MAPPING DETROIT: THE CITY OF HOLES

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ABSTRACT

The case of Detroit shows how, even when the city is going through a history of rapid and sometimes violent change, its basic morphological structures are nearly permanent and thus sustainable. In a research project at the University of Michigan the historical maps of the city are reconstructed and fitted to each other, from the very start of the settlement in 1702 till now. The series of maps combined form proof of historical continuity. Nine distinctive spatial systems have determined the shape of the city. The way of mapping is chosen to also show the effect of recent vacancy and shrinkage. Once, Detroit within city limits was the fourth largest city of the United States, now it is the eleventh. Though their histories may be completely different, shrinking cities all over the world can learn from understanding the urban history of Detroit in their efforts to prevent cities from decaying.

KEYWORDS Detroit, mapping, urban history, morphology, growth, decline, shrinkage

1. ORIGINAL IDEA

The original idea for this small research project, as part of the activities in the first author’s sabbatical semester in the Fall of 2009 as Netherlands Visiting Professor at the A. Alfred Taubman College of Architecture and Urban Planning of the University of Michigan in Ann Arbor in the United States of America, was to generate a series of consistently drawn maps (consistent as to area, scale, orientation and legend) that show the history of growth and decline of the city of Detroit, Michigan. Surprisingly, such a series did not exist.

It is the authors’ opinion that the insights that can be gained from such a series of maps can contribute to the understanding of the particular pattern of growth and decline of the so-called American doughnut cities, the cities that during their period of growth developed empty spaces immediately around and even inside their centers as the result of originally important constituent elements of the urban growth, like in the case of Detroit the automobile industries with their factories and offices relocating to sites at a distance...
from the city center. When they needed more space than available on or around their existing lots, and because they did and do not want to redevelop on site as this would mean temporarily stalling production, they planned and plan for outplacement. In time the distances involved increased ever further and industries left the city and sometimes the region. Partly as a result of this, for some time these cities have been shrinking as for the number of their inhabitants. In Detroit this process started in the late 1950’s. Population within city limits declined from a high at 1,850,000 to less than 800,000 in 2010 (Saulny 2010), and even some of the surrounding suburbs are shrinking.

Though their histories may be completely different, shrinking cities all over the world can learn from understanding Detroit in their efforts to prevent to become decaying cities as well. Especially among the cities in Eastern Europe there are that are comparable to of Detroit, when concentrations of one type of industry lose their strength and take down the cities with them. At least four phases can be distinguished in the spatial development of the automobile industry in Detroit.

Phase 1 - In its description of the history of the city, the Taubman College Graduate Student Capstone Project called *Planning for the Strategic Redevelopment of Downtown Detroit, Michigan* states that “the first automotive plant, which produced Oldsmobiles, opened in Detroit in 1900. [-] Ford Motor Company opened its doors outside of the downtown area in 1903. Soon to follow were the other automotive companies of the time - the Packard Company in 1903, General Motors Company in 1908, Chevrolet Motor Car Company in 1911, and Chrysler in 1925.” (Larsen 2006; Woodford 2001) In the very beginning of the automobile industry in Detroit, up to about 1910, there were a great many small, privately owned workshops dispersed all over the city as it existed at the time that produced materials and parts for the large factories, even then close in character to assembly plants. The first true assembly line, however, was not installed before 1913 in the Albert Kahn designed Highland Park Ford Motor Company Plant (according to University of Michigan Professor of History of Architecture Robert Fishman).

Phase 2 - In the next phase, many individual workshops were incorporated in the big companies and larger factories had to be built, but this still occurred inside or very close to the built-up area of the city, in what is now its center. “In 1925 the city was home to 3,000 manufacturing plants, 37 automobile manufacturing plants, and 250 automobile accessory plants. Factories employed over 300,000 people.” (Martin 1993) In addition, around this time the great headquarters and administrative offices of the automobile companies were built. Trying to ride this tide, the city together with the captains of industry wanted to create what was called the New Center around the crossing of
Woodward Avenue and West Grand Boulevard, about 3 miles (almost 5 km) north of downtown. Because of the Great Depression of the late twenties and early thirties of the Twentieth Century, the New Center did not come off as planned, though some great buildings were realized, notably the General Motors Headquarters (now Cadillac Place, 1922) and the Fisher Building (1929), both designed by Albert Kahn, if in the case of the Fisher Building it was only partly built. Between the actual downtown area and the small area of the New Center a big gap was left that was never really filled.

Phase 3 - In the series of outplacements of factories as well as offices of the car companies, related of course to the general loss of activity in the United States from urban to suburban areas where more space was more easily available at lower costs, after the 1950s the city began to show holes: brown fields that lay fallow, partly polluted and often with dilapidated or partly demolished buildings still more or less standing and posing a real danger to their surroundings, and once lively buildings, including 48 buildings downtown (Whitford 2009) among which skyscrapers that are left completely empty and sometimes have lost all of their glass, meaning that they will rapidly be beyond repair. The great, 0.6 mile (almost 1 km) long Packard Automobile Manufacturing Plant of 1907, designed by Albert Kahn, located just 2.5 miles (4 km) west of the New Center, has been empty and deteriorating since 1956.

Phase 4 - When visiting Detroit and its surroundings in 1997 and again in 2002, it was obvious that the car industry of the ‘Big Three’: Ford, General Motors, and Chrysler, was outplacing itself again to even greater distances from the city and its suburbs. Factories were established in towns 60 miles away and more in all directions, partly to other states than Michigan and to the Southern United States, even to Canada. Around Detroit this resulted in the movement of car parts stacked on very long and very slowly moving freight trains on specially built railroad tracks that were and are a great hindrance to the region. The trains are armored against damage by bored and annoyed people shooting their rifles at them.

All of this occurred before the international financial crisis that took the car industry (s)tumbling down with it.

Parallel to these processes, the population of the city also diminished. The perpetual loss of jobs resulted in people either following the outplacement of the car factories or being left behind to the point where they could finally not afford to live in their houses anymore. The typically American processes of racial and economical segregation often strengthened this. The decline in population started in the 1950’s: the problem of the shrinkage isn’t new to our times. This early start was mainly due to four developments in
industry and in society in general: the upcoming automation and robotization of car assemblage and the outplacement of the car factories on one side and the flight of the white population and the reduction of household size on the other. The present image of large parts of the city is truly surreal: abandoned, dilapidated and burned out buildings, and an awful lot of empty lots that in some parts of the city are leveled, grass is sowed and even regularly mowed. This may sound like it would result in a kind of tidy and neat environment, but as in many streets far over half of the lots have been grassed over, the buildings still standing are ‘lost in space’ and an eerie emptiness and silence reign: the City of Holes. (See Fig. 1)

Figure 1 The City of Holes: vacant lots, based on government properties, corrected for government buildings in use and public parks (Henco Bekkering and Yanjia Liu)

Detroit now has more than 91.000 vacant lots where houses once stood or 27% of the residential properties in the city (Detroit Data Collaborative 2010).

2. SETUP OF THE RESEARCH
To reach the goal of giving insight into the urban development and decline of Detroit, the research setup goes through time and scale. The history of Detroit starts in 1701 with the establishment of a French fortified village called Fort Pontchartrain by a Captain of the Troupes de la Marine named Antoine Laumet, also called Lamothe Cadillac. (Dunnigan 2001) The firsts map that depicts this fort is dated 1702.
The collection of the early maps of Detroit from that moment on published by Wayne State University Press, Detroit in 2001 in the thoroughly researched and crafted large oblong folio *Frontier Metropolis. Picturing Early Detroit, 1701-1838* by Brian Leigh Dunnigan, Head of Research and Publications and of Reader Services of the Clements Library at The University of Michigan in Ann Arbor, has been extremely useful for our research. (Dunnigan 2001) We were able to select from this book the maps that as a series show the successive major changes in the structure of the city up to 1838. These maps were redrawn to the same scale and with a consistent, strongly reduced legend, trying at the same time to find the correct or most probable topographical position in relation to the present map of the city.

A second selection was made from the map collections in the map libraries of the University of Michigan, covering the period from 1838 till now, both on the scale within the city limits that were enlarged several times during history and on the scale of the metropolitan area. The maps still missing to create a consistent series were found, partly in regular commercial road atlases. Of course it was expected and immediately apparent that the historical maps do not fit exactly to the recent maps or for that matter to each other. There was an obvious need for a base-map for the series to relate all other maps to. We derived this base-map from the United States Geographical Survey Map of the Detroit area of 2009 in GIS format. The level of aggregation was digitally increased from the individual parcel to the urban block to create the pattern of streets and blocks. The relative deformation that was needed to fit the historical maps to the base-map results from the inaccuracy that was inevitable at the time of the drawing of these maps in the Eighteenth and Nineteenth Centuries, and from differences in cartographical projection, as more recent (Google) aerial photographs and maps do not fit exactly either. So by necessity the series of maps produced depends on digital manipulation and holds interpretations by the authors.

The legend used to redraw the maps is explicitly intended to result in maps that are readable when printed on normal book or magazine pages in black and white. The obvious choice could seem to have been for figure-ground maps, if only for the status they have in the discipline of urbanism, going back to Giambattista Nolli’s Nova Pianta di Roma of 1748. For several reasons this was not feasible, causing us to choose for street pattern drawings instead of figure-ground drawings. These can actually be seen as figure ground drawings at a larger level of scale, thus strongly reducing the digital information.

The ways in which the series of maps was produced in this research hold limitations and some risks. The most important limitation is for the series on the scale of the city to the
area within the present city limits. First, Detroit, as all other major cities, is part of a much larger metropolitan area where the different parts, though sometimes inadvertently, have a certain inner coherence and to a large degree depend on each other.

A distinction is made, again for reasons of producing readable maps, between a more detailed series on the level of scale of the city and a series with further strongly reduced detail on the scale of the metropolitan area (the last goes beyond the scope of this paper). A second aspect is that the city limits have changed in time several times. Around the moments of change, the area within the former city limits was fairly well filled up, which is of course what called for the enlargement, and building areas certainly extended beyond the city limits. Our maps on the scale of the city do not show this overflow; those on the metropolitan scale do. A next point is that the two municipalities of Highland Park and Hamtramck are completely surrounded by the city of Detroit. As they are obviously part of the urban system around them, the graphic information for their areas has been included in the base-map. Also, the highway system of the city has been consistently drawn as what it is: a veritable spider web of elongated holes in the city.

We had available the digital information in GIS format of the ownership of intentionally all 387,000 lots of Detroit within city limits, researched by a group of University of Michigan students taught by Professor Margaret Dewar and Eric Duweke of Urban Planning at Taubman College in the fall of 2006. The students’ map shows government ownership of parcels, by the City of Detroit, Wayne County and the State of Michigan, excluding public parks, police and fire stations, public schools and libraries, City Hall, and other still functioning public institutions. As the map shows no difference between vacant lots and lots with vacant or partly demolished buildings still standing, it gives a more complete impression of ‘the holes in the city’ formed by about 52,000 publicly owned properties at that time. This information we superimposed on the base-map to create our map of the City of Holes.

According to the most recent inventories, the total amount of vacant lots in the beginning of 2010 is 91,000, resulting in the image of ‘the urban prairie’. To this should be added 31,000 empty residential structures. Of a total of 387,000 lots 122,000 are vacant: 31.5%. Locally the percentage goes up to 60. These numbers come from the Detroit Residential Parcel Survey, based on inventories done in August and September 2009 by local residents and by students of the University of Michigan. The report was published February 22 2010 by Detroit’s Free Press (www.freep.com; www.detroitparcelsurvey.org 2010). The maps of this survey are aggregated in GIS by census block group and divided in quartiles. Thus they are more abstract than our map of the Holes in the City and convey
a different kind of information. Unfortunately, it was impossible to translate the survey’s data into our type of map. But just imagine the number of vacant lots as shown in our map of the City of Holes (see Fig. 1) go from 52,000 to 91,000 ….

3. DIGITAL MANIPULATION IN REDRAWING THE HISTORICAL MAPS
To transform maps with different projections into a series of consistent maps with the same projection, scale and orientation was a challenging task, made possible only by graphic computer techniques. As explained before, the historical maps do not fit exactly to the recent maps. This called for some degree of interpretation and manipulation.

For the series of maps on the scale of the city, we dealt with this problem by as much as possible deducting the urban growth of a certain period from the most recent map with standard projection, our basemap. With the help of the staff of the division of the Spatial and Numerical Data Services Lab of the University of Michigan at Taubman College (SAND Lab North) we were able to work with the US Geological Survey parcel based GIS data for the Greater Detroit Area of 2009. These data are on the scale of taxable parcels and thus include a lot of information irrelevant for our maps. SAND Lab North helped us to aggregate parcels into urban building blocks using the GIS toolbox. The new maps show the islands of the building blocks in black and the network of public and open space in white: the simplest legend possible, referring to the black and white of figure-ground maps but not the same. Using this reconstructed map of the situation in 2009 as our base-map, one by one the maps of earlier periods were generated working backwards in time and, so to say, deducting urban areas.

In the computer, the historical maps of the selected years were placed over the base-map, and adjusted in scale and orientation. Due to the different projections used for these maps, they could not be perfectly matched to each other, but it is not difficult to relate specific parts in different maps to each other. By reducing the built-up urban areas of the 2009 building block map through referring to the lesser built-up areas in the historical maps, introducing distortion where necessary, we generated the maps going back in time until 1968, the earliest map showing the highway system. We used a 1952 map to add the many blocks that were torn down for the construction of the highways as shown in the 1968 map. (See Fig. 5.) With this new base-map of 1952, we reconstructed the maps backwards until 1835 following the same procedure.
4. HISTORY FIXED IN PLACE

The map of Detroit and surroundings in 1825, depicting the local so-called Ten Thousand Acre Grid surrounded by the larger scale standard American Jefferson Grid, also shows several sets of double lines, most probably representing pre-existing Indian trails. (See Fig. 2.) We were able to fix three of the four corners of the ‘Ten Thousand Acre Grid’ to existing street corners on the 2009 map of Detroit and found complete correspondence of the double lines in the historical map with the present course of Woodward Avenue, it being the missing First Avenue next to Second and Third, as the last two are still named. To match the course of Jefferson Avenue and the bank of the Detroit River we had to deform the map, shortening the distance between grid and river. This is probably due to a mistake in the 1825 map. After this correction, the somewhat irregular course of Michigan Avenue fits as well. According to our interpretation the old Indian trails have transformed into Woodward, Michigan and Jefferson Avenues. (See Fig. 3.) This held out even in the reconstruction of the city after the great fire of 1805 that left only one house standing. (See below for the planning of the reconstruction.) As is so often the case in the history of cities, the basic structure of the city has proven to be as good as permanent. It also survived the changes in government: after the French rule from 1702 to 1770 the area became British and in 1793 the United States government took over. So much more deplorable is the building of Cobo Hall by Giffels and Rosetti in 1960 right over and across Jefferson Avenue, impeding the visual perception of the basic urban structure in this part of the city.

Figure 2 Map of the Surveyed Part of the Territory of Michigan by Orange Risdon, 1825, showing the so-called Ten Thousand Acres Grid (upper middle part) (from Dunnigan 2001)

Figure 3 The structure of the ‘Ten Thousand Acres Plan’ superimposed on the map of 1968 (Henco Bekkering and Yanjia Liu)
From this, we reasoned backward in time. The orientation to the compass of the ‘Ten Thousand Acres Grid’ is derived from the French agricultural parceling that did not use a grid, but narrow strips more or less perpendicular to the bank of the river, resulting in the so-called ribbon farms. The basic crossroads of in the different stages of the forts that preceded the city and that have a central crossing, as military forts tend to have. The enlarged forts even show the beginnings of the urban pattern that is still recognizable in the small-scaled building blocks of downtown today. It made sense to situate the first French Fort Pontchartrain on the crossing of the Indian trails, because this meant that it was relatively easy to reach from larger distances and to explain its location to first visitors.

5. ATTEMPTS TO (RE) DESIGN

After the devastating fire of all of the city of Detroit in 1805, that left not more than one building standing, prominent citizen and Judge Augustus B. Woodward was appointed to lead the redevelopment. He set out to make, or maybe better said: have made a plan that he intended to resemble Pierre-Charles L’Enfant’s layout of Washington DC, defining large lots of which one was granted to every adult resident or couple after the fire. (See Fig. 12 and 13) This is the start of Detroit as the city it still is, made of freestanding single-family homes rather than the row houses that dominate other American cities of the time. Fortunately, the Woodward plan as a whole was abandoned by 1818. (Larsen 2006)

It is indeed an inadequate urban design, as it results in lots with mostly non-rectangular borders on the small scale and endless repetition without recognizable hierarchy on the larger scale. It would have resulted in a city in which it is impossible to orientate oneself and to find one’s way around. This is almost the opposite of L’Enfant’s plan of Washington DC, which of course does have hierarchy and an easily recognizable urban form and pattern. There is however a very interesting aspect to the Woodward plan that has been a determining factor for the urban form of Detroit. It appears to have found inspiration in and made use of the original pattern of the crossing of Woodward and Jefferson Avenues (supposedly not named after the Judge, but as an avenue running towards the great woods of Michigan North of the city) together with the diagonal course of Michigan Avenue. It adds new radial avenues to these to create the regular hexagonal pattern.

Though the old course of Michigan Avenue, stemming from an Indian trail, led to the addition of Grand River Avenue to the east of Woodward, west of Woodward there is only one radial avenue implemented: Gratiot. In reality, the radiating pattern of these great avenues of Detroit is not only asymmetrical, but as mentioned above they do not
cross in one point either and this makes the pattern around Campus Martius relatively hard to understand. Fort Street, more or less parallel to the much older Jefferson Avenue, is added to form the base line of the goosefoot, but crosses Woodward at a distance from the others, on the South side of Campus Martius. Campus Martius itself has never been a spatially well-defined place in itself. Not only are its borders irregular, there is actually very little spatial definition because so many buildings surrounding it have only a narrow façade toward the square.

![Figure 12](image1.png) A Plan of the City of Detroit Drawn By Albijah Hull, Surveyor of Michigan January 1807: proposal of 1806 (from Dunnigan 2001)

![Figure 13](image2.png) Plan of Washington DC by Pierre-Charles L’Enfant, 1791 (source: http://gtm-media.discoveryeducation.com/videos/imagelibrary/print/EF6BED81-F845-3EC9-39D5BA5226EO2419.jpg)

From this part of the research we conclude that there are nine spatial systems that have determined the morphological structure of the city of Detroit (see Fig. 16):

1. Rivers
2. Early French forts
3. French ‘ribbon farms’
4. Ten Thousand Acres Grid’
5. Jefferson Grid
6. Radial avenues
7. Street grids
8. Railroads
9. Highways

- The Detroit River is the reason for Detroit to be where it is. Its bank has been changed considerably through time by landfill and harbor constructions. The tributaries have largely disappeared from view, but in the city of today more or less continuous linear parks follow their courses.
- The early forts fixed the basic cross of the urban structure of Detroit and one of the radial avenues: Woodward, Jefferson and Michigan Avenues, stemming from old Indian trails. The extensions of the forts formed the first small-scale urban pattern of the downtown area.
• The French ‘ribbon farms’ set the orientation to the compass of the central urban grid, more or less perpendicular to the river.

• The ‘Ten Thousand Acres Grid’, taking over this direction, remains in the city plan as the area between Tireman Avenue/West Grand Boulevard in the south, Conant Avenue in the east, the railroad track north of Oakman Boulevard in the north and Ironwood Avenue and Nardin Street in the west. The northwestern corner has been cut off by Livernois Avenue. The area within has been divided into a grid of regular building blocks.

• The Jefferson Grid of 1 Mile in both directions determined the orientation of the rest of the urban grids.

• The great radial avenues break through the relative regularity of the grids: Michigan, Grand River and Gratiot Avenues.

• The block grids outside the area of the original ‘ribbon farms’ and the ‘Ten Thousand Acres Plan’ are mainly oriented according to the Jefferson Grid, generally longer from north to south.

• The railroads mostly were in place before the urbanization of the adjacent areas, so they have been more or less incorporated in the urban pattern by pragmatic adjustments of the grid.

• The later installment of the highway system in the 1950’s and ’60’s in the existing urban tissue has been much more destructive, and intentionally so. As in many American cities, the highways were traced so as to demolish areas of the city that were perceived as a threat to established society. In the case of Detroit, not only did the construction below grade result in sometimes two or three blocks wide destruction of existing homes and streets, the courses were deliberately laid out so as to eliminate easy connections between so-called bad neighborhoods as well, thus fragmenting the city. (See Fig. 17.)

In addition to the nine structuring systems mentioned above, the many plans for redevelopment of bad neighborhoods form together a tenth influence on the form of the city. As they were generally conceived independently from each other and almost never finished according to plan these cannot be shown in a schematic drawing.

6. GROWTH AND DECLINE ON THE SCALE OF THE CITY

The selection of time periods between maps in the series on the scale of the city is partly based on major changes in size and morphology of the city, partly on the availability of
historical maps in the three University of Michigan map libraries. The series starts at the end of the period covered by *Frontier Metropolis* with the redrawing of a map dated 1835 found in the Detroit Public Library: *City of Detroit in the State of Michigan by John Farmer, District Surveyor*.

The first maps of the growth of the city show a small town of in 1835 less than 1 by 2 miles (1.6 by 3.2 km), clearly based on the double goosefoot structure, with almost all of downtown laid out and Eastern and Western extensions on several of the former 'ribbon farms'. In 1863, this pattern has extended to an area of about 2 by 4 miles (3.2 by 6.4 km). The urban area has become at least five times as big in less than thirty years and shows the first railroads, largely outside the built-up area of the city. In 1895 the area within the city limits of that moment is filled to the brim: approximately 3 by 6 miles (almost 5 by 10 km). Urban growth is again very strong during this period. The same is true for the situation in 1912, when the distances from downtown to the city limits in the
east and the west, and from the river to the north are more than 6 miles (almost 10 km). As mentioned before, there will have been developed areas outside the city limits, reason for enlarging these soon after. (For this overflow, compare the series of maps below on the metropolitan scale from 1921 on). In 1920 the city has reached more than half of its present size. Thirty-two years later, in 1952 all of the area within the present city limits is filled up: 138 square miles (357 km²), 29 miles (47 km) east to west and 13 miles (21 km) north to south. From that moment on, in essence the morphology of the city does not change anymore, except for the destruction caused by the installment of the highway system in the ten years between 1958 and 1968. The depressed highways fragment the city and isolate downtown from the surrounding neighborhoods. The only fortunate aspect of their being on a lower level is that the floor of the city can relatively easily be continued across the highways by building additional bridges or bridging over broader stretches in the future. For now, they are very disruptive indeed and as such have succeeded in the original goal of fragmenting the city and distancing so called bad neighborhoods from each other.

The map of 2009 finally shows The City of Holes: white are in addition to public open space the great many vacant lots spread all over the city, but with relative concentrations. These are the areas where the real problem of Detroit lies. The visual impact ranges from surreal where the municipality has taken some action to tidy things up, to flat out frightening where the image of the city now resembles cities after destructive acts of war with empty and burned out buildings and buildings literally falling apart. Even where the city has taken the trouble to break down the dilapidated buildings of which ownership fell in public hands, flattened out the lots, sawn grass and regularly mows it (or mowed, as the city is now functionally bankrupt), the images take away one’s breath. It is not only hard to imagine how this spatial disruption can be repaired within one or even two generations. It is indeed hard to decide if repair would be advisable: certainly not to reconstruct the city that once was. This is obviously impossible because of the lack of economic carriers for the city at the moment. It is probably also not desirable because one may very seriously critique that city, that not only because of its mono-culture of car production, but also because of its spatial form and characteristics with the endless repetition of small freestanding homes on endless straight streets was doomed for decline and because of environmental issues will be even more doomed in the future.
Figure 18 Series of maps on the scale of the city, (Henco Bekkering and Yanjia Liu) 1835; 1863; 1895; 1912; 1920; 1952; 1968; for 2009: The City of Holes see Fig. 1

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CONTRIBUTIONS

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