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### Introducing the Amazing Spaghetti Junction

On May 23 2022, one national newspaper ran the following headline, “Spaghetti Junction at 50: how the fabled Midlands interchange put Birmingham on the map”. In 1972 the architectural critic Reyner Banham celebrated the “close-packed curving and intersecting perspectives of double files of columns, a big Brummagem artwork”.

Significantly, the complex, layered concrete and steel structure – whose principal engineer was the London-born architect Evan Owen Williams – brought together national and local highways, ushering traffic into the city of Birmingham via the multi-lane Aston Expressway.

It has always been more than just a traffic junction to Highways Patrol officer Steve Price who says it holds a special place in the hearts of many Midlands residents who said the famous motorway interchange was “a thing of beauty”, and admits “you either love it or hate it”.

#### **For drivers new to the interchange – some navigational help**

Its numerous carriageways, supported by over 550 concrete columns, tended to mesmerise some motorists and having to make quick decisions whilst travelling at 50 mph made some people anxious of getting on to the wrong carriageway that would take them miles out of their way. A note - if you wanted to drive along every road at Gravelly Hill Interchange, you would need to travel about 73 miles. The Birmingham Mail produced a three-part cut-out-and-keep guide, advising them to “use your eyes, drive on the signs, and you will untangle Spaghetti without trouble”.

Large scale road projects have always had their detractors for many reasons. There were from the start activists who challenged the positioning of such a large junction in the middle of housing and the effects that would have on public health, particularly for children whose schools were relatively near to the junction. Although an engineering marvel, it came at some cost to local communities and the environment. To make way for its 12,655 tons of structural steel and 175,000 tons of concrete, 146 houses were demolished. It came also with a great deal of noise and dust, which is still the case today.

## **A personal story taking the A38M, Spaghetti Junction, M6 and Junction 7**

The day after the opening of Spaghetti Junction my wife and I wanted to drive on this amazing piece of motorway engineering. Looking at the maps, our intent was to use the Junction to the M6 going north to the next junction and return making it safely back to the City Centre. All went wrong, but surprisingly not at Spaghetti Junction.

We got on to what would become the Dartmouth Middleway and around the roundabout and took the slip road down on to the Aston Expressway, which felt like driving along a wide, runway-like carriageway. After passing Aston Hall, ahead we could see what looked like a concrete road version of an Alton Towers roller coaster, only this was for cars. As we approached the interchange we wondered how we were going to cope with all its tentacles spewing out in all directions. The signage was clear and keeping to the left, we were quickly on the slip road to the M6, where fortunately the traffic was on the light side.

No problem at all, what a lot of fuss. Leaving behind junction 6 we were heading north-west for Junction 7, the A34 turning. Taking the slip road and keeping to what we thought would be the lane around the roundabout and back on to M6 South, we found ourselves forced to take the slip road back onto the M6 going west. It was as if the designers of this junction were playing a joke on us. It made Spaghetti Junction look like a snip.

Quickly we had to make a decision where to turn off the M6 in a very short distance and either heading left on a link road to the M5 and come off that at Junction 1, where we would return on a parallel link road back on the M6 or we could stay on the M6 to Junction 9 the Wednesbury turning. We chose the M5 and travelling on the link roads and returned safely minutes later to the M6 south. Spaghetti junction came into view and our roller coaster ride took us over the whole interchange and we descended back on to the A38M and carefully back home.

The Joke was definitely on us that day.

## **Spaghetti Junction at 50 (24 May 2022)**

Gravelly Hill Interchange is the UK's busiest motorway junction and is one of the country's most iconic concrete structures: it turned 50 two years ago. It is also one of the biggest motorway interchanges in Europe, with more than 200,000 vehicles travelling on it daily.

Residents living underneath it have said their homes are constantly getting covered in dirt and their area is really noisy - but they still love it. They *like* living under such an iconic landmark. Dad-of-one Brian Thomas, 45, said he finds the noise of the traffic soothing and joked that

the area even comes with its own beach - a pile of industrial sand next to the canal. He said, "I'm sort of proud to live near here."

Heinz produced 500 Spaghetti Junction cans to celebrate the 50th anniversary.

## The History of Gravelly Hill

The name is likely to be medieval or older and probably referred to this section of the ancient road to Lichfield. Gravelly glacial drift made for easier travel than the claylands which are common across much of east Birmingham. The River Tame ford on the Lichfield Road at



Salford Bridge also took advantage of the glacial drift and made for a good crossing away from the muddy swamps that filled the valleys of Birmingham's rivers and streams.

Gravel was extracted here commercially, as can be seen on the 1889 Ordnance Survey where gravel pits can be around the area.

Gravelly Hill grew into a Victorian suburb after 1862 with the opening of Gravelly Hill Station on the new Sutton Coldfield Branch Line. A number of handsome Victorian houses is still standing.

Birmingham's only caves were to be found in the sandstone cliffs near Slade Road, where the River Tame wore its way through the soft sandstone of Birmingham ridge. Sadly the caves were lost under Spaghetti Junction.

Gravelly Interchange was designed to follow the Tame Valley, through which a number of canals ran and more recently Sutton Coldfield Branch railway line, and a number of minor roads and the previously mentioned Lichfield Road

## **Factors taken into account when building the interchange**

One stipulation in construction was that the canal tow-paths running underneath the junction needed to have sufficient clearance to allow horses pulling the canal boats along the canals. Beneath the junction is Salford canal junction where the Birmingham & Fazeley, the Grand Union and the Tame Valley canals meet. The interchange was also built over the confluence of the River Tame and Aston Brook, the River Tame and River Rea. Today the M6 here crosses the Tame valley on stilts and the intersection is virtually unnoticed from the M6 motorway. It is best appreciated on foot from Salford Bridge which carries the Lichfield Road over the River Tame.

The designers of Midland Links were required to build a six-lane carriageway with link roads through several built-up areas, with the minimum demolition and disruption. To achieve this, the M6 and Spaghetti Junction follow the line of the local canals and river network on elevated sections. In 2023 the area around and inside the interchange and is full of trees and when looking at it from above the Interchange appears to be growing out of woodland.

It is called an asymmetrical junction that provides access to and from the A38 (Tyburn Road), A38(M) (Aston Expressway), the A5127 (Lichfield Road/Gravelly Hill), and several unclassified local roads. It serves 18 routes and includes 2.5 miles of slip roads, but only just ½ mile of the M6 itself. It is spread over five different levels, it has 559 concrete columns, reaching up to 24.4 m (80 ft). The engineers had to elevate 21.7 km (13.5 mi) of motorway to accommodate the railway lines, canals and rivers. The landscape beneath was re-engineered, with the River Tame redirected and Salford Reservoir and park created.

There's a perhaps surprising amount of greenery, a labyrinth of pathways and heavily-graffitied painted subways.

## **My personal reflection on Gravelly Hill Interchange**

This most iconic concrete structure had a great impact on this part of North Birmingham. It is a double edged sword: it copes mostly to deliver its load of vehicles to all points of the compass successfully. It remains a big investment for everybody connected with it, who fortunately agree to the appropriate level of expenditure to keep it in good order. However as pollution is now considered a major problems in all trafficked urban areas, the motorway network and Spaghetti Junction create pollution which is blown up into the air. Particulates can be found a greater distance the higher up the vehicles are when coming over the Interchange.

The Gravelly Interchange was a solution to a transport issue that probably wouldn't have happened now. In its day it was marvelled at as a great triumph of design and engineering.

It was a marvel of how they managed fit all its tentacles into such a complex area and taking note of heritage canals, the cross rail to Lichfield and an existing road network.

However, before the Interchange was built the missing parts of the M6 & M5 were referred to as the 'Missing Midland Link'. I can remember previously travelling up the north in the late 60s and having to hop on and off the M5 and M6 because a large swathe was unfinished and I had to use local roads. When I moved back to Birmingham in 1971, the M6 was gradually extending westwards from Coventry and south towards the last piece of jigsaw of the Gravelly Hill Interchange.

### **How Spaghetti Junction changed Birmingham**

Gravelly Hill Interchange or Spaghetti Junction, to give its nickname, was a coup for the Birmingham authorities, renewing the city's place on the national and global stage. In the aftermath of WWII, during which Birmingham was extensively bombed, the car industry was thriving. With greater affluence came greater mobility. As towns and districts to the north of Birmingham attracted suburban dwellers, commuter traffic increased.

In the early 1970s, the multi-lane highway cutting through the urban fabric was a brand new phenomenon. As such it took some getting used to. In the months after the interchange was built pedestrians had been seen crossing the Aston Expressway among streams of fast-moving traffic, who one presumes didn't much care for their lives.

### **Commissioning, designing, constructing and opening the interchange**

In 1958 The Ministry of Transport commissioned Sir Owen Williams to investigate possible routes to connect M6, A38M and A38. The interchange was approved and in an announcement made by the then Minister of Transport, Richard Marsh, in August 1968. Construction was expected to take three years and to cost £8m. (In the event took 4 years and cost £10m.) The work was led by chief engineer Roy Foot. Before the interchange could be opened, its opening was delayed by several months whilst "box girder inspections" took place to ensure they were safe, following the collapse of similar box girder bridges in Australia. On 24 May 1972 the Interchange was opened by the then Secretary of State for the Environment, MP Peter Walker.

### **Maintaining the interchange**

In November 2007 it was noted major repair works had to be carried out several times since its completion, owing to 3 factors, increasingly the very heavy traffic through the junction, in

the first year of opening, the average flow of vehicles was 40,000 per day, whilst today over 200,000; cost-saving measures during its construction had reduced the ability of parts of the structure to withstand the traffic and weather; heavy use salt and grit had weakened the joints in the structure during frost and snow.

In the course of closing the slip-road from the Tyburn Road on to the Aston Expressway, inspecting Spaghetti Junction itself extensive repair work had to be carried out, beyond the routine repairs to the box girders that had been ongoing since the late 1980s. The annual repair budget was upwards of £7m at that time.

By 2009, it was estimated that 1¼ billion vehicles had travelled through the junction, and although structural defects had been found, the overall structure was stable enough to continue carrying traffic.

In 2022 The National Highways, responsible for the maintenance of the M6 and Interchange, said 200,000 vehicles cross it each day and £300,000 repairs were “essential” for keeping the road safe. They said “We have an on-going detailed and methodical maintenance regime in place at Spaghetti Junction, including the replacement of expansion joints, painting of steelwork, the clearing drainage channels and gutters, clearance of vegetation and removal of graffiti.

Most of this work goes unseen to passing motorists as it’s underneath the road,” said programme delivery manager, Jess Kenny. “However, there are some instances where we need to close the road to vehicles to keep our repair teams safe while works takes place.” Such work affected M6 northbound carriageway between junction six and Salford Circus and the southbound carriageway within the junction.

After an inspection of Tame Valley Viaduct (part of northern section of the Aston Expressway) extensive repairs were required to reinstate the viaduct, which carries about 80,000 vehicles a day and was showing signs of deterioration. Transport minister Baroness Vere said the viaduct was the “lifeblood of Birmingham” and also connected the city to the rest of the country. The work of strengthening and refurbishing the underside of the viaduct so it can continue to carry heavy vehicles and it will remain open during the work which will see it. Routine concrete repairs are carried out in small sections, so the overall strength of the supporting beams is never compromised. Small sections of old concrete are cut out using high pressure water, rather than using physical tools. This removes the risk of damage to other sections of viaduct through vibration. Waseem Zaffar, cabinet member for transport and environment on the Labour-run city council, said: “This is a significant investment into a key piece of our city’s highways infrastructure.” The scheme’s total cost is £93.46m, with the remainder coming from the council and the Local Growth Fund.

## **Pollution and the Roads (Friends of the Earth)**

Chris Crean, campaigner for West Midlands Friends of the Earth, said: “Failing to fix air pollution costs lives. “It also shows a failure to address the climate crisis because the sources and solutions are intrinsically linked.

“If ministers want to avoid a return to the health-damaging and illegal levels of air pollution we had before lockdown, their enthusiasm for ‘active travel’ needs to be a permanent switch and not just a short-term gap plugger.

“The Government must also end its damaging fixation on building more roads. You can’t justify this by planning to phase out polluting petrol and diesel vehicles and replace them with electric ones.

“We need to go much further than just getting out of one type of car and into another.

“Investment in better cycling and walking should be part of a fair and green post-Coronavirus economic recovery plan aimed at creating a cleaner, fairer future.”

## **Reports of NO<sub>2</sub> Pollution – and what Birmingham is doing about it**

The legal limit of no higher than 40 micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ) has been set by the EU and also is the target set in the UK annual air quality objectives. The figures from councils during 2018, the most recent available, show an improvement on the previous year across England, which is shared among the ten worst performing sites across the wider West Midlands.

Two sites noted as the worst in the West Midlands were Coventry’s Holyhead Road and part of St Chad’s Queensway in Birmingham with more than 74 ( $\mu\text{g}/\text{m}^3$ ). This was confirmed by Defra modelling, the concentration of NO<sub>2</sub> in Birmingham’s air was up to 50 per cent higher than it should be”. According to the council’s own figures 900 people die from poor air quality in the city each year, compared to 30 from road accidents.

The Birmingham Clean Air Zone (CAZ) – introduced in 2021 –intends to address the issue, reducing the numbers of higher-polluting cars entering within the CAZ and charging those who do.

Whilst NO<sub>2</sub> Pollution affects thousands of British children exposed to illegal levels of air pollution, it appears there is a lack of awareness among many of those living and working in some of the worst hit areas and those running schools and nurseries. In Birmingham there are

38 nurseries and 30 schools within 150 metres of a road where emissions of NO<sub>2</sub> are above the legal limit.

Anne Shaw, Birmingham council's lead officer on air quality said a lot of work was underway, but it was a challenge changing people's attitudes to driving in a city that "grew up on the car industry".

She said the council has a range of measures, from encouraging low emission vehicles to a revamped cycle network to help tackle the issue.

"We are not anti-car, the car is still here, but there are 200,000 journeys of under a mile in this city each day – it is about removing some of those trips."

### **Walking Around Gravelly Interchange**

I walked along the roads leading up to the Aston Hall to get an early view of The Interchange but realised that it's difficult to get good views until right by Salford Park, when the elevated M6 and Aston Express Roads reared up upon their columnar legs. The lake was formerly the Aston Reservoir, which when comparing old 1840-1860s OS 6 inch map on Side by Side maps with the modern Bing map, showed how much of the reservoir was taken for Aston Express roads. From there I made my way to Salford Circus, where the Erdington Arms formerly stood on the corner of Slade Road and Lichfield Road. Arriving by Salford Circus, I made my way across Lichfield Road and then through a iron gate under the Junction.

Above the vastness of the roadways above me was awe inspiring. Concrete columns arrayed in serried ranks ahead of me, with the roadways held aloft on their concrete box girders. Making my way into the forest of concrete trees I was following the Birmingham Canal Navigations north-west. All around the columns and the accessible concrete walls were treated as an art exhibition of graffiti artists. The canal was dark but sunlight was streaking in making their way through the tangle of the Spaghetti's arms, so straight some curving round in tight curves. Down in this cavern of a place you noticed the different planes the different roads were on.

To my left I saw the dance of the roads high above carrying the road vehicles in all directions. Various covered bridges I suspected were conveying water or former power cables over the River Tame and canal. Out in the light, electricity pylons appeared to be striding away as fast as they could to get away from all this concrete and traffic.

Down here you could see the intricacy of placing these vast columns some 24 m high had been very precisely, whether going into the ground and spaced along the canal, yet still giving access for canal boats.



Up ahead the old blue bricked, arched railway bridge for the Cross Rail Lichfield to Longbridge was going over the canal below. In the spaces where ever they could, trees were growing up as in a concrete canopy of a concrete woodland. Eventually leaving the Junction behind me, I followed the M6 up, along an old footpath bringing me out on to the grounds of a former club house with sports grounds now the Greek Orthodox Church of Trinity. Looking back I could grasp the vastness of the M6 shed of all its slip roads being supported not by the columns but by a tall stone retaining wall. On my way walking past Brookvale pond and down to Slade Road, I rejoined the funfair of traffic arriving at Salford Circus.

I next wanted to visit the Circus and then cross over Lichfield Road and walk along Lichfield Road to the beautiful Salford bridge over the river Tame. Both sides sport lovely balustrades of very substantial square and curved balusters.

Returning up Lichfield Road after the junction with the Circus high above is the high level road taking traffic from the A38 (east side) on its way to join the A38 M and into Birmingham.

Entering through a gap in the wall by Lichfield Road, you come to Salford Junction with the Birmingham and Fazeley Canal and the Birmingham and Warwick canals. Mostly under the M6 various footbridges takes you over one canal and on to the tow-path of another. Various old conveyor systems, long abandoned, fenced areas greet you, as well some very colourful graffiti sprayed onto what ever surface presents itself. Here you will meet cyclists and pedestrians making their way through the area.

Going back up Birmingham and Fazeley canal towards the City Centre there are some intriguing old structures, some connected with the former power station along the Birmingham and Worcester Canal. Form here you cross over the River Tame and looking to your right you see the even more beautiful Salford arched bridge in brickwork the arch in fine sandstone stone and the balustrading between piers above.

There are some classic black latticed painted graffitied bridges span over one canal to get you to another, which I am doing to head up the Birmingham and Worcester Canal to come away from the junctions, of canal and road, and view just above me the vast strength of the concrete box girders, many of which have had to be reconstituted as part of the ongoing maintenance work.

One more walk to make is follow the continuation of the Birmingham and Fazeley Canal as it dips out of its canopy of the M6 also going east. The fine gravel path beside the canal and the river Tame lazily making its way towards the River Trent.

We have to leave this bastion of British road construction that has made itself I hope more loved than hated. For me, I love it for possibly all the right and some wrong reasons. It's sheer boldness and audacity makes it seem a living landmark but as you cannot get on any of it as a pedestrian it's definitely also an edge.

## Credits

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First, I am indebted to The Guardian newspaper for one of their articles on the subject; for various articles about the 40th and 50th anniversaries of the opening of the Junction; Friends of the Earth item about pollution and children's health; various websites, on Gravelly Hill, those connected with the locals' responses to their Spaghetti Junction and other articles I looked into for information. For any others I have not referred specifically, I apologise.

Any views expressed in this article are mine and are my interpretations of any of the documents that I have encountered, I apologise for any inaccuracies.

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