Infrastructure as object and producer

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ABSTRACT

[SLIDE 01 - TITLE] Infrastructure, whilst often characterised in terms of its invisibility via network multiplicity, functional ubiquity and semantic indeterminacy, still depends upon local, fixed, physical points of presence. This presentation will consider the objectification of infrastructure from an architectural perspective by showing how the seemingly invisible and diffuse is necessarily materialised and localised in the form of the built artefacts of infrastructure which are, by turns, prosaic and monumental. Infrastructure will be described as object and as producer of objects and the materiality and materialisation of infrastructure as concretised yet simultaneously ethereal. Such a situation seeks to explore the limits of the urban, the expanded geography and the morphology of the contemporary city.

INTRODUCTION

[SLIDE 02 – VALVE HOUSE] Infrastructures are the basic physical and organisational systems and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise. Today, infrastructure has become a constituent part of the discourse surrounding city regions and global cities. Infrastructure is reimagined in a global discourse and related to rights to the city and comparable levels of access to services in a privatised market. Infrastructure is also a producer of space and an integral architecture in contemporary technical, secure-realm and ecological contexts.

A search of the catalogue of the RIBA Library using the term 'infrastructure' shows its earliest use in architectural periodicals by French experimental urbanist Yona Friedman [SLIDE 03 – YONA FRIEDMAN] in the mid 1960s. His 'development over a Paris terminal' was ambitious and visionary, but surprisingly grounded in empirical studies that 'established that material required for the infrastructure will be in the order of 25kg/m^2 of steel on site for every square metre of floor area'.[1] As Hauck and Kleinekort acknowledge, '[t]he interdependence between infrastructure and urban development has always been one of the most important topics of urban planning. However, in the discourse of urban design, infrastructure has played a comparatively

[1] Friedman, Y. (1966) 'Development over a Paris terminal', *Architectural Design*, January 1966, p.6,8.

subordinate role.'[2] That is not to say that infrastructure and architecture have not been discussed in both critical and practical terms. The Team 10 meeting at Royaumont in 1962 was themed around 'infra-structure'.[3] The precise definition of the term and its meanings and applications was not resolved either before or after the meeting. The two strands into which most projects presented could be classified were those with growth potential and those of group form– I.E. schemes that were not fully formed and could emerge over time or schemes that were fully determined and each subsequent piece had a predetermined position in pursuit of the whole.[4] In truth, the CIAM group had been studying the relationship between architecture, urban design and infrastructure through the 1950s, perhaps most famously in Louis Kahn's studies for Philadelphia [SLIDE 04 – KAHN PARKING], but in numerous other projects that dealt with urban systems including the Smithsons and Peter Sigmond's *Berlin Haupstadt* [SLIDE 05 - HAUPSTADT]. Christopher Dean and Brian Richards presented the most explicitly transport based schemes and predicted that '[t]he new Euston Station will probably be a sub-centre of London, a little city in itself.'[5] This statement recognises the primacy of infrastructural hubs and their situation as micro-cities, most explicitly manifest today at and around airports. [SLIDE 06 – MOVEMENT NOTATION] Richards went on to author the provocative *New Movement in Cities*,[6] apparently based on research carried out for Colin Buchanan and containing some of Richards' own ideas illustrated by Warren Chalk.[7] Alexander D'Hooghe classifies this as 'architecture as an infrastructural system' and views it as part of what he terms 'the systems turn in infrastructural thinking'.[8] It is this transition between urbanism's 'City Beautiful' model of axial spaces, monuments, squares and distinctive public buildings and the twentieth century views of infrastructure as networked distributors, D'Hooghe speculates, that helped vanish its material qualities. [SLIDE 07 – VIEW FROM NOTATION] Even Kevin Lynch and Donald Appleyard's seminal study of the road dealt with the 'view from', rather than the 'view of' and eschewed the object qualities of American highways in favour of the 'visual sequences for the observer in motion'.[9]

OBJECT

Much has been made recently of the 'invisibility' of infrastructure and its capacity to act as background to the urban experience, only becoming visible or known at the point of failure when a flood, fire or other disaster interrupts the

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[2] Hauck, T & Kleinekort, V. (2011) 'Infrastructural Urbanism' in Hauck, T., Keller, R. & Kleinekort, V. [eds] (2011) *Infrastructural Urbanism. Addressing the In-between* (Berlin: DOM Publishers) p.9.
[3] van der Heuval, D. & Risselada, M. [eds.] (2005) *Team 10: In Search of a Utopia of the Present* (Rotterdam: NAi Publishers) pp.99-119
[4] See <http://www.team10online.org/team10/meetings/1962-royaumont.htm> [Accessed 5 June 2013]
[5] Smithson, P. (1975) 'Team 10 at Royaumont 1962', *Architectural Design*, November 1975, p.682.
[6] Richards, B. (1968) *New Movement in Cities* (London: Studio Vista)
[7] See Sadler, S. (2005) *Archigram: Architecture Without Architecture* (Cambridge MASS: MIT Press), p.209, note 120.
[8] D'Hooge, A. (2010) 'The Objectification of Infrastructure: The Cultural Project of Suburban Infrastructure Design' in Stoll, K. & Lloyd, S. [eds.] (2010) *Infrastructure as Architecure. Designing Composite Networks* (Berlin: jovis Verlag) p.79.
[9] Appleyard, D., Lynch, K. and Myer, J.R. (1966). *The View from the Road* (Cambridge, MA: MIT Press) p.2.

flows that sustain our urban existence.[10] Here, and from a distinctly architectural perspective I wish to consider the objects of infrastructure as well as infrastructures capacity to produce unique, and complex, objects.

Architects tend to objectify. One of the major stumbling blocks for architectural students is to forget context and focus singularly on the object they are designing. Architectural training and practice is a form of indoctrination or institutionalisation. We speak the same and specialist, convoluted language and see things similarly. Objects are seen as formal artefacts and even the seemingly mundane are celebrated, usually from a typological perspective and informed by understanding type as a critical method for design.

In this, I refer to dams, bridges, water towers, transformer stations, gasometers and more.

[SLIDE 08 - TYPOLOGIES] Famously the photographers Bernd and Hilla Becher presented their straight, elevational studies of industrial building types in series.[11]

[SLIDE 09 – GRAIN ELEVATORS] In particular, their studies of grain elevators resonate with architectural history.[12]

The grain elevator seemed to epitomise the ideal of 'form follows function' and Europeans, like le Corbusier, Walter Gropius and Erich Mendelsohn, were all drawn to the allure of the structure for its honesty and formal simplicity. In 1911 Gropius' showed an interest in the architectural possibilities of reinforced concrete and presented a lecture accompanied by projected photographs of grain elevators.[13] He later penned an article illustrated with nine photographs of the same.[14] Following the publication of Gropius' article, Le Corbusier became smitten by Gropius's grain elevators, so much so that he reprinted them in his 1923 manifesto, *Vers une Architecture*.[15] But before doing so, Le Corbusier retouched the photographs with gouache paint, to remove details he saw as extraneous (company logos and such). [SLIDE 10 – GRAIN ELEVATORS VERS] The grain elevator photographs went viral and were reprinted dozens of times in at least six different countries over a 100-year span. By the late 1920s, the grain

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[10] See Graham, Stephen (ed.), *Disrupted Cities. When Infrastructure Fails,*(Oxford, New York: Routledge: 2010) p.6. Citing Steve Hinchcliffe's definition from 'Technology Power and Space – The means and ends of geographies of technology', in *Environment and Planning D; Society and Space* 14 (1996) p.665.

[11] MIT Press published a series of photobooks by the Bechers that represented their typological approach to the presentation of their work. Amongst them were: *Water Towers* (1988); *Blast Furnaces* (1990); *Gas Tanks* (1993); *Mineheads* (1997); *Cooling Towers* (2006)

[12] Becher, B. & Becher, H. (2006) *Grain Elevators* (Cambridge, MA: MIT Press)

[13] Gropius, W., 'Monumentale Kunst und Industriebau', unpublished lecture manuscript, trans. Tilo Amhoff. Berlin, Bauhaus-Archiv (Walter Gropius Nachlaß), 1911. See Mejía Moreno, C. (2014) 'The "Corporeality" of the Image in Walter Gropius' *Monumentale Kunst und Industriebau* Lecture', *Intermédialités*, pp.24-25.

[14] Gropius, W. (1913) 'Die Entwicklung Moderner Industriebaukunst' in Diederichs, J.E. (1913) *Die Kunst in Industrie und Handel* (Jahrbuch des Deutschen Werkbundes)

[15] Le Corbusier-Saugnier (1923) Vers Une Architecture (Paris: Editions G. Crès et Cie)

elevator photographs were considered icons of modernity.[16] The clarity of the relationship between form and function, for the European observers, superseded any pseudo-cultural connotations that had been imposed on the typology by American artists and commentators. Mendelsohn referred to his 'silo dreams', so great was the visual impact and physical presence of these colossal structures, that embodied all the emergent Modernist movement was concerned with.

It easy to consider these as feats of engineering, but many had architects involved too. In a golden age of reconstruction in post-war Britain, engineers, architects, landscape architects and designers in the delivery of motorways, power stations, reservoirs and telecoms reordered massive swathes of the countryside in collective endeavours. [SLIDE 11] In an era of nationalised industries, most infrastructure was controlled by large bodies with clear hierarchical structures, seen here in this table from 1971[17] – the exception being the water companies who were not given regional structure until the Water Act 1973. Each infrastructure thus had its unifying features, by typology, if not design.

[SLIDE 12] The standout architectural structures of the microwave network were the large cylindrical towers built from exposed reinforced concrete in the 1960s. Less than ten were constructed, the most celebrated was the Post Office Tower in central London, opened by Harold Wilson in October 1965. Interestingly the companion structure for Birmingham city centre was to follow the same approach as London but a 'totally unexpected change in the design of the tower proposed for aesthetic reasons' meant that it was built square in section with distinctive corner profiles.[18] Whilst of the same construction method, the city centre towers and those in less urban settings had alternative appearance. Seven rural and suburban towers were built to a design named 'Chiltern' - its form approved by the Royal Fine Arts Commission. They were sited at Stokenchurch (Buckinghamshire), Charwelton (Northamptonshire), Pye Green (Staffordshire), Sutton Common (Cheshire), Tinshill (Leeds), Wotton-under-Edge (Gloucestershire) and Heaton Park (Manchester).[19]

At Heaton Park the tapering tower joined an existing police radio antenna on an elevated position north of the city centre in 1965. At the head of the tower four cantilevered discs provided the platforms for a mixture of aerial types. Most visually striking were the horns. The largest of these paraboloid aerials were 27ft (8m) tall and made from ribbed aluminum, their shape and scale offered

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[16] For a study of how these images resonated and impacted globally see Hatherley, O. (2015) Silo dreams: metamorphoses of the grain elevator, in *The Journal of Architecture*, Vol. 20, No. 3, pp.474-488.
[17] Pollard, D. (1971) 'Regional Plan implementation: infrastructure', in *Town and Country Planning*, Nov. 1971, pp.500-505.
[18] Hanman B.I.G. & Smith N.D. (1965) 'Birmingham radio tower' in *Post Office Electrical Engineers' Journal*, No. 58, October 1965, pp.182-186.
[19] Creasy L.R., Adams H.C. & Silhan, S.G. (1965) 'Radio towers' in *The Structural Engineer*, Vol. 43, No.10, October 1965, pp.323-336.

greater capacity for receiving.[20] The inverted pyramid forms had chamfered faces over the horns' apertures made from a pearlescent Hypalon-coated terylene sheet and the cluster of aerials on the tower appeared deliberate and composed. Some of these towers were visible from the growing motorway network and the distinctive futuristic silhouette of the horn reflector microwave aerials accentuated their formal similarities.

The form and composition of the towers on the landscape was of concern and discussed in engineering journals, as were pylons in the 1920s.[21] Their number and position was determined by line-of-sight logic that meant that prominent hills were a useful aid to the network. Concrete was both structural and sculptural here.[22] The form of the 'Chiltern'-type towers suggested their growing from the ground, a rootedness, and the notion of these as symbolic of fear, or a threat of the Cold War, was assuaged by 'White Heat' and progress.

[SLIDE 13 – FIDDLERS FERRY] The silhouettes of cooling towers and the stark volumetric forms of nuclear reactor buildings became the enduring symbols of power generation of the twentieth century and are steadily being decommissioned and demolished. These built objects of the post-war reconstruction programme that are ostensibly functional are cognitively invisible due to their very status. Their monumentality is undeniable but latent. Only when one talks of their significance as a feature (ironically usually in the 'view from the road') are images stirred in others. Fiddler's Ferry and Eggborough on opposite ends of the M62 [SLIDE 14 - TINSLEY] or Tinsley cooling towers, next to the M1 near Sheffield, blown up in a night time spectacular pyrotechnics display observed by thousands.

[SLIDE 15 - TRAWSFYNYDD] The wider landscape contexts, which were highly considered and no less designed, are even more camouflaged. In some senses this is testament to the success of the landscape architects whose task was often to blend or to disguise the impact of the functional-industrial development. One of the most prominent exponents of landscape architecture in infrastructural projects was Dame Sylvia Crowe. [SLIDE 16 - BOOKS] Crowe wrote the go to guides *The Landscape of Power* and *The Landscape of Roads* and collaborated with architects and engineers in the design of power stations and motorways.[23] The field-object condition of large forms in the landscape and their formal composition within it was recognised by Crowe as a design opportunity. She saw the elements of infrastructure, its objects, as parts of three-dimensional pictures. The views and presence of bridges, cooling towers, pylons and the sweeps of the roads themselves were lines, tones and forms to be composed as one would a painting. Infrastructure never had it so 'beautiful'. Areas of countryside were

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[20] Corbin, S.T. & May, A.S. (1955) 'Broadband Horn Reflector Antenna' in *Bell Laboratories Record,* November 1955, pp.401-404.
[21] Dunne, A. (1999) *Hertzian Tales: Electronic Products, Aesthetic Experience, and Critical Design* (London: Royal College of Art)
[22] Millar J.B. (1965) 'Reinforced-concrete radio towers' in *Post Office Electrical Engineers' Journal*, Vol. 58, No.10, October 1965, pp.178-181.
[23] Crowe, S. (1958) *The Landscape of Power* (London: Architectural Press); Crowe, S. (1960) *The Landscape of Roads* (London: Architectural Press)

transformed in a type of pragmatic formal poetry where form met function and feeling. No more so can this be seen than in the construction of the M62 connecting the north-west to the north-east over the Pennine hills.

[SLIDE 17 – SCAMMONDEN] At Scammonden close to the highest point of the motorway, engineers, architects, landscape architects and designers cam together to create a unique agglomeration of elements, most notably the world's first dam-motorway hybrid.[24]

It's sensation was described in the Design Journal in 1971: 'In this short stretch the motorway climbs from the Outlane interchange with A640 up to Pole Moor, where it enters a series of small cuts with attractive stepped rock slides. The panorama opens out as the road turns on to Scammonden Dam and the new lake with its distinctive valve tower close to the road on the eastern bank. From this point the Deanhead cutting and Scammonden Bridge are clearly visible. In the cutting there are views of Blackstone Edge carrying the county boundary and the Pennine Way and, rounding a bend, the road stretching up to Windy Hill across Moss Moor. Here the carriageways split on sidelong ground and curve around a farmhouse, its chimney smoking and hens clucking as though nothing had happened in the last four years.'[25]

This experience was not accidental. Landscape architect J.B. Blaney worked alongside the County Surveyor, Colonel Maynard Lovell, who designed Scammonden Bridge, delivered by the main contractor Alfred McAlpine, which won a Civic Trust Award. The fences for this section were a bespoke design by the Darlington Fencing Company and most prominent as a standalone object was the valve tower designed by architect John A. Strubbe and engineers Rofe, Kennard and Lapworth. Not only were the elements objects, but the landscape was treated as an object in its entirety.

[SLIDE 18 - DOUNREAY] As these monuments[26] and landscapes are dissembled and decommissioned it is important that the relationship between their design and the socio-cultural, economic and political is documented in detail, narrated and communicated, to ensure the transfer of historic knowledge. In particular the design of landscape, that was intended to achieve its purpose over an extended period of time, needs to be fully recorded, reconsidered, and reported. The nature of these objects in their landscape setting and the cultural meaning attached to their original construction and removal is yet to be explored and their presence is significantly under-valued.[27]

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[24] Concrete Quarterly, Summer 1972, p.26

[25] Rowlands, D. (1971) 'Motorways that take to the moors', in *Design Journal*, April 1971, pp.58-65.

[26] The monumentality of infrastructures has been explored in a Soviet context by Anna Neimark (2012) 'The Infrastructural Monument: Stalin's Water Works under Construction and in Representation', *Future Anterior: Journal of Historic Preservation, History, Theory, and Criticism,* Vol. 9, No. 2 (Winter 2012), pp. 1-14;

[27] Aron Vinegar and Jorge Otero-Pailos (2012) 'Editors' Introduction: On Preserving the Openness of the Monument', *Future Anterior: Journal of Historic Preservation, History, Theory, and Criticism,* Vol. 9, No. 2 (Winter 2012), pp. iii-vi.

[SLIDE 19 – LES HALLES] In many senses the objects in the field become obvious and obviously visible when disclosed in terms attached to their design and production. The objects produced by infrastructure are even closer at hand, hidden in plain sight and so intrinsic to cities that they go unnoticed – these are the infrastructural architectures - by which I don't necessarily mean the architecture of infrastructure, but more the densely knotted parts of cities where mobility and exchange coalesce to create hybrid urban environments. The best examples are found in Asia, but most close at hand would be somewhere like Les Halles in Paris where the RER and Metro converge on (under) the site, with two major road tunnels and all of this is supplanted with a major commercial undertaking atop. These might be referred to as megastructures, groundscrapers, landform building or hybrid-buildings, but networks of flows explicitly produce the complex, knitted objects.

CONCLUSION

Without time to further theorise infrastructural architectures it is worth returning to the original premise of this talk: the material and ethereal qualities of objects and spaces produced by infrastructure and the effects this has on the morphology and geography of the city. By extension the city is the countryside. In the UK, the functions on which our cities depend are the engineered and designed landscapes of the hills, valleys and plains that surround them. We have discussed the object nature of infrastructural elements in field-object conditions and the landscape as produced object. Landscapes are made and unmade in service of flows as dams, bridges, motorways and internet servers are collocated in rural hinterlands. In the inner city the flows of capital coalesce to create new objects symptomatic and emblematic of the late twentieth and early twenty-first century city. [SLIDE 20 – NO STOP CITY] In these terms the levels, layers and surfaces of the inner city are produced by infrastructure that creates a new morphology and the geography of the city is by extension creating endless 'no-stop' cities of unbounded space. This can be stated by real material objects of infrastructure, the pipes, tubes, valves and junctions of aqueducts, sewers, electrical supply, motorways and their attendant surface built forms and not limited to a digitally enhanced version of the urban.