WALKABILITY LESSONS FROM THE PAST

Congress for the New Urbanism 25th Annual Meeting

Seattle, Washington

May 3 – 6, 2016

ABSTRACT

For thousands of years cities have been centers for commerce, creativity, and livelihood, consisting of relatively unchanged characteristics such as walkable streets, diverse land-uses, and human-scaled buildings and streets. With the introduction of the automobile this past century, the desire for free-flowing traffic and convenient parking drastically altered the fabric of many cities. Transforming cities into places that accommodate automobiles converted downtowns into office parks rather than vibrant mixed-use environments and removed entire neighborhoods.

This study quantifies selected characteristics of Downtown Bridgeport, Connecticut, prior to the widespread use of the automobile to better understand how cities functioned when they were constructed at human-scale. The urban fabric for the pre-automobile era (1913) was then compared to that in the post-automobile era (2013). Our most startling findings relate to changes in the density and diversity of land uses. From the passenger train station located in the downtown, a pedestrian in 2013 could reach only 28% of the number of establishments that a 1913 pedestrian could in a 5-minute walk. Looking only at a single type of land use—residential--a startling 6% of the number of residential properties can be accessed today, something that reflects the lack of mixed-use nature of the city. Analysis of this type helps to further inform the general debate about the place of automobiles in cities and how city planners and developers can promote walkability by repairing the urban fabric to increase density and land-use mix.

AUTHORS

Kristin Floberg *(corresponding author)*
Department of Civil & Environmental Engineering
University of Connecticut
261 Glenbrook Road, Unit 3037
Storrs, CT 06269-3037
Email: kristin.floberg@uconn.edu

Norman Garrick, Ph.D.
Department of Civil & Environmental Engineering
University of Connecticut
261 Glenbrook Road, Unit 3037
Storrs, CT 06269-3037
Email: norman.garrick@uconn.edu

Carol Atkinson-Palombo, Ph.D.
Department of Geography
University of Connecticut
215 Glenbrook Road, Unit 4148
Storrs, CT 06269-4148
Email: carol.atkinson-palombo@uconn.edu

WALKABILITY LESSONS FROM THE PAST

INTRODUCTION

Cities have been centers for commerce, creativity and livelihood for thousands of years, consisting of relatively unchanging characteristics such as walkable streets, diverse land-uses, and human scaled buildings and streets. In the last one hundred years the invention of the automobile has radically altered human settlement patterns. Many cities such as Bridgeport, Connecticut, have changed from being oriented towards humans to places that prioritize personal vehicles. The resultant changes represent a drastic departure from the way that cities were designed for thousands of years. The changes have been so monumental that it may be difficult for society to imagine a city without the automobile playing a significant role in the form and function.

The influential urban activist, Jane Jacobs, spoke of "mass amnesia" in her 2004 novel, *Dark Age Ahead*. She wrote:

> *"People living in vigorous cultures typically treasure their cultures and resist any threat to them. How and why can a people so totally discard a formerly vital culture that it becomes literally lost?" (1, pg. 4)*

Jacobs questioned how society had forgotten the treasure of a complex urban environment and its many advantages. The questions of how and to what extent to accommodate automobiles remains a major challenge that needs to be addressed in any attempt to revive walkable and livable cities. This paper aims to characterize and quantify how Bridgeport, Connecticut changed since it embraced the automobile. Our goal is to better help those seeking to revitalize cities understand what was in place before the automobile to understand the extent of the challenges they are facing in becoming more walkable, livable, competitive and fiscally solvent.

Case Study: Bridgeport, CT

This study explores how a typical American city has changed since the widespread use of the automobile. Bridgeport, Connecticut was first settled in the mid 17th century and officially established as the city of Bridgeport in 1836. Four years later the railroad was opened and in conjunction with the port, cemented the city's role as an industrial center. Industrialization increased the population from just over 3,000 residents in 1840 to 115,289 residents in 1914 *(2)* with the population peaking at 158,709 in 1950. Population has declined since then, now standing at 147,629 residents *(3)*. Even after this population decrease, Bridgeport is still the most populous city in Connecticut.

Bridgeport is located in the southwest region of Connecticut in Fairfield County, the wealthiest region of the United States. However, in recent years, Bridgeport has faced

economic turmoil with low-income levels of $21,002 per capita, 23% of the population living in poverty *(3)* and the third highest crime index in Connecticut *(4)*.

Bridgeport started to slowly accommodate the automobile in the beginning of the 20th century by increasing parking *(5).* However the most drastic change in the city started in the late 1950's, after President Eisenhower signed the Federal-Aid Highway Act of 1956. By January 1958, Interstate 95 was completed in most of Connecticut. It was built through much of the existing downtown. Figure 1 shows an aerial photograph of Bridgeport in 1965 *(6)*. The aerial image shows how much of the downtown was carved out in order to build the freeway. By 1972 the Route 8/25 segment between Interstate 95 and Trumbull, Connecticut was completed. At this time Bridgeport starts to resemble the present day conditions of the city. Figure 2 is an aerial prior to the opening of Route 8/25 in February 1970 *(7)*. It is also interesting to take note of how the razed land cover in 1965 was replaced by 1970 with towers surrounded by parking. To capture these changes the study focuses on the downtown neighborhood of Bridgeport, where the majority of these urban renewal and freeway building projects completely reworked the urban fabric. It is delineated by the Pequannock River to the east and 1-2 blocks to the south and west of the freeways. It is approximately 0.6 square miles in area or 4 percent of the total city area.

FIGURE 1: Aerial Photograph of Bridgeport 1965

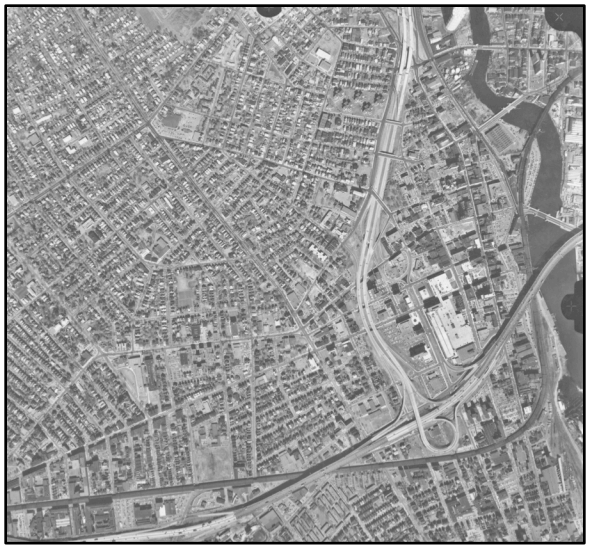

FIGURE 2: Aerial Photograph of Bridgeport 1970

METHODOLOGY

In order to quantify the differences between 1913 and 2013 Bridgeport, a geographic information data layer, or shapefile, depicting the land cover with the coordinating land use and building characteristics attributes was created. The 2013 database was created using the 2013 parcel shapefile and a 2016 aerial image. The parcel shapefile was embedded with the desired attributes including land use and building height. To create the building footprint layer, the parcels were clipped to the building footprint from the aerial image.

Due to the nature of historical documents, a geographical database is usually much more tedious than present day data as a starting file most likely does not exist. The building footprint layer was created from scratch by first georeferencing the earliest known aerial image of the area, dating back to 1934. Another challenge is that most of the buildings from 1913 do not exist today. The 1934 aerial was therefore used to georeference Sanborn Fire Insurance maps from 1913. These maps were chosen based on the online availability from the University of Connecticut's Map and Geographic Information Center (MAGIC) and Yale University Library's Digital Collections, respectively *(8)*. Using the georeferenced collection of Sanborn maps, a shapefile was created by individually outlining each building and assigning the necessary attributes to each shape. This allowed for a reasonably accurate comparison between 1913 and 2013.

RESULTS: BRIDGEPORT 1913 VERSUS BRIDGEPORT 2013

The following sections of this paper show the differences between 1913 Bridgeport and 2013 Bridgeport based on land use, building coverage, and pedestrian accessibility.

Changes in Land Use 1913 versus 2013

Figure 3 shows the dramatic changes in land use in the 100 years between 1913 and 2013. The most drastic changes include the loss of the fine-grained fabric that once existed and the intricate mix of uses in this district of the city. In 1913, buildings occupied thirty percent of the downtown land. Over the next one hundred years, with the reworking of the urban fabric the total building coverage was reduced to only nineteen percent of the total land area. This equates to a 38% loss in building coverage during the two time periods.

Table 1 shows how the building coverage is allocated by the following land uses: commercial, residential, municipal/exempt, industrial, and transportation storage. In 1913 there is a clear central business district (CBD) where the majority of the commercial buildings are located. Note that there are also smaller commercial establishments sprinkled along the main corridors of residential neighborhoods. These establishments served as the neighborhood grocery, deli or small family-run business. While in both years nearly the same amount of land area was devoted to commercial properties, the maps show a marked contrast in the size and arrangement of those

buildings in the two time periods. Unlike the commercial properties of 1913, those in 2013 are mostly used as office buildings for corporations, which diminish both the amount of businesses in the downtown and the diversity in terms of their different functions.

Residential properties, shown in green, surrounded the CBD in 1913 and made up nearly one third of the total building coverage. Their location surrounding the CBD as well as the quantity ensured the walkable nature of the downtown. By 2013 most of the housing was removed from the downtown with only five percent of the building coverage devoted to residential uses.

In 1913, industrial establishments were distinctly defined along the railroad tracks for convenient movement of goods. A large variety of products were made in Bridgeport at the turn of the century including consumer goods such as ice cream, beer, and corsets, as well as machinery. By 2013, the amount of industrial space had halved, much of which is vacant.

The most drastic change in land use from 1913 to 2013 is the land devoted to municipal or property tax exempt buildings. Such properties include courthouses, community college, and stadiums, that when combined comprise nearly 45 percent of the land coverage in 2013. This contrasts sharply with 1913, when only 4 percent of the land coverage was municipal or exempt.

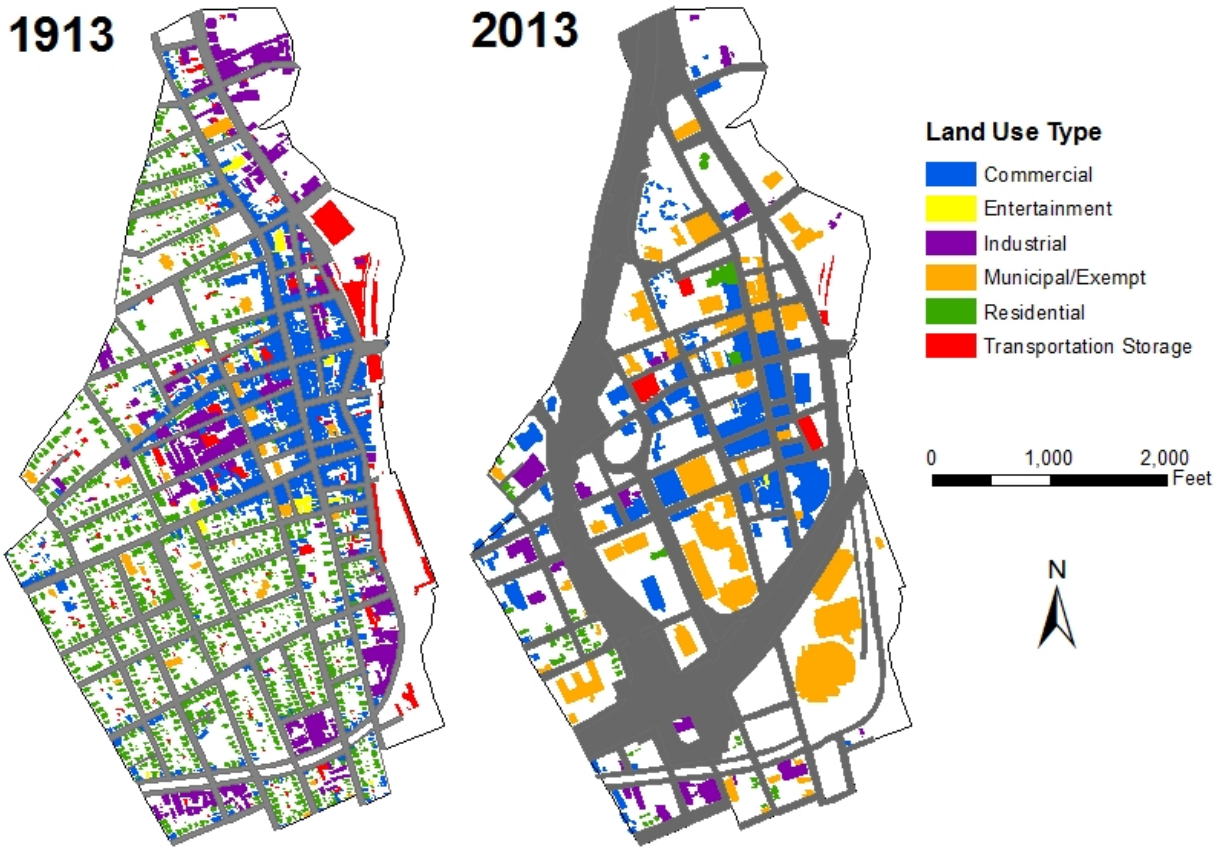

FIGURE 3: Land Coverage by Land Use and Year

TABLE 1: Total Land Area

	Footprint Area (ft^2)		% of Total Building Area	
Land Use Type\ Year	**1913**	**2013**	**1913**	**2013**
Municipal/Exempt	214,757	1,429,261	4.3%	44.8%
Commercial	1,611,273	1,181,716	32.2%	37.0%
Residential	1,612,446	161,244	32.2%	5.1%
Industrial	1,052,391	309,834	21.0%	9.7%
Built Transportation Storage	518,087	109,477	10.3%	3.4%
Total	5,008,955	3,191,532		
Total Study Area	16,471,794	16,471,794		
% Land Cover	30%	19%		

Visualizing the Downtown in 1913 versus 2013

The two-dimensional nature of aerial maps limits how the city is portrayed. To add some texture to our project, we used ArcScene to create three-dimensional renderings of the downtown in both 1913 and 2013 using the building heights.

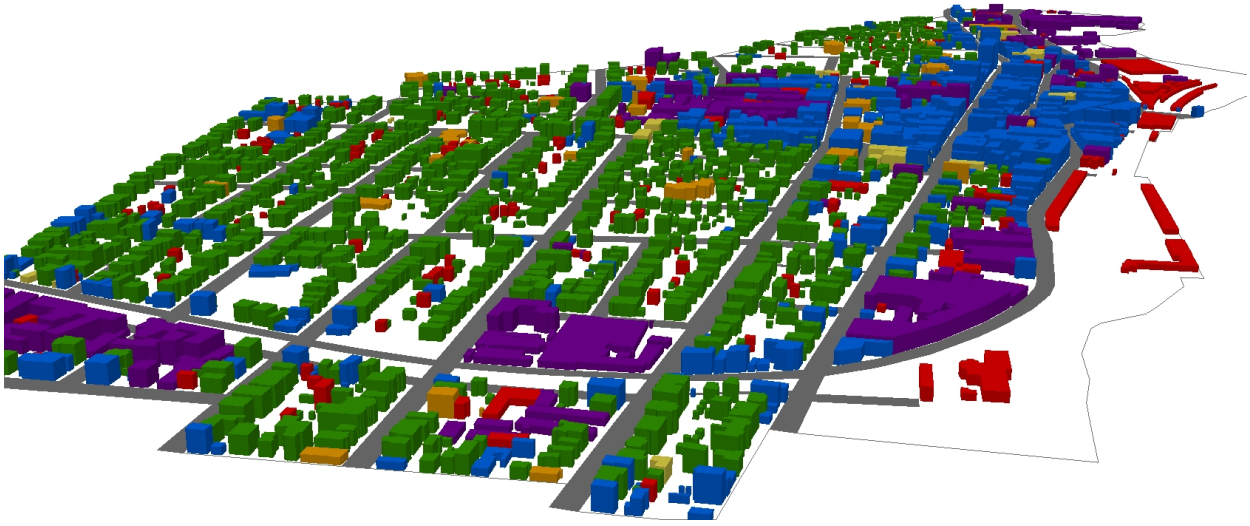

FIGURE 4: Three-Dimensional Model of 1913 Downtown Bridgeport

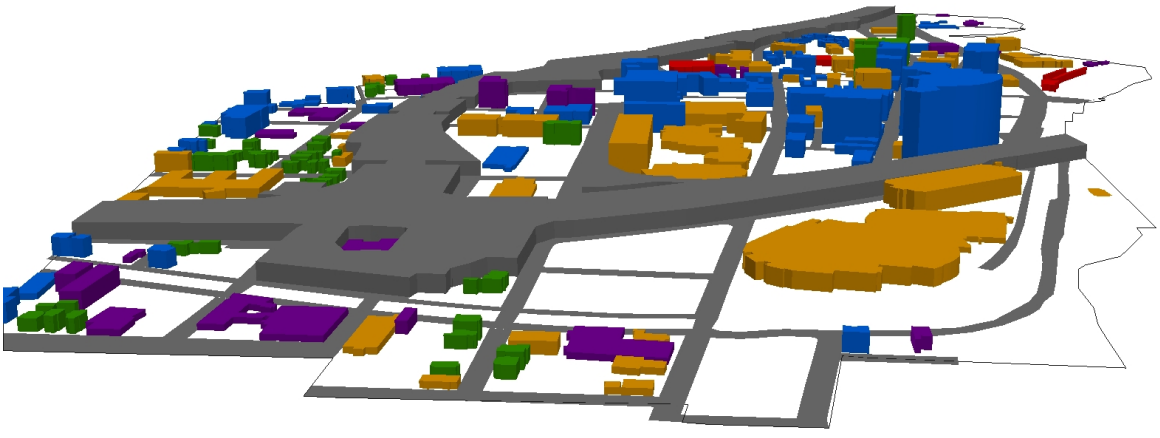

FIGURE 5: Three-Dimensional Model of 2013 Downtown Bridgeport

The 3-D renderings show how much the downtown has changed in just one hundred years, in both form and function. Looking at the 1913 model you can feel the sense of place that the buildings created while the 2013 model conveys an unfriendly pedestrian environment best suited for cars. The following section explores the pedestrian environment of both eras more closely.

Pedestrian Street Network

The pedestrian street network is comprised of all streets legally accessible to pedestrians; freeway segments being removed. Figure 6 shows the pedestrian network for both 1913 and 2013.

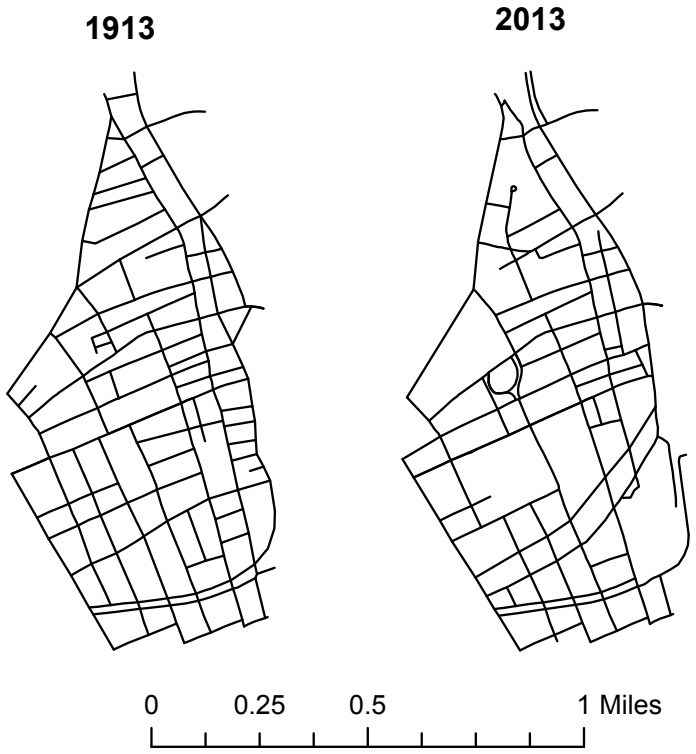

FIGURE 6: Pedestrian Street Network by Year

In the core of the downtown there are visible changes to the street network including the loss of connectivity where the two freeways interchange and the addition of superblocks. Connectivity can be measured in many ways, one of which is intersection density. The downtown intersection density changed from 232 intersections/mi^2 in 1913 to 203 intersections/mi^2 in 2013.

Pedestrian access maps in increments of 5 and 10 minutes are shown in Figure 7. Two locations were picked based on examples of 2013 origins, one is the train station, which is the same in both years, and the second is Housatonic Community College.

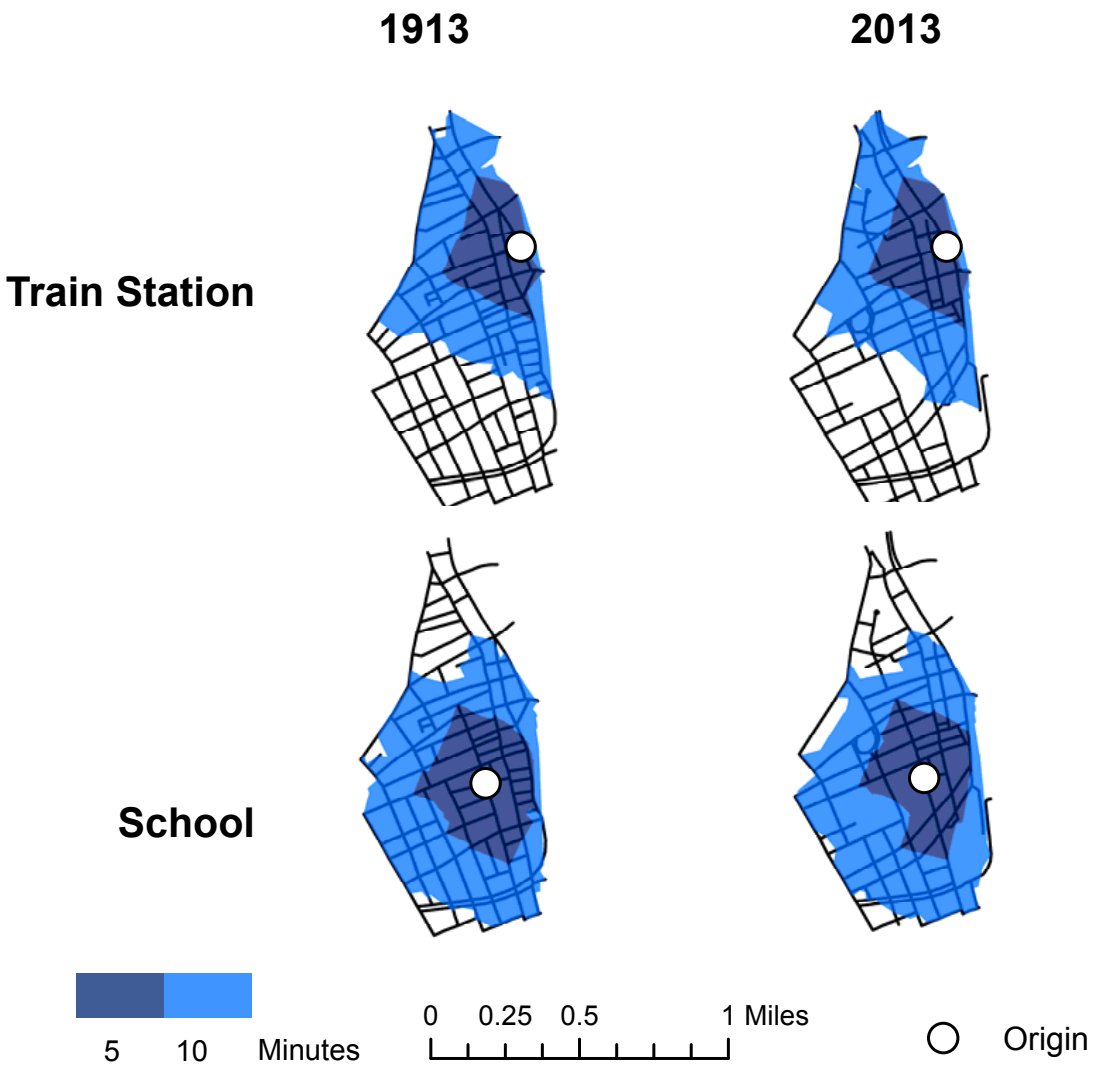

FIGURE 7: Pedestrian Accessibility Maps

The change in accessible area changed minimally with a 0.5% to 11% decrease in service area between the two time periods. However further investigation reveals that even though the access area has decreased minimally the amount and diversity of establishments have been diminished significantly as well, telling a more compelling story of the walkable nature of the city in 1913 compared to today.

Using the 5-minute pedestrian accessibility maps for the train station and school origins, all buildings within the accessibility area were selected. Table 2 shows how many buildings with their coordinating land uses that are accessible for each year and origin. From the train station a pedestrian could reach 276 establishments in a 5 minute walk in 1913; in 2013 a pedestrian can reach only 28% of what was attainable in 1913. Commercial establishments were reduced to only 22% of what was accessible in 1913 and only 6% of the residences in 1913 are walkable in 2013. The pedestrian access

from the school has also significantly changed between 1913 and 2013. One residential building is accessible in 2013 while in 1913, 287 residences were within a 5-minute walk of the school. Overall, only 10% of the 1913 buildings were accessible from the school by 2013. Designing large-scaled buildings with limited uses greatly affects the walkable nature of cities.

TABLE 2: Accessible in 5 minute walk

Origin\Land Use Type	Commercial	Industrial	Municipal/Exempt	Residential	Total
1913 Train station	199	33	8	36	276
2013 Train Station	43	3	28	2	76
% of 1913 accessible	22%	9%	350%	6%	28%
1913 School	189	27	18	287	521
2013 School	44	1	8	1	54
% of 1913 accessible	23%	4%	44%	0%	10%

CONCLUSION

This research links the pressing issues of walkability and livability that urban planners are attempting to reinvigorate to conditions that existed in the past. Prior to automobiles people built cities that were walkable from both a street connectivity and land use-mix perspective. In 1913, the citizens of Bridgeport lived in a city where residential and commercial buildings made up two-thirds of the built environment, equally, making for an environment conducive to short trips easily made on foot. One hundred years later, nearly half of the downtown is exempt from property taxes and only 5% of the building footprint is for residential uses creating a place that is heavily destination based, not easily accessible by walking.

Jane Jacobs wrote in her novel, *The Death and Life of Great American Cities*:

> *"Borders can thus tend to form vacuums of use adjoining them. Or to put it another way, by over simplifying the use of the city at one place, on a large scale, they tend to simplify the use which people give to the adjoining territory too, and this simplification of use—meaning fewer users, with fewer different purposes and destinations at hand—feeds upon itself. The more infertile the simplified territory becomes for economic enterprises, the still fewer the users, and the still more infertile the territory. A kind of unbuilding, or running-down process is set in motion (9, pg.259)."*

Jacobs' understanding of how and why cities lose their functionality has been realized in many American cities. Bridgeport has simplified what the downtown is used for and thus decreased the numbers of people who use the space.

In 1913, people could reach 276 different commercial, industrial, municipal, and residential properties within a 5-minute walk from the train station. In contrast, in 2013, a pedestrian can only reach 76 different properties, 3% of which are residential. If the same land use mix of 1913 was in place today, people could consider not owning a car. This would reduce the need for parking and perhaps allow stakeholders to create a virtuous cycle between land use and transportation in the urban environment. The 1913 image of Bridgeport illustrates just how mixed the land uses were in the city and how walkable the downtown was. This historical example could help planners uncover this amnesia of a time where cities were vibrant and walkable.

We can learn from the 1913 citizens of Bridgeport the importance of a balanced land-use environment that promotes walkability based on proximity because in the end New Urbanism should really be good Old Urbanism for a new era.

ACKNOWLEDGEMENTS

The authors would like to thank the U.S. Department of Transportation's New England University Transportation Center, the Connecticut Transportation Institute and the University of Connecticut's Center for Real Estate and Urban Economic Studies for funding this project.

REFERENCES

1. Jacobs, Jane. *Dark Age Ahead*. Vintage Books Edition, 2007.
2. "Bridgeport." *The Encyclopedia Americana: A Library of Universal Knowledge.* Volume 4, 1918.
3. "USA QuickFacts from the US Census Bureau: Bridgeport City, Connecticut." State and County QuickFacts, 2015.
4. "Connecticut Crime Index City Rank." USA.com. 2017
5. University of Connecticut Libraries Map and Geographic Information Center - MAGIC. *1934 Connecticut Aerial Photography Index*. 2013.
6. University of Connecticut Libraries Map and Geographic Information Center - MAGIC. *1965 Connecticut Aerial Photography Index*. 2013.
7. University of Connecticut Libraries Map and Geographic Information Center - MAGIC. *1970 Connecticut Aerial Photography Index*. 2013.
8. Sanborn Map Company. *Bridgeport, Connecticut: Insurance Maps.* Map. 1:600. Volume 1, 1913.
9. Jacobs, Jane. *The Death and Life of Great American Cities*. Vintage Books Edition, 1992.