time periods included busy times such as school pick up and peak Saturday morning.

1.2. The junction is not a standard 4 way cross roads, it is a staggered cross road as George Street and Market Street are offset. Also, the entrances to Market Street and George Street are restricted in width, consequently the stop lines are set well back to allow plenty of space for the swept path of large HGV vehicles as they turn in. The geometric implications of the staggered junction and the set back of the stop line results in long "intergreen" times (all the signals are red) between the green phases of the signals to allow vehicles to safely clear the junction between the stages. The implications on the operation of traffic lights is there is a lot of "lost" time when no vehicles are moving.

1.3. The observations did not demonstrate excessive queuing, which could be defined as when a vehicle must wait for more than one green phase of the lights. This is due to the traffic signals, which operate under a computer software system called MOVA[1] (Microprocessor Optimised Vehicle Actuation) which includes elaborate vehicle detection. MOVA is very responsive to the traffic demand and extends the green period when demand increases, see Annex Slide 3. The combination of the geometric challenges and the variation in signal timings results in long delays to traffic up to 2 minutes.

1.4. It was also observed that there is a steady demand for pedestrians to cross all 4 arms of the junction (Slide 4). There are no specific pedestrian facilities consequently pedestrians must cross during the "intergreen". In practice pedestrians were observed to be very adept at this, vigilantly crossing when the lights were red, although sometimes getting stranded in the middle of the road on Fore Street.

2. There are Some Specific Issues

2.1. **Market Street** experienced long queues at the signals, sometimes up to 30 cars used the signals at one green phase, see Slide 5. The queues occasionally extended back to the exit from the Waitrose Car Park but almost always cleared in one green phase of the lights. The operation of the pedestrian crossing created gaps in the traffic, which occasionally interrupted the detection of the signals and green times were not extended sufficiently for the vehicles to clear the stop line.

[1] MOVA assesses the traffic flows approaching on each arm of the junction and then calculates which arm should be allocated what green time and seeks to determine a set of signal timings which will maximise the throughput of the junction under the current conditions.

2.2. **Fore Street** has two lanes at the stop line. The dominant movement is from Fore Street to Market Street. The nearside straight ahead and left turn lane, regularly gets blocked off either by parked cars or vehicles queuing in the right turn lane. The signals operate very efficiently sometimes extending the green time to almost 1 minute which allows nearly 30 vehicles to cross the stop line.

2.3. Service buses were observed to use Fore Street and turn right into Market Street. Currently they can make use of the full width of the road. No large HGVs were observed undertaking this manoeuvre during survey periods. Traffic counts show a very low number of large HGVs turning into Market Street, approximately 4 a day.

2.4. **George Street** has a surge of school bus coaches (approximately 14) entering the junction and at around 3.30pm, Slide 6. This is accommodated by the traffic signals over 2 or 3 cycles of the lights. So there is some delay.

3. Potential for a Double-Mini Roundabout Layout

3.1. Various options have historically been considered to improve the operation of the junction. An option that has probably not been consulted on is a Double-Mini Roundabout, see Slide 7. The Market Street junction lends itself to make such an option possible:

- Fore Street is a wide road with space for a 12 metre diameter roundabout.
- The staggered nature of the junction.
- The Double-Mini roundabout splits all the movements and conflict points, so although there are more conflict points each conflict point has less vehicles, see Slide 8.
- There are very few large HGVs, see Slide 9, that take up a large swept path area when turning and entering the side roads. The drivers of these types of vehicle are skilled at managing such situations.

3.2. The two layouts, existing signals and Double-Mini roundabout, have been modelled using the junction capacity software and traffic count data provided by Devon County Council. A summary of the results is shown in Slide 10. This shows that the Double-Mini layout has greater capacity and traffic queues are reduced. In terms of delay, during busy periods, the average delay per vehicle will reduce by almost 1 minute or 60%. This equates to almost 20 hours total delay for all vehicles for each of the busy hours, which will also have a significant environmental benefit.

3.3. The Double-Mini option has a risk that it could be overwhelmed if there were a large increase in traffic However, this risk must be balanced against the limited capacity of the surrounding road network. It is unlikely Fore Street can accommodate a substantial increase in traffic due to the urban nature of the road and the number of junctions and pedestrian crossings.

3.4. The sketch layout, see Slide 7, provides facilities for pedestrians. The layout shows zebra crossings on 3 arms and a signalised crossing on Fore Street, potentially using the existing traffic island. It is recognised there would be two signalised pedestrian crossings approximately 80 metres apart, but this is considered acceptable in the central shopping areas of Market Towns where there are high numbers of pedestrians.

3.5. The Market Street junction must accommodate several service buses mainly turning from Fore Street into and out of Market Street. The swept path of service buses, see Slide 11, shows that the wide width of Fore Street allows these movements to take place within the available footprint. School buses can exit from George Street without any geometric constraint. Allowing the number 12-16 to exit over a short period of time requires some innovation. A potential solution is to use the signalised pedestrian crossing to create gaps in traffic to enable vehicles to exit from George Street for a short period of time.

3.6. A summary of the "pros & cons" comparing the existing signals to a double-mini layout is provided in Slides12 & 13.

4. Conclusion

4.1. The assessment systematically outlines the operational inefficiencies and safety concerns of the current junction. It then presents a reasoned case for a Double-Mini Roundabout which reduces delays by almost 60%. This is supported by observations and traffic modelling and addresses the potential challenges such as accommodating large HGV vehicles, pedestrian movements and increased volume of traffic.

08th July 2025

Annex

Slide 1 - Okehampton Market Street Junction April 2025

Problem

Perception that traffic experiences long delays on all arms of Market Street Junction

In some instances, traffic tails back into School Way and blocks the exit from the car park

It is the common view that the signals are causing the problem of long wait times

Work to date

Observations of the operation of the junction over 4 days for 4 one-hour periods, albeit during February – taking videos of the operation of the signals

Provisional modelling of a double-mini roundabout alternative

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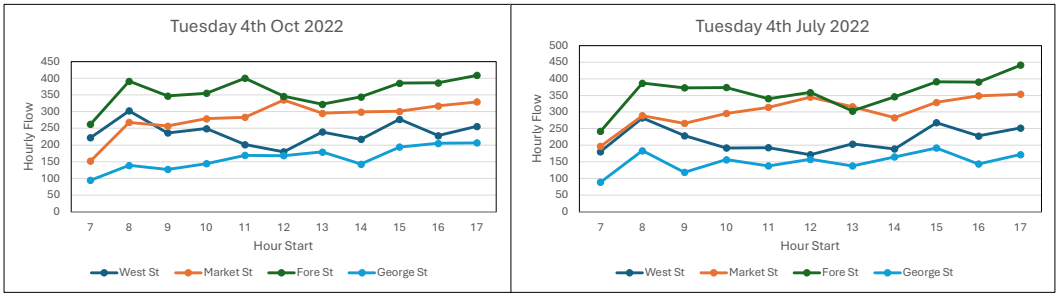
Slide 2 - Traffic Flows



	AADT	Av Speed	Speed 85%
2025	9970	25.2mph	32.6mph
2024	10756	28.2mph	34.1mph
2023	10718	28.8mph	34.6mph
2022	10328	28.2mph	35.2mph

Flows October and July Similar
Traffic flows similar 2023 to 2024
Fairly flat daily profile
Peak Hour 17.00-1800 on most arms

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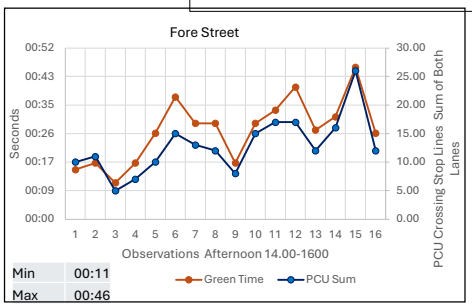
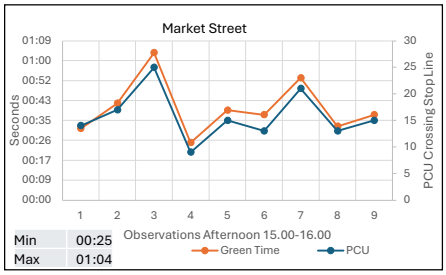
Slide 3 - Okehampton Market Street Junction – Signal Operation



Min	00:11
Max	00:46



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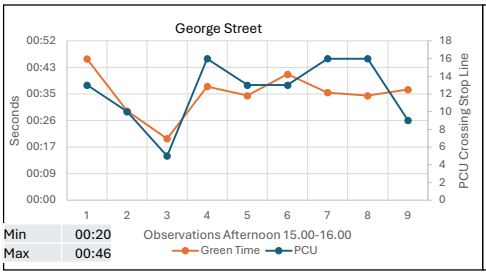
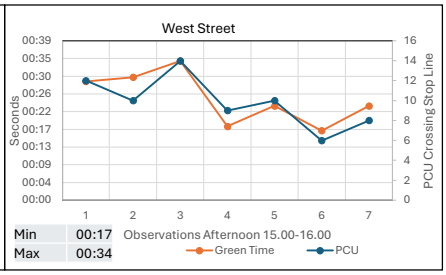
Max	01:04



Min	00:20
Max	00:46



Min	00:17
Max	00:34

Observations:

No vehicles left waiting at end of green time

Good correlation between signal timings and demand flow

Big variation in green times

Cycle time varies between 2 & 3 mins average 2.5mins

Wait time 1.5 – 2mins

Note: March 2025 observation -16.00-17.00 5-10% lower than peak flows

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Slide 4 - Okehampton Market Street Junction - Pedestrians

Pedestrian survey Tuesday 17th February 11-12.00. During Half term

Pedestrians are geared up to the operation of the traffic lights. They patiently wait and confidently cross.

It works quite well even though there is no green man

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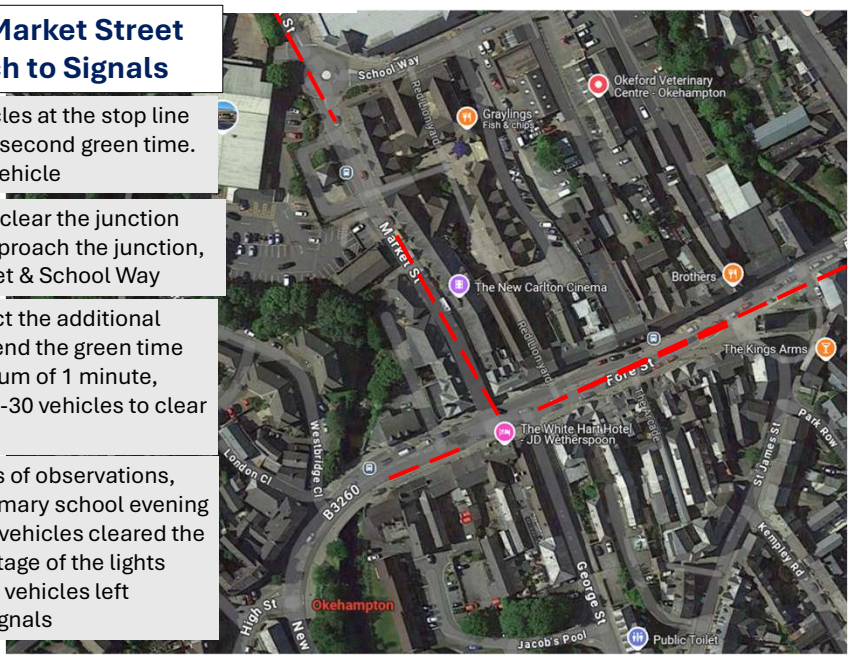
Slide 5 - Market Street Approach to Signals

Typically, 5 vehicles at the stop line would trigger 10 second green time. (2 seconds per vehicle

As the 5 vehicles clear the junction more vehicles approach the junction, from Market Street & School Way

The signals detect the additional vehicles and extend the green time to up to a maximum of 1 minute, allowing up to 25-30 vehicles to clear the junction.

During the periods of observations, which covered primary school evening pickup period, all vehicles cleared the junction in each stage of the lights and there were no vehicles left queueing at the signals



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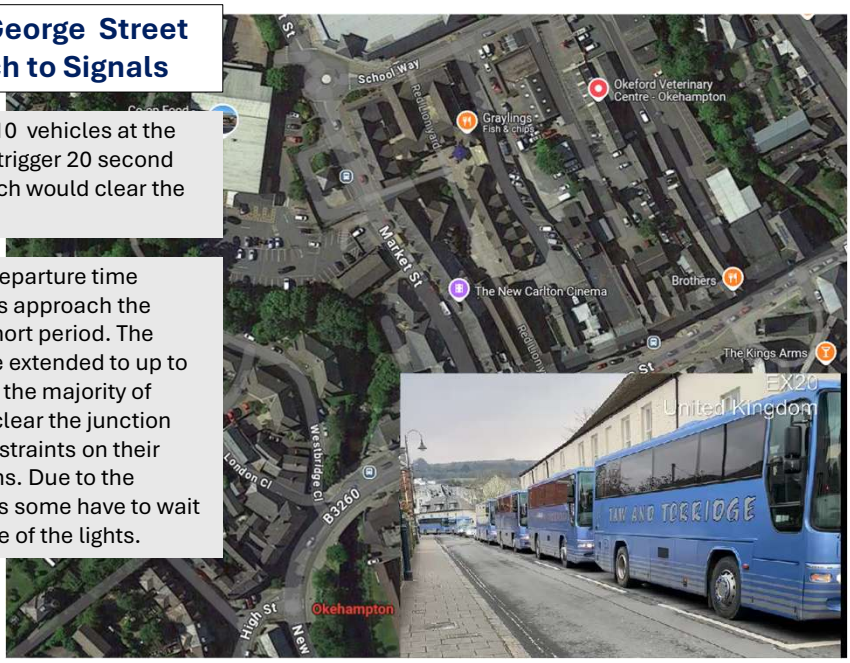
Slide 6 - George Street Approach to Signals

Typically, up to 10 vehicles at the stop line would trigger 20 second green time. Which would clear the junction.

But at College departure time numerous buses approach the signals over a short period. The signal timing are extended to up to 50 seconds and the majority of vehicles safely clear the junction without any constraints on their large swept paths. Due to the number of buses some have to wait for the next cycle of the lights.



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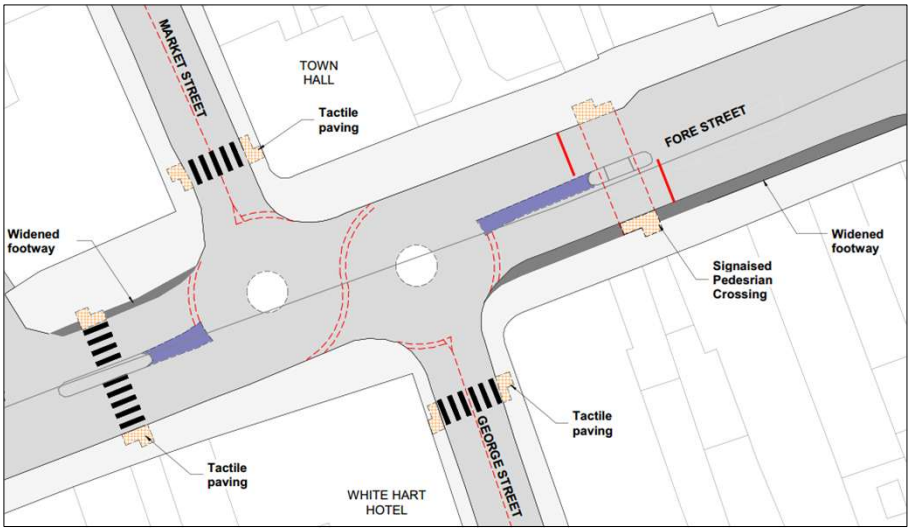
Slide 7 - Okehampton Market Street Junction – Potential Double Mini Roundabout Schematic Sketch



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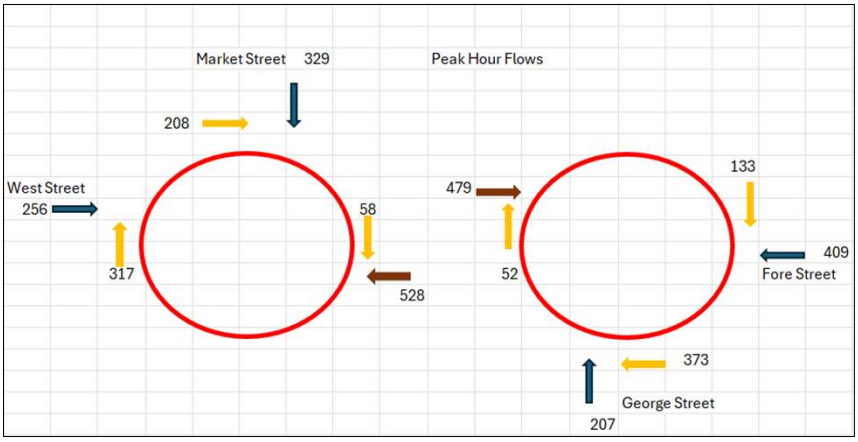
Slide 8 - Double Mini – Conflict Point



The Junction is staggered, the double-mini layout splits the traffic up and reduces the volume of traffic at each conflict point

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Slide 9 - Okehampton Market Street Junction – Large Vehicles

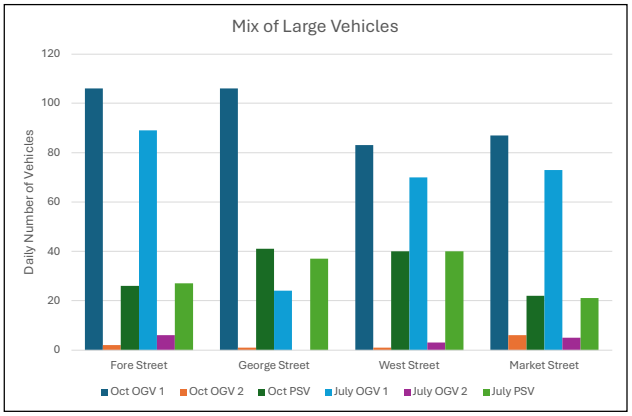
Lots of goods vehicles as would be expected

Hardly any large heavy goods vehicles (OGV2)

Significant number of buses on all arms

Buses entering George Street from Fore Street -1 or 2 observed

Very few large goods so the chance of two meeting is very small



Other Goods Vehicle 1 (OGV1) Classification Includes all rigid vehicles over 3.5 tons gross vehicle weight with two or three axles.
Other (Large) Goods Vehicle 2 (OGV2) Classification Vehicles under this category are rigid vehicles with four or more axles and all articulated vehicles.
PSV – Bus & Coach

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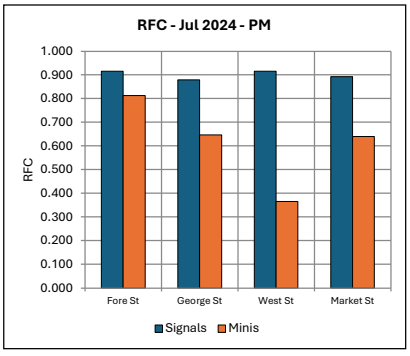
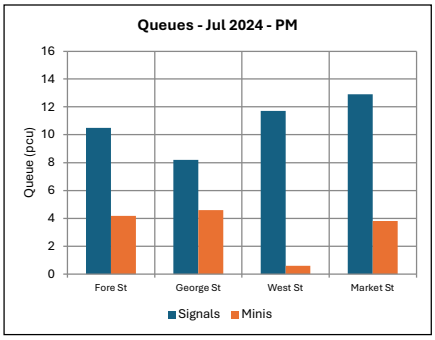
Slide 10 - Okehampton Market Street Junction - Comparison Signals with Double Mini





The signals do work within capacity
The double mini would have greater capacity

The signals cause queue/delays to traffic as the signal timings can be as long as 1.5 -mins
The double mini has less delays

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Slide 11 - Double Mini showing Bus Swept Paths

Swept path for buses are mostly acceptable.

The exception for buses being from Fore Street to George Street but only 1-2 were observed?

Swept path for large goods vehicles is problematic but there are very few and are likely to manage.

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Slide 12 - Pros & Cons of Signals

Pros	Cons
Observations shows traffic clears the signals on each green stage, with the exception of George Street when the college buses leave.	Long times between green stages due the staggered nature of the junction and the need for swept path of large vehicles. At normal demand, 20% of the capacity of the junction is lost.
Due to the wait between the green time there is time for pedestrians to cross the road on all 4 arms.	There is a long wait at the signals due to the 4 stages and expansive nature of the junction, this results in blocking back at busy times on approach roads e.g. Waitrose roundabout.
There is room for the swept path of large vehicles	If demand is high the ahead lane of Fore Street is frequently blocked. Also, the green times on busy arms increase and overall vehicle delays increase before they get a green signal.
Copes with surges in demand by extending the green time	Pedestrians have to nip across the road in the intergreen and occasional get stranded in the middle of Fore Street

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Slide 13 -Pros & Cons of Double Mini Roundabout

Pros	Cons
During typically busy periods it would operate with few delays and traffic would have reduced wait times.	It would struggle to accommodate surges in demand. George Street school buses could cause congestion for a short period.
There is some spare capacity in the double mini option based on the survey period.	Swept paths of large vehicles could intimidate other traffic and could cause delays. Although there are very few large vehicles
Fore Street is wide and there is room to accommodate a double-mini roundabout option with sufficient space for cars and most large vehicles to pass each other.	If traffic demand increases substantially it is likely that the junction will reach capacity. But so will the overall road capacity.
Pedestrian facilities would be improved, potentially zebras on 3 arms and a signalised crossing on Fore Street.	The surge of school bus exiting George Street issue could possibly be overcome with an adjustment to the red times on the pedestrian crossing on Fore Street, at15.30pm.

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