

Belgrave Flyover Belgrave Road Leicester

Historic Building Recording Survey

for Indigo Planning

CA Project: 660226 CA Report: 14136

November 2014

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date	10 November 2014	
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date	13 November 2014	
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SUMMARY

Project Name:	Belgrave Flyover
Location:	Belgrave Road, Leicester
NGR:	SK 5922 0562
Туре:	Historic building recording survey
Date:	28 February 2014
Location of Archive:	To be deposited with the Leicestershire County Council Museums
	Service
Accession No.:	A11.2014
Site Code:	BFL 14

In February 2014, Cotswold Archaeology carried out a Level 2 photographic building record of the Belgrave Flyover, Belgrave Road, Leicester. The flyover was built in 1973–4. Its road deck of pre-cast beams (manufactured in Gloucester) was supported by reinforced concrete crossheads on pairs of posts, poured *in situ* and founded on deep piles. The flyover was found to be in largely original condition, although it had suffered some spalling and exposure of reinforcing bars and seems to have undergone a limited amount of concrete repair. The flyover was typical of the period and type and contained no unusual or innovative systems of construction. A detailed eyewitness description of the construction of the flyover has been incorporated in an appendix to the report.

1. INTRODUCTION

- 1.1 In February 2014, Cotswold Archaeology carried out a Level 2 photographic building record of the Belgrave Road flyover in Leicester (centred on NGR: SK 5922 0562; Fig. 1). This work was commissioned by Indigo Planning. This report provides a historical and structural background to the photographic archive, and includes illustrative selections from the archive.
- 1.2 Planning permission for the demolition of an old supermarket and the erection of a new supermarket building, as well as associated changes to the road network, was granted by Leicester City Council (LCC; the local planning authority). The Belgrave Flyover was demolished as part of these works. A condition attached to the planning permission for the development requires a programme of archaeological recording, and the historic building recording of the flyover constituted one element of this programme. The scope of the building recording survey was agreed in discussions with Chris Wardle, the Leicester City Archaeologist.
- 1.3 The building recording survey was carried out in accordance with a detailed written scheme of investigation (WSI) produced by CA (2014) and approved by Chris Wardle. The fieldwork also followed the *Standard and guidance for the archaeological investigation and recording of standing buildings or structures* (IfA 2008), *Understanding Historic Buildings: a guide to good recording practice* (English Heritage 2006), the *Management of Archaeological Projects 2* (English Heritage 1991), and the *Management of Research Projects in the Historic Environment (MORPHE): Project Manager's Guide* (English Heritage 2006).

The site

1.4 The Belgrave Flyover lay on the north-eastern outskirts of Leicester City Centre. The flyover continued the line of Belgrave Road over the Belgrave Roundabout.

Archaeological background

1.5 A desk-based heritage assessment of the proposed new supermarket site was produced by CA (2012). This noted that Belgrave Road preserves the line of the

Roman Fosse Way. The Belgrave Flyover and the large Belgrave Roundabout beneath were constructed in 1973–74.

Objectives

1.6 The objective of the building recording survey was to produce a photographic record of the flyover in order to mitigate its loss through demolition.

Methodology

- 1.7 The fieldwork followed the methodology set out within the WSI (CA 2014). The building recording survey consisted of a photographic survey undertaken to Level 2, which is defined in *Understanding Historic Buildings: a guide to good recording practice* (English Heritage 2006) as:
 - A general view or views of the building (in its wider setting or landscape).
 - The building's external appearance. Typically a series of oblique views will show all external elevations of the building, and give an overall impression of its size and shape. Where an individual elevation embodies complex historic information, views at right angles to the plan of elevation may also be appropriate.
 - The overall appearance of the principal rooms and circulation areas. The approach will be similar to that outlined [above]
- 1.8 Clearly, the last paragraph is not relevant to this project. The photographic record included general views of the flyover from a number of angles, as well as context shots relating the building to other structures and its general surroundings. Detail photographs illustrated structural features and other details. Appropriate scales were used.
- 1.9 The photographic record includes a detailed photo register and an annotated plan, which locate the photographs.
- 1.10 The flyover was already part-demolished at the time the survey took place, and for health and safety reasons access to the upper part of the structure was restricted.

1.11 The survey archive is currently held by CA at their offices in Milton Keynes. CA will make arrangements for the deposition of the archive with the Leicestershire County Council Museums Service under accession number A11.2014. A summary of information from this project, as set out within Appendix B, will be entered onto the OASIS online database of archaeological projects in Britain.

2. RESULTS

- 2.1 The flyover was found to be a combination of poured reinforced concrete structure with pre-cast concrete elements (Fig. 3). The road deck was made of the latter, with close-set parallel beams spanning cast *in situ* cantilevered beams (crossheads) on paired posts (Fig. 4).
- 2.2 There were seven supporting crossheads and eight open spans reached by ramped sections at each end (Figs. 5 and 6). The sides of the deck were finished with precast panels of rough-cast textured concrete (Fig. 7). In the end ramps (from almost ground level to a metre high), these panels reached the ground and formed a wedge-shaped cover to the poured, reinforced side walls of the end ramps which were formed in foundation trenches (Fig. 8). The next two bays were closed in with curtains of deeply-ridged concrete panels set some distance in from the edge (Figs 7 and 9). The main spans were completely open.
- 2.3 The construction technique used was evident from an inspection of the underside of the flyover (Fig. 4) and confirmed by the published recollections of Peter Crane, who was a student engineer working on the construction of the flyover from Aug 1973 (these recollections are reproduced in Appendix A of this report). Crane states that the crossheads (Fig. 10), which formed the main supports for the road deck, were based on "four 14m-deep 1.2m diameter piles for each of the column bases. The flyover was to consist of seven intermediate crossheads, supported on columns, and a north and south ramped abutment. This would produce eight spans, [each] to be spanned using 17, 23m-long pre-cast concrete beams per span, each weighing 21 tonnes, a total of 136 beams. The overall length of the flyover was to be 382m."
- 2.4 Crane points out that, as the flyover was gently curved in plan, the beams were of several different lengths and had to be delivered from the Dowmac factory in Gloucester in the correct order for sequential construction.

- 2.5 The cambered ledge on the crossheads on which the road beams rested automatically provided the road camber. Combined with the tapering underside of the cross head, a consequence of the designed loading, and the trapezoidal cross section, this produced a pleasingly elegant elevation to the crosshead (Fig. 11).
- 2.6 The beams were capped with a poured, reinforced-concrete slab to provide a base for the road surface. The pumping of ready-mixed concrete was a relatively new technology in 1973, but this is how the road deck slab was laid, from lorries on the road below. The CA survey team noted a large number of concrete planks stored under the flyover (Figs 3 and 4), and these are assumed to be the road deck slab, diamond-sawn and removed in neat sections.
- 2.7 The parapet of the flyover was guarded by steel rails which were clearly the originals, although added at the very end of the project.
- 2.8 The relatively thin concrete of the side panels had spalled in places due to the expansion under corrosion of the reinforcing bars, although the structural beams did not seem to have been affected. There was some evidence on one or two of the crossheads of spalling through what appears to have been resurfacing of the concrete (Fig. 12).
- 2.9 The roundabout under the flyover was landscaped in 1974 with two ponds with fountains. These have been *"dry for years"* (Appendix A) but at the time of the building recording survey, the concrete-lined basins were still evident (Fig. 13).
- 2.10 The strips under the flyover north and south of the roundabout were paved decoratively (Fig. 14), and this appears to have been a later embellishment. The granite stone setts were laid radially in slightly domed discs around the crosshead posts and in pitched rows elsewhere. This latter arrangement gave a textured effect but also clearly discouraged any vehicular use. This stone-set strip extended about two and a half metres either side of the crosshead posts. The rest of the area was paved in square, concrete, paving slabs to just a little wider than the road deck above.
- 2.11 On the roundabout, the paving was similar but the setts were laid much more normally (i.e. flat) and the slabs were extended much further out from the flyover shadow.

3. DISCUSSION

- 3.1 The Belgrave Road flyover was built in 1973-4 and was essentially in its original condition when demolished. The hard landscaping under the flyover seemed to have been altered much more recently. The ponds and fountains in the central area were as built, but not functioning.
- 3.2 The flyover was typical of the period and type and contained no unusual or innovative systems of construction.
- 3.2 The recollections of Mr Crane (reproduced in Appendix A of this report) have allowed his descriptions of the building procedures and the evidence of his photographs to be compared with the structure as recorded.

4. CA PROJECT TEAM

The survey fieldwork was undertaken by Peter James. This report was written by Peter Davenport. The illustrations were prepared by Dan Bashford. The archive has been compiled by Emily Evans and prepared for deposition by Hazel O'Neill. The project was managed for CA by Derek Evans.

5. **REFERENCES**

- CA (Cotswold Archaeology) 2012 Land at Belgrave Road, Leicester: Heritage Desk-Based Assessment CA Typescript Report No. **12110**
- CA (Cotswold Archaeology) 2014 Belgrave Flyover, Belgrave Road, Leicester: Written Scheme of Investigation for Historic Building Recording

APPENDIX A: RECOLLECTIONS OF THE CONSTRUCTION OF THE FLYOVER

Taken from the website of the Leicester Mercury (accessed 15 October 2014):

http://www.leicestermercury.co.uk/Peter-Crane-s-pictures-work-progress/story-20622266-detail/story.html

Belgrave Flyover: 'As someone who worked on it, I'm sorry to see it go' Posted online February 13, 2014

Peter Crane was a student engineer working on the construction of the flyover from Aug 1973.

Tomorrow, the final curtain falls on Belgrave Flyover. After 40 years, serving millions of drivers, this postwar concrete monolith is condemned to become a footnote in the history of Leicester's highways.

Back in 1973, while living in digs on Leicester's Westcotes Drive, 20-year-old student engineer Peter Crane, from Birmingham, took part in the flyover's construction.

Here, using his original behind-the-scenes site report and rare colour photos, Mr Crane reveals the hard work and planning of all involved.

"During the second year of an HND in building at Sheffield Polytechnic, I undertook a period of industrial training," says Mr Crane, now of Wigston.

"The civil engineering contract I was assigned to was the Belgrave Road/Abbey Park Road improvement scheme, on the A46/A6 out of Leicester towards Loughborough, consisting of a new flyover, a new canal bridge and storm water culvert.

"This five months' training in Leicester was due to be followed by nine months on a leisure centre in Alfreton, Derbyshire, also being built by Clugston Construction, of Scunthorpe.

"When I joined the site on July 30, 1973, the new canal bridge in Abbey Park Road was-half built, prior to the demolition and replacement of the bridge.

"The storm water culvert had been built either side of the roundabout and was under construction within it. This roundabout was in use, but not fully completed.

"Piling had commenced on the flyover, using a large auger piling rig which formed four 14m-deep 1.2m diameter piles for each of the column bases.

"The flyover was to consist of seven intermediate crossheads, supported on columns, and a north and south ramped abutment.

"This would produce eight spans, to be spanned using 17, 23m-long pre-cast concrete beams per span, each weighing 21 tonnes, a total of 136 beams.

"The overall length of the flyover was to be 382m and it was designed for two lanes of traffic in each direction.

"The contract had started on February 28, 1972 and was planned to be a 24-month contract costing £1.2m (about £12 million today). The contract had already been delayed by a building strike and the Statutory Undertakers diverting the services around the site to allow works to take place.

"My duties on site as a student engineer involved assisting the site engineers in setting out, supervising the works and undertaking quality control. This, in my case, involved the taking of 6in test cubes of all the concrete used on site and undertaking 'slump' or 'cone' tests of the concrete prior to use, to check it was to standard.

"While on site, myself and another student made 477 test cubes, collected 365 more from the piling subcontractors, recorded all these and arranged for collection or delivery of these to the Leicester Corporation Testing Facility, in Bowling Green Street, where they would be crushed at set intervals to check on the quality of the concrete used.

"The cubes were stored in a water tank on site prior to collection – it was not an enjoyable task retrieving them for collection on a cold winter day.

"The pre-cast beams for the flyover were made by Dowmac, in Gloucester.

"I was asked to accompany sub-agent R Collier, assistant resident engineer J Middleton and flyover designer C McCauley on a visit to Gloucester, to check on the beams and to witness a deflection test, where a beam was put under a hydraulic load.

"The beam placing took place between Sunday, November 4 and Sunday, November 11, 1973, when the surrounding roads were closed from 8pm to 6am each weekday and all day on both Sundays, with lifting commencing at 10am.

"The beams were transported from Gloucester in pairs, using specialist vehicles. These had a cab unit attached to one end of the beam and the other end attached to a separate steerable powered bogie, with another driver to get around tight corners.

"These beams actually formed the spine of the vehicle and they came through Leicester city centre under police escort in three or four vehicle convoys.

"The initial load, on the first Sunday, suffered a brake failure which delayed the beam placing, because the curvature of the flyover required slightly different lengths of beam and they needed to be placed in sequence by a 70-tonne crane.

"To allow for delays, a stockpile of beams were located in the adjacent goods yard site, where the Belgrave Sainsbury store was later built. These beams were then used on the last Sunday.

"The best night operation had all beams on site by 2.40am and placed by 3.45am: the worst night was when beams were still being placed at 8.30am in the midst of the Leicester rush hour!

"The site was located next to the Bridle Lane Tavern, on Lower Willow Street. Some of site staff had caravans or mobile homes located at the rear of the site, so it was a perfect opportunity to have a 'lock-in' while we waited for the vehicles to arrive from Gloucester, particularly in the company of Brian McInerney, one of the subcontractors - a larger than life character!

"The flyover dramatically took on its finished form during this week, much to the amazement of people passing the site daily, who saw that a new span appeared every morning as the flyover grew in length.

"Once all the beams were in place, they were formed into a deck slab with additional steel reinforcement and concrete, which was pumped from road level using a concrete pump and special pump mix, supplied by Topmix, based at Soar Lane.

"In 1973, concrete pumping was still in its infancy but it was the most effective way to place the concrete, enabling each deck to be poured, one at a time, using 65 cubic metres on each pour.

"After each pumping operation, the pump and its pipework were cleaned using a sponge ball, known as a 'pig', which should have been caught when it came out the end – but on more than one occasion, the 'pig' escaped up the Melton Road!

"The last deck was poured on December 20, 1973, the day I left the contract to move on to the Alfreton scheme.

"I returned to the site in April 1974, to see the remaining canal bridge beams being lifted into place. It was evident that the three-day week in spring 1974 had delayed works on the flyover. But, by July 1974, the flyover was complete, apart from the handrails and final landscaping.

"I enjoyed working on the scheme and my time in Leicester, so much so, I came back in 1978 to a post in the Estates Department of Leicester Polytechnic and moved to the NHS District Estates Department, based at Leicester Royal Infirmary, the following year," adds Mr Crane.

"Belgrave flyover was designed to have around a 60-year lifespan, but in recent years, has started to show signs of deterioration.

"It was never used to its full potential. It was designed to accommodate two lanes of traffic in each direction, but in the end, only carried single lane traffic.

"On the roundabout below were meant to be the two largest bore fountains in Britain, but they've been dry for years.

"Flyovers such as this were very much of their time. There are better traffic management solutions, such as parkand-ride, or trams, as Nottingham has seen and embraced. "I'm not sure the roundabout will cope with the future traffic flow, but since it was built, the centre of the city has moved towards the Highcross shopping centre.

"Belgrave Flyover wasn't a landmark, as it was purely functional. But as someone who worked on it, it's sad to see it go."

APPENDIX B: OASIS REPORT FORM

PROJECT DETAILS			
Project Name	Belgrave Flyover, Belgrave Road, Leicester: Historic Building Recording Survey		
Short description	In February 2014, Cotswold Archaeology carried out a Level 2 photographic building record of the Belgrave Flyover, Belgrave Road, Leicester. The flyover was built in 1973–4. Its road deck of pre-cast beams (manufactured in Gloucester) was supported by reinforced concrete crossheads on pairs of posts, poured in situ and founded on deep piles. The flyover was found to be in largely original condition, although it had suffered some spalling and exposure of reinforcing bars and seems to have undergone a limited amount of concrete repair. The flyover was typical of the period and type and contained no unusual or innovative systems of construction. A detailed eyewitness description of the construction of the flyover has been incorporated in an appendix to the report.		
Project dates	28 February 2014		
Project type	Historic Building Recording Survey		
Previous work	None		
Future work	Unknown		
PROJECT LOCATION			
Site Location	Belgrave Road, Leicester		
Study area (M ² /ha)	N/A		
Site co-ordinates (8 Fig Grid Reference)	SK 5922 0562		
PROJECT CREATORS			
Name of organisation	Cotswold Archaeology		
Project Brief originator	Leicester City Council		
Project Design (WSI) originator	Cotswold Archaeology		
Project Manager	Derek Evans		
Project Supervisor	Peter James		
MONUMENT TYPE	Transport infrastructure: flyover		
SIGNIFICANT FINDS	None		
PROJECT ARCHIVES	Intended final location of archive (museum/Accession no.)	Content	
Physical	N/A	N/A	
Paper	Leicestershire County Council Museums Service (A11.2014)	Registers, plans	
Digital	Leicestershire County Council Museums Service (A11.2014)	Digital photos, pdf report, registers	
BIBLIOGRAPHY			
CA (Cotswold Archaeology) 2014 <i>Belgrave I</i> Survey CA Typescript Report 141	Flyover, Belgrave Road, Leicester: Historic 36	Building Recording	









- 3 The crosshead/piers and the pre-cast road deck. The stacked concrete planks are the sawn-up road deck.
- 4 The poured-in-situ posts and crossheads and the underside of the pre-cast road-deck beams. The removal of the road deck has allowed the separate nature of the beams to be appreciated.



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5	The southern half of the flyover, showing its general character	Cotswold Archaeology e enquiries@cotswoldarchaeology.co.uk
6	One of the approach ramps, showing the solid side walls at the base and the side panels.	PROJECT TITLE Belgrave Flyover, Belgrave Road, Leicester
		FIGURE TITLE Photographs
		PROJECT NO. 660226 DATE 15-04-2014 FIGURE NO. DRAWN BY DJB REVISION 00 5 & 6 APPROVED BY LM SCALE@A4 N/A 5 & 6





- 7 The textured pre-cast side panels of the flyover (and the deeply ridged poured base walls) (scale 1m).
- 8 The side walls of the flyover at the base of the ramps, road deck removed. Note that they end before the container in the distance.



 PROJECT NO.
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 15-04-2014
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9	The ridged walls of the enclosed underside of the flyover, where the ramps end.	Cotswold Archaeology www.cotswoldarchaeology.co.uk e enquiries@cotswoldarchaeology.co.uk
10	The road deck beams being lowered into place on the crossheads in November 1973.	PROJECT TITLE Belgrave Flyover, Belgrave Road, Leicester
		FIGURE TITLE Photographs
		PROJECT NO. 660226 DATE 15-04-2014 FIGURE NO. DRAWN BY DJB REVISION 00 9&10 APPROVED BY LM SCALE@A4 N/A 9&10

10





- 11 One of the crossheads fully exposed by demolition of the road deck.
- 12 Spalling of concrete on the pre-cast side panels and under the cross head. This crosshead also seems to show signs of repair or secondary work on the underside.







Cirencester 01285 771022 Milton Keynes 01908 218320 Cotswold Archaeology Andover 01264 347630 One of the two 1974 fountain basins. www.cotswoldarchaeology.co.uk e enquiries@cotswoldarchaeology.co.uk The paving under the flyover outside the roundabout. PROJECT TITLE Belgrave Flyover, Belgrave Road, Leicester

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Photographs PROJECT NO. 660226 DRAWN BY DJB APPROVED BY LM DATE 15-04 REVISION 00 SCALE@A4 N/A 15-04-2014

FIGURE TITLE

13 & 14

FIGURE NO.