

Does large-scale infrastructure have an impact on urban development?

The case of Geneva, Switzerland

FiBRE

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Sixty second summary

When developing urban areas, one of the key issues to consider is that of traffic. The provision of well-planned, adequate transport infrastructure is key to dealing with the levels of traffic generated by a major urban area. The issue of accessibility is also important, and transport infrastructure can help ensure an urban area is made fully accessible both internally and externally. This research by Pierre Stämpfli, which formed part of his Master thesis at the Centre for Urban & Real Estate Management (CUREM), Zurich, aimed to analyse the relationship between large infrastructure and urban development by using the example of Geneva's city bypass, which opened in 1993, as a real case study.

Covering an area of approximately 41,000 km², Switzerland is a land-locked country in Western Europe, home to some 7.5 million people. As a federal republic, it is divided into 26 states, referred to as Cantons. While Berne is Switzerland's capital, its economic centres are the cities of Zurich and Geneva.

The city of Geneva, the capital of the Canton of Geneva, is the second most prosperous city after Zurich. Geneva is located in what has been called the 'metropole lemanique', an area that is developing around Lake Geneva and home to approximately 1.5 million inhabitants. Being a growing urban area, there are many large-scale infrastructure developments underway there. One of the major development projects in Geneva has been the government's attempts to deal with the city's traffic problems. The main routes into the city, from the north and the south, were originally unconnected and consequently traffic had to come into the city when in transit.



The main findings were that:

- The urban form is heterogeneous and **strongly influenced by the building regulations prevailing** in the different construction zones
- Urban sprawling was happening, as in other modern cities, but the **correlation with the new infrastructure couldn't be demonstrated**
- There is **no obvious relationship** between the construction of the motorway and urban development in the canton of Geneva.



Geneva – Switzerland's second largest city

The city of Geneva is located in eastern part of the so-called 'métropole lémanique', that is developing itself around the lake of Geneva, and which houses approximately 1.5 millions inhabitants. Geneva is the biggest urban centre of the metropolis area.

There were two highways leading to the city of Geneva; one from the south, coming from France and one from the north coming from Switzerland. They weren't connected and the transit traffic had to pass through the city. Because of this, in 1984 the government decided to solve the problem by constructing a city bypass, which was completed by 1993.

As in other agglomerations, the bypass is actually mostly used for inner-region trips. It transformed relations in the region and let new traffic knots appear. The main question is therefore: did the transformation of these relations in the region have an effect on the urban development of Geneva? And if so, what kind of effect?



Measuring the effects of large infrastructure development

Pierre Stämpfli studied the region at three levels:

Level One

An analysis of the region's dynamics as a whole, with specific focus on urban sprawl.

Level Two

An analysis of the demographic evolution and employment market at a communal level, where the focus was on the analysis of the employment and demographic distribution and its evolution in the communes with improved accessibility, relative to the communes without.

Level Three

An analysis of the evolution in the man-made environment at a district level, with specific focus on the evolution of building activity during the period.

These three levels of analysis enabled Pierre Stämpfli to produce a model that describes the relationship between the man-made environment of a certain area and its accessibility.

So what did the analysis show?



Results

At Level One, the area selected for analysis was the so-called ‘region franco-valdo-genevoise’, which goes beyond the borders of the canton of Geneva and integrates parts of France and parts of the Vaud region. The analysis undertaken in this study shows that, as in other modern cities, urban sprawl had occurred, however at this level the correlation between urban sprawl and new infrastructure could not be proved.

The concept of accessibility was introduced at Level Two of the analysis. For the purpose of this study it was defined as ‘the travel time from a location in the region of Geneva to the next reference point’. The reference points used in this study were the motorway accesses and the city centre. This enabled the region to be divided into seven groups of communes according to their level of accessibility to the new infrastructure and the city centre, before and after the bypass was constructed. The population and numbers of jobs were then recorded at five year intervals from 1980-2000.

This analysis of the demographic evolution of the region did not show a clear trend. There is, however, evidence of population redistribution from the city centre outwards to the other communes. This trend occurs across the entire region, however no obvious difference was observed between municipalities with an improved access to the highway, and those without. As Pierre Stämpfli comments, ‘as in previous analysis, urban sprawl goes on, but the highway does not have a significant effect on its regional structuring.’

Indeed, according to the results of this research, accessibility has the biggest effect on where employers locate. They observed a positive trend in employment figures for areas near to the bypass and the city centre.

At Level Three the focus was on building activity, and as such the scale of the study was reduced – the premise being to examine the changes in various parts of the canton using representative samples. For each sub-sector, the number of buildings constructed in the four five-year periods from 1980 to 2000, were recorded. This evidence showed that the sub-sectors that have the highest density form a corridor that runs parallel to the motorway.

And what about the urban form? Well, as this research reports, the urban form is heterogeneous and is strongly influenced by the building regulations that prevail upon the different construction zones. The researchers observed three building types that blend together to form the urban landscape. Firstly, within an area of detached housing, the morphology is made up of small entities.

The second type is industrial buildings, which tend to be found in wide zones that cover a large surface area. Finally, the third type, groups of residential or office buildings, are generally organised in a linear arrangement. The more recent developments are physically separate from each other, and more often than not their relationship to each other is not obvious.

So, Pierre Stämpfli identified these trends, but how did they stand up to testing?



Modelling the trends

Calculating the multiple linear regression helped Pierre Stämpfli to confirm these trends. All the variables tested were statistically insignificant, with the exception of the construction potentials and the building activity in the previous period. In other words, no correlation was found between accessibility to the city centre or to the bypass, and the urban development of Geneva.

In the canton of Geneva, as the permissions for construction are given by the public authority in the form of zone planning, it is safe to say that here urban development is largely driven by the government's decisions.

For the purpose of this study, Pierre Stämpfli assumed that the guidelines expressed in the canton's Master Plan would be applied. The results showed strong development levels in those sectors that were close to the motorway interchange from the third period (2010-2015), in comparison to the general trend, which was negative. Pierre Stämpfli comments that 'single family houses areas also benefit from the new legislation'.



“...urban development is largely driven by the Governments decisions...”

Drawing conclusions

This study has shown that there is no obvious relationship between the construction of the motorway in Geneva and urban development. At the regional level, urban sprawl – which is clearly underway – has so far not been exacerbated by the new motorway.

The municipalities that are newly connected to the motorway, do not appear to have benefited from the accelerated change in demographics. However, a phenomenon of demographic redistribution between the urban centre and the peripheral municipalities was observed by Pierre Stämpfli in this study. In fact, the influence of accessibility has been stronger on the location of jobs, since municipalities close to the new motorway and close to the city centre have experienced higher than average growth in the number of jobs they have available.

However, these trends cannot be directly translated into construction activities. There is no obvious relationship with levels of accessibility,

and the types of construction that are undertaken are heterogeneous. Recent building developments in the area are physically separate from one another and subsequently appear as individuals. As Pierre Stämpfli comments 'the result is a patchwork style urban structure that lacks overall unity'.

Indeed, results show that urban development is hampered by the shortage of available land and the other location factors become insignificant. This study has enabled a systematic analysis of developments in Geneva over the last twenty years, and their relationship with the new section of motorway, to be carried out. This study follows on from previous studies by the Federal

Regional Development Office (ARE) and, in the case of Geneva, provides another examples of the difficulty in showing a direct relationship between infrastructure development and general urban development.

The development of this model has suffered from a lack of available data at sub-sector level from the start of the observation period. The Cantonal Office of Statistics is however currently gathering data at this level, which will enable the model developed in this particular study to be improved in the future.





About the research

This paper is based on the study by Pierre Stämpfli (pierre.stampfli@bluewin.ch) for the Master of Science in Real Estate from the Center for Urban and Real Estate Management (CUREM) in Zurich (<http://www.curem.ch>). It was originally presented at the 14th ERES Conference in London, June 2007.

FIBRE written by Amy Roberts, RICS



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**The Royal Institution
of Chartered Surveyors**

12 Great George Street
Parliament Square
London SW1P 3AD
United Kingdom

T +44 (0)870 333 1600
F +44 (0)20 7334 3811
contactrics@rics.org
www.rics.org

RICS Europe
Rue Ducale 67
1000 Brussels
Belgium

T +32 2 733 1019
F +32 2 742 9748
ricseurope@rics.org

RICS Americas

The Lincoln Building
60 East 42nd Street
Suite 2918
New York, NY 10165
USA

T + 1 212 847 7400
F +1 212 847 7401
ricsamericas@rics.org

RICS Asia Pacific

Suite 2104
Central Plaza
18 Harbour Road
Wanchai
Hong Kong

T +852 2537 7117
F +852 2537 2756
ricsasiapacific@rics.org

RICS Oceania

Suite 2, Level 16
1 Castlereagh Street
Sydney NSW 2000
Australia

T + 61 2 9216 2333
F + 61 2 9232 5591
info@rics.org.au

