9-12-2016

With a National Park Next to Its Downtown: Forecasting the Distribution of the Economic Impacts of the Coltsville National Historical Park within Hartford, Connecticut

Dmitriy V. Tarasov
University of Connecticut - Storrs, dmitriy.tarasov@uconn.edu

With a National Park Next to Its Downtown: Forecasting the Distribution of the Economic Impacts of the Coltsville National Historical Park within Hartford, Connecticut

Dmitriy Vladimirovich Tarasov

B.A., Virginia Commonwealth University, 2006

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

at the

University of Connecticut

2016

APPROVAL PAGE

Masters of Arts Thesis

With a National Park Next to Its Downtown: Forecasting the Distribution of the Economic Impacts of the Coltsville National Historical Park within Hartford, Connecticut

Presented by

Dmitriy Vladimirovich Tarasov, B.A.

Major Advisor____

Dean Hanink

Associate Advisor____

Carol Atkinson-Palombo

Associate Advisor____

William Berentsen

University of

Connecticut 2016

ACKNOWLEDGEMENTS

I would like to thank everyone who guided me in the course of my research and took the time to answer my questions about data and research methods. In particular, I would like to express my gratitude to Michael R. Howser at the University of Connecticut Libraries' Map and Geographic Information Center (MAGIC) and university librarian Steven Batt, whose assistance greatly sped up my search for data and gave me peace of mind when citing it. I would also like to thank Brett Flodine, GIS Manager with the City of Hartford; his assistance with locating the data I sought, and the time he took to help me overcome the technical difficulties I faced while preparing the data for my analysis, were more than anyone had the right to expect. In addition, I feel the need to thank the University of Minnesota staff who maintain the National Historical Geographic Information System (NHGIS) for providing me with prompt and helpful feedback on my citations of their GIS data—despite the fact that I sought such feedback during the summer semester! I am grateful to my advisor, Dean Hanink, and my other advisory committee members, Carol Atkinson-Palombo and William Berentsen, for their support and patience as they guided me through the initially unfamiliar and bewildering world of spatial data models.

Contents

Tables

Figures

Thesis Problem Statement

Dmitriy V. Tarasov

Advisor: Dean Hanink, Professor and Graduate Program Coordinator, Department of Geography

Research Topic

My thesis project will deal with the future economic impact on the city of Hartford, Connecticut of the new Coltsville National Historical Park. The park encompasses the former Colt firearms factory, closed for over two decades, and the surrounding area, informally known as Coltsville, that was once its company town. While best known as the production site of some of the first practical multiple-shot firearms, the factory's arguably stronger claim to historic significance is the contribution it made to manufacturing everywhere by pioneering a number of mass-production techniques. For years, a group of local stakeholders worked to persuade the National Park Service (NPS) to make Coltsville, on the National Register of Historic Places since 1976 (O'Connell et al. 2009, 7), a unit of the National Park System. This effort came to fruition in late 2014, although the new national park is understood to still be years away from becoming fully operational. The goal of my analysis is to forecast the economic impact of the new national park on the city of Hartford in terms of the number and location of additional jobs resulting from the increase in visitor numbers brought about by the new park.

Rationale

For decades, American cities have struggled with the loss of revenues and a shrinking economic base as residents and industry depart to the suburbs. (Here and throughout this paper, the term *city* in a post-World War II context refers only to that part of an urban area, usually its oldest and largest jurisdiction, that contains most of the traditional functions of cities, as distinct from the mainly residential suburbs, which typically surround it.) By all accounts, Hartford, the city at the core of the metropolitan area at the edge of which the University of Connecticut is situated, has not been spared these problems. In recent years, many cities have shifted their strategies for combatting this trend from retaining or attracting manufacturers ("smokestack chasing") to repositioning themselves as their metropolitan areas' hubs of the service sector and cultural and leisure activities. Often, this means exploiting the city's historic ambience, which can seldom be matched by newer developments on the metropolitan edge. Hartford has so far lagged in embracing this trend, but this may be about to change. The city's "Six Pillars of Progress" strategy seems to be underpinned, at least in part, by the notion of amenities as drivers of urban economic revitalization; although unrelated, the push for a national park in Coltsville is likely informed by similar thinking.

Aware of Hartford's need to find new uses for its underutilized spaces, I am genuinely curious about the effects on the city of the new national park and the adaptive reuse of the former Colt factory. Without a doubt, the inventor and industrialist Samuel Colt was a controversial figure, yet few places in the United States can match the historic significance and name recognition that his legacy lends to the new national park. William

Hosley, former curator of decorative arts and Americana at the Wadsworth Atheneum and a consulting historian to the Coltsville Ad Hoc Committee (Museum Insights et al. 2008, 7), describes the rationale for the national park effort as follows:

> The stakes are high and the competition is fierce. If Hartford does not play its Colt card, it will be hard-pressed to compete in the global economy. The combined forces of globalization and homogenization are forcing cities, states, regions, and locales to participate in a global tourism beauty contest that will increasingly divide haves from have-nots, destinations from pass-throughs and places that generate buzz from places that get little respect, even from those who live there. It's unfolding fast and furiously, with the plum images and reputations being scooped up by places that understand the new rules of engagement. (Hosley 2005)

Furthermore, the subject seems to be rather obscure even locally compared to some other recent developments, such as, most notably, the controversy surrounding the proposed minor league baseball stadium in central Hartford. Therefore, research on Coltsville allows me to shed light on an obscure yet fascinating local issue.

Method

The new park's impacts will be estimated by linear regression based on forecasts of annual visitor numbers and the experience of comparable National Park Service units. They will then be allocated throughout the study area by means of a gravity-type spatial interaction model similar to that suggested by Robert A. Garin as a modification to the Lowry model. After describing and summarizing the results of this analysis, I will suggest ways of making future analyses of this type better suited to successfully modeling a complex phenomenon. I have asked Dean Hanink, Professor and Graduate Program Coordinator at the Department of Geography, to act as my advisor due to his expertise in the application of urban-planning models.

Chapter 1: Introduction

For major cities in the United States, particularly older cities once heavily reliant on manufacturing, the decades since World War II have been characterized by the loss of residents to suburbanization and the concurrent trend for manufacturers to relocate to more spacious “greenfield” sites. The problem is particularly acute in cities whose limits encompass only the oldest, usually central, part of the urban area, with suburbs lying in other jurisdictions. In such “underbounded” cities, there is typically little land that is easily available for development, meaning that the city is at a disadvantage when business and industry seek easily developable land.

Hartford, Connecticut, illustrates well the post-World War II fate of an underbounded industrial city. At the turn of the 20th century, Hartford was one of the most prosperous cities in the United States (O’Connell et al. 2009, 27). Hartford’s metropolitan statistical area is still one of the wealthier ones today. Of the 929 metropolitan and micropolitan areas defined in 2014, only 26 had a higher median household income (US Census Bureau 2014a) and only 20 enjoyed a higher per capita income than the Hartford-West Hartford-East Hartford metropolitan statistical area that year (US Census Bureau 2014b). In recent decades, however, Hartford itself has had to contend with an increasingly smaller and poorer population and much vacant or underutilized land.

Colt’s Manufacturing Company, perhaps Hartford’s best-known industrial enterprise, also moved out of the city in recent decades. The company’s Hartford factory, closed since 1994, produced some of the first truly practical multiple-shot firearms and various weapons associated in the popular mind with the settlement of the American West in the 19th century. The site's less-known but much more far-reaching legacy is the perfection of a number of mass-production techniques using interchangeable parts, techniques that went on to be adopted in many other industries.

Not long after the plant's closure, a group of local stakeholders began an effort to make the old factory and its adjoining former company town a unit of the National Park System. After a number of setbacks, this was accomplished at the end of 2014, although it is generally agreed that the park is currently still years away from becoming fully operational, and some details about the park's design and visitor experience are yet to be agreed upon. This study seeks to model the economic impact of the future park's visitors on the city of Hartford, as measured by the distribution throughout the city of additional service-sector employment attributable to visitor traffic to the park.

Chapter 2: Study Area Background

2.1 Cities in Search of New Roles

The final decades of the 20th century were marked by a massive exodus of manufacturing from American cities to suburban or offshore sites, to the point where no major city in the United States had a majority of its workforce employed in manufacturing by the end of the century (Ward 1998, 187). Simultaneously, residents were also forsaking the city for new suburban homes—between 1950 and 1970, the percentage of metropolitan residents living in suburbs rose from 41% to 50% (Massey and Denton 2014, 592). As the populations of cities fell, businesses there closed or followed their customers to the suburbs. In many cases, these trends were powerful enough to starve cities of their economic base, presenting them with an existential problem.

Although there were attempts by cities to retain manufacturers or attract new ones, it eventually became apparent that manufacturing would not return and that cities were in need of a new role. Thus, in recent decades, cities have sought to reposition themselves as their metropolitan areas' hubs of the service sector (Ward 1988, 187). Attempts are also being made to entice suburbanites to relocate back to the city or at least to visit it with greater frequency and to spend more money there. Often, cities have tried to emphasize their centers' historic character to this end. Informing this tactic has been the popular if controversial school of thought that aesthetic and cultural considerations have recently come to play a greater role in the making of residential choices, especially by younger and better-educated demographic groups. Thus, ambience and culture are often seen as necessary for attracting or retaining talent in high-technology and creative industries (Clark et al. 2002, 498-500). Under this assumption, cities have an advantage in attracting such talent; Ford (2003, 3-4) points out that buildings in a variety of ages, sizes, and degrees of repair can be found in cities, meaning that a range of rents and activities is possible there that is seldom matched by suburban shopping malls and housing tracts. For most of the 20th century, the core of the typical American large city has been dominated by office space (141), with the surrounding land taken up by "support activities" such as port facilities, rail yards, warehouses, and low-end housing such as residential hotels (6). The second half of the century has seen many of these activities, and some of the office space, decamp from the city, leaving behind vacant or underutilized land that is unsightly or polluted or both, but also freeing up space for "clean," if space-intensive, cultural and leisure-related land uses, such as sports arenas, museums, and performing-arts venues, on which many cities are pinning their hopes for an economic boost.

Hartford, when seen in this light, is quite typical. Industrial employment in the city grew until 1952, with workers in the service sector outnumbering industrial employees from 1960 onward (Grant 1982, 169). The decennial census of 1950 found the city's population at what turned out to be an all-time high of slightly under 180,000 (US Census Bureau 1950a); the figure fell to just over 120,000 by 2000 (US Census Bureau 2000a). From 4.55% in 1970 (US Census Bureau 1972, 27), unemployment in the city roughly tripled to 15.9% in 2000 (US Census Bureau 2000b); in the latter year, the poverty rate stood at 30.6% (Hartford Public Library and the Hartford Community Data

Collaborative 2012). The thinning of the population and its purchasing power robbed the central city of much of its vitality. By 1997, Hartford was perceived as "a poster child for urban decay," with high building vacancy rates and retail "in the doldrums," the two flagship downtown department stores having both gone out of business in the early 1990s (Petersen 1997).

Table 1. Study area population trends since 1950

	1950	1960	1970	1980	1990	2000	2010
Hartford	177,397	162,178	158,017	136,392	139,739	121,578	124,775
Tract 500500	3,572	2,607	1,152	1,123	1,473	1,448	1,477
Tract 500400	3,024	2,783	2,805	3,039	3,028	2,065	1,687

Sources: Data from Connecticut Secretary of the State 2013; US Census Bureau 1950a, 1960b, 1970, 1980a, 1990a, 2000a, 2010e.

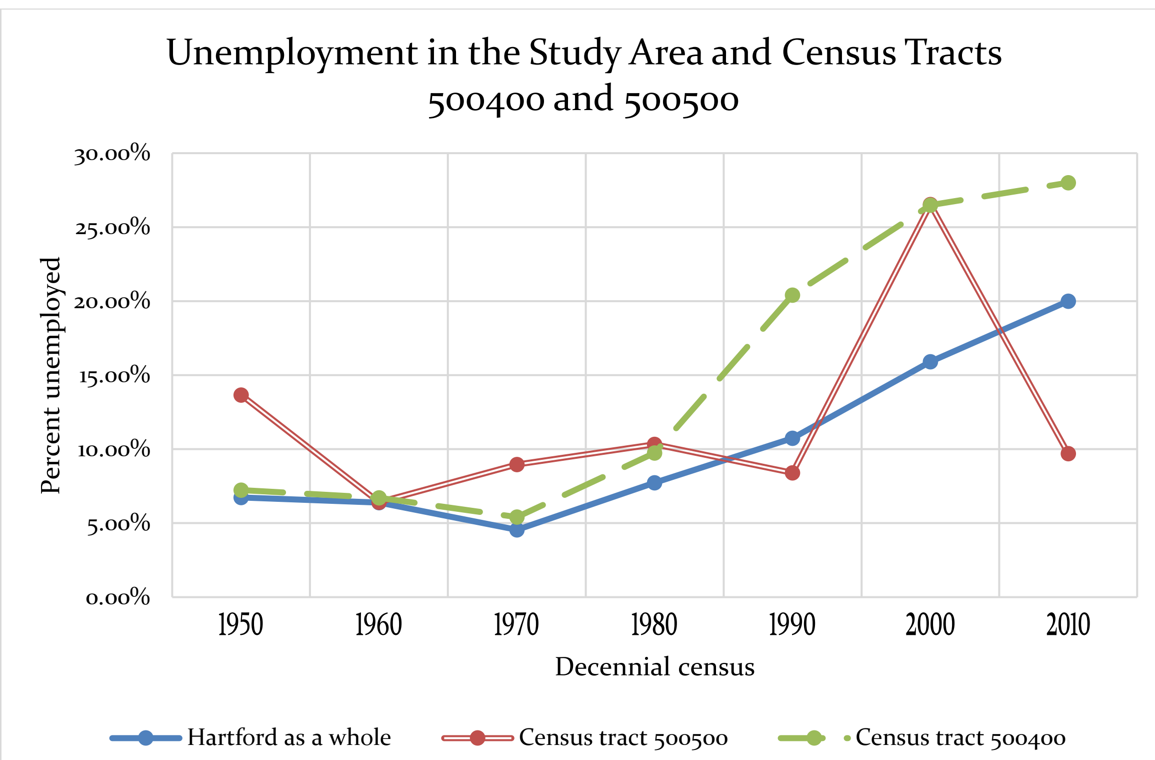

Figure 1. Unemployment (as percentage of civilian labor force) in Hartford and the two Coltsville census tracts since 1950

Sources: Data adapted from US Census Bureau 1950c, 1960a, 1972a, 1980b, 1990b, 2000b, 2010f.

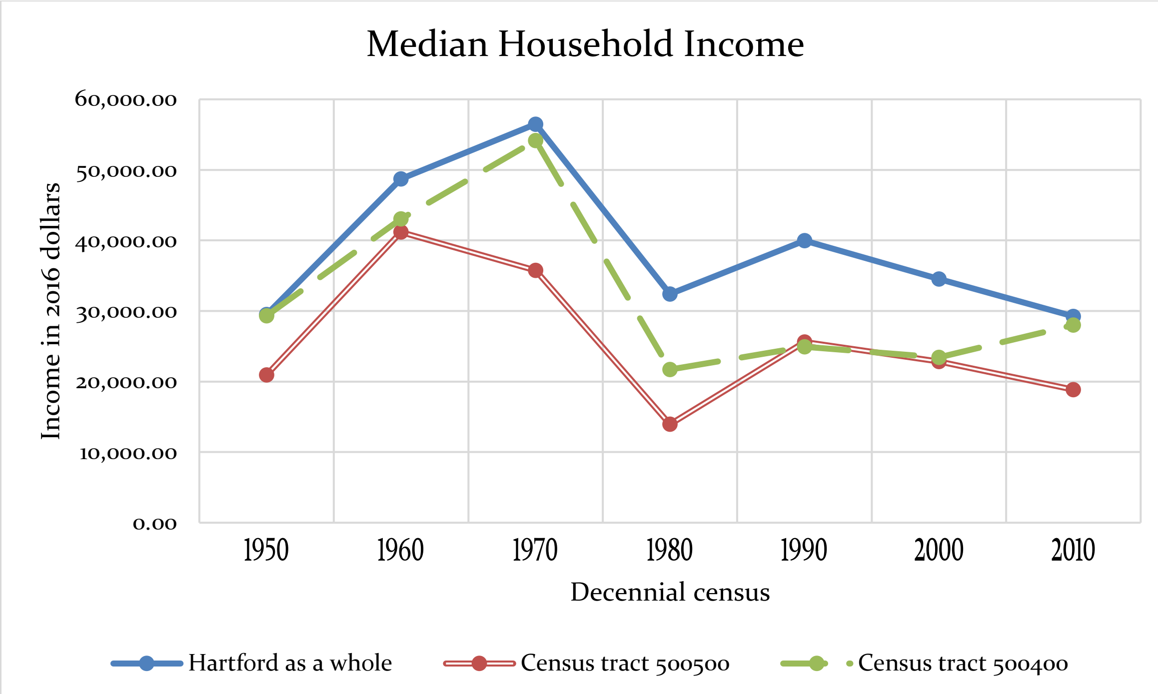

Figure 2. Median household income in Hartford and the two Coltsville census tracts since 1950, in 2016 dollars.

Sources: Data adapted from US Census Bureau 1950b, 1961, 1972b, 1980c, 1990c, 2000c, 2010c; US Department of Labor 2016.

Like many other American cities in the same situation, Hartford is looking to culture, arts, leisure, and education to lure suburban spending visitors, if not new residents. A set of measures for revitalizing the city, dubbed the "Six Pillars of Progress," were identified in the 1990s by the state, federal, and local governments as well as business interests. The "six pillars" include encouraging new housing downtown with the goal of creating 1,000 units; improved access to the city's riverfront, which is largely walled off from the city by Interstate 91; revitalization of Harford's civic center; the establishment downtown of a community college campus; improved and expanded downtown parking; and a convention center. As part of these efforts, downtown Hartford's riverfront has seen a massive development called Adriaen's Landing take shape with a combination of state and private funding. Containing a convention center, residences, hotels, an entertainment-retail district, the Connecticut Science Center, and their associated parking garages, the complex was expected to attract four million visitors each year and lead to the creation of 1,900 jobs (Peacock 2001). Immediately north of downtown, a minor-league baseball stadium is being built, although its projected costs and benefits to the city have been the subject of much controversy.

In Hartford's Sheldon-Charter Oak neighborhood, south of downtown on the Connecticut River, stands what some believe to be another potential visitor draw and undoubtedly one of Hartford's claims to fame. A complex of industrial buildings dating from the 19th and early 20th centuries, it is linked with the name of one of Hartford's most famous natives (albeit one inseparable from controversy) and was the site of an important milestone in the Industrial Revolution. Attempts to adaptively reuse the former Colt firearms factory have been underway since at least the cessation of arms production there in 1994, with parts of the factory having been reused earlier. At times, such attempts clashed with various stakeholders' visions for making the most of the place's historical significance. Other factors hampering the old factory's rehabilitation apparently included industrial contaminants on the site, the moribund state of Hartford's real-estate market in the 1990s, and the sheer magnitude of the project; nevertheless, after several false starts, progress is being made on repurposing the old manufacturing complex. Meanwhile, efforts to recognize and publicize the site's historic significance reached a turning point in 2014, when the Coltsville Historic District comprising the factory and its former workers' township became a unit of the National Park System.

2.2 The Colt Factory and the Study Area

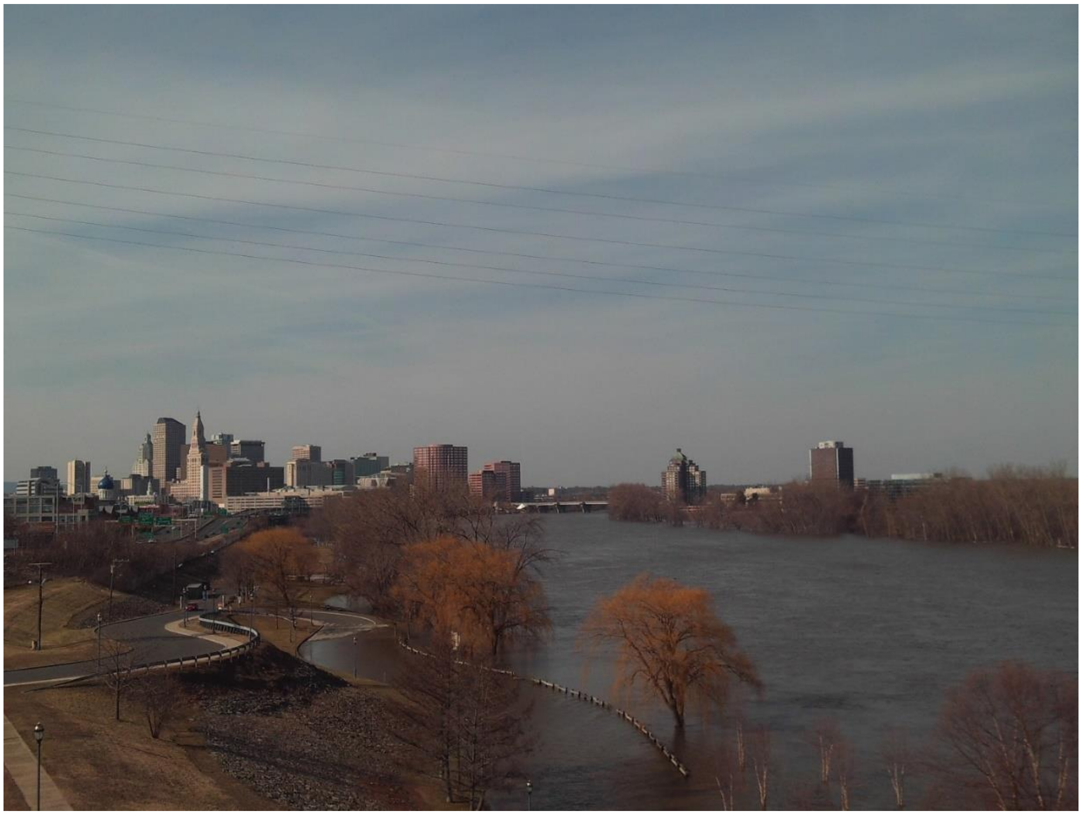

Figure 3. View of the Colt factory (left) and the Connecticut River (somewhat overflowing its banks), with downtown Hartford in the background; photograph taken from the Charter Oak Bridge looking northward.

The city of Hartford, Connecticut is the study area of my research. The future national park is a 260-acre site (O'Connell et al. 2009, 6) to the southeast of downtown Hartford (see figure 4). The park consists of two non-contiguous parts; the southern part makes up the bulk of the park's territory and contains the former Colt factory and most of the other surviving related buildings, as well as Colt Park (a municipal park in the City of Hartford Parks System, not to be confused with the Coltsville National Historical Park). The smaller part to the north of it is centered on the Church of the Good Shepherd and its parish house. The factory itself occupies 17 acres bounded by Masseek Street to the south, Hyushope Avenue to the west, Nepaquash Street to the north, and Van Dyke Avenue to the east and northeast (City of Harford Planning Division 2000). A railroad and Interstate Highway 91 separate the factory buildings from the Connecticut River to the east (see figure 4). Colt Park comprises much of the land area of Sheldon-Charter Oak, the neighborhood containing the former factory. The rest of the neighborhood is a mixture of residences and office space, although some light industry remains (Flodine 2015b); such mixed land use seems to be the legacy of redevelopment during the 1980s, which included the adaptive reuse of another former factory (Hosley 2005).

Figure 4. Detailed view of Coltsville National Historical Park

Sources: Data adapted from Bogar 2012; Connecticut Department of Energy and Environmental Protection 1984; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2012.

Sheldon-Charter Oak has been no exception to the problems that have beset Hartford in the last few decades. The neighborhood's boundary roughly corresponds to those of Hartford County census tracts 500400 and 500500. Tract 500400, south of 500500, is the larger of the two; although much of it consists of Colt Park, it also includes the factory buildings. Historically, the workforces of the Colt factory and other nearby factories likely comprised much of these tracts' populations; at the time of the 1950 census, "operatives and kindred workers" were the most numerous type of worker among the male population of census tract 500400 and the most common type, among both genders, in tract 500500 (US Census Bureau 1950c). Post-World War II trends in these two tracts broadly parallel the postwar history of Colt and the rest of Hartford's industry. Population of the two tracts has generally been on a downward trend in the postwar era, with tract 500500's population in 2010 less than half of what it was in 1950 and tract 500400 having lost nearly half its residents (see table 1). Decennial censuses from 1990 onward show tract 500500's population as being stable at between 1400 and 1500 residents (US Census Bureau 1990a, 2000a, 2010e). Tract 500400's population fell between 1950 and 1960 (US Census Bureau 1950a, 1960b), then rose slightly by 1970 (US Census Bureau 1970) and slightly more by 1980 (US Census Bureau 1980a), falling ever since (US Census Bureau 1990a, 2000a, 2010e). Unemployment in Hartford as a whole seems to have reached a post-World War II low of 4.55% as late as 1970 (US Census Bureau 1972a). It has climbed in every decennial census since then, however; a broadly similar pattern is observable in the two main Sheldon-Charter Oak census tracts (see figure 1). Apparently, the effects of deindustrialization were not strongly felt in Hartford until after 1970, meaning that, in this city's case at least, the phenomenon is somewhat more recent than suburbanization. Median household income also continued to rise after World War II, until 1960 in 500500 and until 1970 in 500400 and in Hartford as a whole; however, it plunged dramatically between 1970 and 1980 and, although there has been a slight recovery since then, it is still considerably below its postwar high, for both the two Sheldon-Charter Oak tracts and the city (see figure 2). Before 1970, therefore, although suburbanization was taking place, conditions seem to have been improving for those who remained in the city; the poverty for which Hartford became known by the 1990s (Coakley 1995) seems to have set in rather abruptly between 1970 and 1980.

More than half of all housing units (458 of 726) in tract 500400 were built before World War II. In 500500 and in Hartford as a whole, housing from that era forms a plurality of all housing units, with 34.2% and 47.86%, respectively (US Census Bureau 2010d). Worn-out housing is thus likely a problem in both Hartford in general and Sheldon-Charter Oak in particular, although Coltsville has recently seen some renovation of existing housing and creation of new housing units, and there is much historic housing in Sheldon-Charter Oak that would probably be ripe for renovation should the neighborhood become attractive to new residents again.

Of Coltsville's surviving buildings, the most iconic is certainly the red-brick East Armory, known internally at the company as Building A; the building is located at 55 Van Dyke Avenue and faces eastward, toward the Connecticut River (see figure 14). The onion-shaped blue dome on its roof, speckled with gold stars and crowned with the figure of a rampant colt, is a local landmark; it is clearly visible from Interstate Highway 91. Completed in 1867, the Armory incorporated what were then state-of-the-art fireproofing techniques in order to avoid the fate of the original East Armory, which stood on the site until being destroyed by a fire in 1864 and which was visually almost identical apart from being constructed of brownstone rather than brick (Labadia et al. 26). Two wings of the original East Armory (see figure 6) survive behind it; now known as the Foundry (Building F) and the Forge Shop (Building D) (27), they are the oldest structures on the site, pre-dating the fire of 1864 (19). Of the other factory buildings, many have been torn down over the years, including, in the late 1940s, a "massive" West Armory (Gosselin 2012); nevertheless, ten major structures remain. Besides the East Armory, Foundry, and Forge Shop, they are the North and South Armories (Buildings M [see figure 20] and P [see figure 21], respectively) (Labadia et al. 28), Warehouse (Building W), Machine Shop (Building R) (see figure 22), Power Plant (U), and Garage (O)—all built during World War I—and the World War II-era U-shaped Office Building (N) (29). The flood of 1936 took a toll on Coltsville's other buildings—a number were torn down due to flood damage (18)—as, perhaps, did post-World War II urban renewal. Even so, nineteen units of 19th-century worker housing still stand; these include ten five- or six-family tenements on Huyshope and Van Block Avenues, built in 1856 (see figure 7), and nine two-family "Potsdam cottages" on Curcombe Street, from 1859 (see figure 25). The tenements are still used as dwellings, having been restored as "housing for middle-income workers" at some point by 1982 (Grant 1982, 196). The cottages on Curcombe Street, built in a style that evokes traditional German half-timbered architecture, originally housed the workers of Colt's willow ware factory, many of whom came from Potsdam (137-8).

Other remnants of Coltsville are three managers' houses on Wethersfield Avenue, the Episcopal Church of the Good Shepherd at 155 Wyllys Street, built in 1869 in the Victorian Gothic style (see figure 17), and its Caldwell Colt Memorial Parish House (see figure 18), added in 1896 in memory of Caldwell Colt, the Colt family's only child to survive into adulthood. Still standing on Wethersfield Avenue are Armsmear, the Colt family's mansion (see figure 28), and its several associated structures such as the carriage house. Finally, the building at 157 Charter Oak Avenue was originally built by Colt's company as a warehouse, and a number of residential and industrial buildings not constructed by the company but dating from the same era remain in the vicinity (Labadia et al. 32-36).

Between Armsmear and the former factory lies the expanse of Colt Park (see figure 10), originally Armsmear's garden, which Elizabeth Colt willed to the City of Hartford for use as a park at her death in 1905. Warwarme and Van Dyke Avenues run atop dikes built in Samuel Colt's day to protect the industrial complex from the waters of the Connecticut River (O'Connell et al. 2009, 11-15). The ponds, fountains, plantings, statues, and greenhouses in Colt Park are gone, however, having been removed in favor of lawns and athletic fields by 1952, as is the machinery in the former factory. As of 2009, a private nonprofit organization was working with the City of Hartford to develop a botanical garden on the Wethersfield Avenue end of Colt Park (where another landmark, a monument to Samuel Colt, stands), but there were no plans to restore the park to its Colt family-era splendor (O'Connell et al. 2009, 15).

2.3 Historical Background

2.3.1. The Colt Factory: The Early Days

Although the concept of the multiple-shot firearm with a revolving magazine did not originate with Hartford native Samuel Colt (1814 – 1862), he is credited with refining the design of such a weapon and popularizing it (O'Connell et al. 2009, 17). A primitive early repeating firearm on display in the Tower of London, as well as a ship's windlass, both observed by Colt as a sailor in his youth, are usually said to have inspired him to design what turned out to be the first truly practical revolver (Grant 1982, 2-4). At first, Colt had difficulty marketing it and his several other inventions, but eventually he gained the contacts necessary for securing large orders for the revolvers on the strength of their performance in the Mexican War and the Seminole Wars in Florida. These and several other mid-19th century conflicts, together with an increased civilian demand for firearms during the California gold rush (Simon 1997), helped Colt emerge as a major manufacturer of firearms. Although it is doubtful that violence in the Old West was ever as widespread as popular culture suggests, the historian Walter Prescott Webb claims that the revolver was one of the technological innovations that enabled American settlers to occupy the Great Plains (Webb 2003, 245). Another historian, Robert M. Utley, concurs, writing that "a weapon that enabled a horseman to fire six shots without reloading had revolutionary implications" (Utley 1967, 26-27). Hundreds of thousands of revolvers were certainly sold by the Colt's Patent Fire Arms (*sic*) Manufacturing Company to both the military and civilians, with more than 300,000 revolvers having already been produced by 1860 (Grant 1982, 18).

Samuel Colt's first attempt to manufacture his firearms began in Patterson, New Jersey in 1836 and failed in 1842; later, he would have his revolvers produced in Eli Whitney's factory in Hamden, Connecticut, and later still, in his own successive factories in present-day downtown Hartford. Eventually the need arose for much bigger production premises, and 1855 saw the opening of the large, purpose-built, steam-powered factory in Hartford's South Meadows district (Grant 1982, 10), whose adaptive reuse is the focus of this paper. At the time, it was the largest privately-owned arms factory in the world (Simon 1997).

A tireless promoter of his factory's products, Samuel Colt pioneered many of today's marketing techniques, notably what is now called celebrity marketing, which he practiced by making gifts of his revolvers to royalty, war heroes, and other notable individuals whom he met (US Department of the Interior 2004). He also commissioned the artist George Catlin to paint a series of paintings depicting adventures in the West featuring his revolvers. The blue dome atop East Armory also can be said to be a marketing technique, since it served no practical purpose besides giving the factory a recognizable, distinctive look (Grant 1982, 11). In 1851, Colt exhibited 500 of his guns at the Crystal Palace Exhibition in London, serving free brandy on that occasion and even reading a paper on "rotating chambered-breech firearms" to the Institute of Civil Engineers (9).

Colt's activities in London foreshadowed the global reach of today's multinationals. From the beginning, Samuel Colt saw the entire world as his market, even patenting his revolver in France and the United Kingdom before doing so in the United States. In 1853, he would even open a factory in London. Although the factory was short-lived, closing its doors in 1857, it made Colt the first American manufacturer to establish a factory abroad (Grant 1982, 9 – 10). At the time of his death, Colt was one of the wealthiest and best-known individuals in the United States (1). However, Colt could be unscrupulous in his business practices; his company supplied weapons to both sides in the Crimean War, and he reportedly sold "hundreds of thousands" of rifles to the southern states immediately before the outbreak of hostilities in the American Civil War “at a large discount” (O’Connell et al. 2009, 17).

In 1849, the machinist Elisha K. Root joined the Colt’s Patent Fire Arms Manufacturing Company (Simon 1997), becoming its head superintendent. Later, after Samuel Colt’s death, he succeeded him as the company’s president and held that position until his own death in 1865 (Grant 1982, 220). During his time at Colt, he developed power-driven machines that greatly automated the hundreds of integrated steps of the revolver-making process. Root’s inventions mechanized the factory to the point where 80% of the gun making there was performed by machine alone (8). Root’s best-known innovation seems to have been a power-driven drop forge for shaping parts from hot iron (O’Connell et al. 2009, 18). “The credit for the revolver belongs to Colt; for the way they were made, mainly to Root,” sums up Joseph Wickham Roe after stating that Root devised “machines for boring, rifling, making cartridges, stock turning, splining, etc.” and “worked out the whole system of jigs, fixtures, tools, and gauges” (1916, 69). Elisha Root is believed to be the inspiration for the inventor in Mark Twain’s *A Connecticut Yankee in King Arthur’s Court*. Twain, who visited the factory in 1868, described it as follows: “It comprises a great range of tall brick buildings, and on every floor is a dense wilderness of strange iron machines … a tangled forest of rods, bars, pulleys, wheels, and all the imaginable and unimaginable forms of mechanism … It must have required more brains to invent all those things than would serve to stock 50 Senates like ours” (Grant 1982, 16).

Together with the federally-owned armory in Springfield, Massachusetts, the Whitney plant in Hamden, Connecticut, and other armories in the Connecticut River Valley, the Colt factory in Hartford became part of a manufacturing region nicknamed

"Precision Valley" that stretched from New Haven, Connecticut to Windsor, Vermont. The region's gun makers and machine-tool builders perfected machine production of standardized parts, impacting industries far outside the Connecticut Valley and firearms manufacturing. By the late 1850s, innovations first made in this region found their way into the production of sewing machines, watches, railroad equipment, wagons, and hand tools, and, later, typewriters, agricultural implements, bicycles, and gramophones, eventually being applied to the production of cameras and automobiles in the 20th century. William Hosley describes the Connecticut River Valley of the 1850s as the Silicon Valley of its day, "the vanguard of an internationally significant, technology-based transformation" (1996, 34). As a 1998 study by the National Park Service points out, the higher skill level, and consequently higher earnings, of many workers in these precision industries "encouraged the development of more prosperous, stable communities" than those in many other industrial regions of the United States, and being employed in the manufacture of arms, especially those used in national defense, carried a measure of prestige (US Department of the Interior 1998, 31).

The factory was built on what would today be called a greenfield site; proximity to the Connecticut River meant that the site was subject to periodic flooding, and Colt to a large extent shaped the land by draining it (US Department of the Interior 2004) and by having dikes built to protect his factory (Grant 1982, 9-10). The dikes were but one of many ways in which the area was reshaped in Samuel Colt's day. Colt believed in the importance of creating a stable community for his workforce, and he hoped that amenities would help him attract skilled workers. Colt had housing for his employees built near the factory, and eventually the surrounding area became a self-contained township, with its own sewage system and gas works, a store, a boat dock for shipping the factory's products, a railroad depot, a school, and recreational facilities including a library and a community center (Simon 1997). Colt also laid out the neighborhood's street grid, giving the streets Dutch and Native American names to evoke Hartford's early days (O'Connell et al. 2009, 27). Charter Oak Hall, which no longer exists, was the site of reading rooms, art and music classes, and space for lectures, entertainment, and dancing. There was a German-style beer garden, since many of the skilled workers hailed from Germany; and Colt also sponsored two militia companies, baseball teams, an Armory Glee Club, an Armory Dramatic Association and Mechanics Balls, and the Colt Band, "a fixture at parades and civic events in Hartford through World War II." The Caldwell Colt Parish house contained a kindergarten, Sunday school, library, sewing room, cooking school, gymnasium, pool tables, and bowling alleys (27-28). Designed by the architect Edward Tuckerman Potter, known as the designer of Mark Twain's Hartford home, it was built in 1896 and still serves as a community center today (30).

This industrial district was termed "South Meadow Improvements" by Colt, but soon came to be unofficially known as Coltsville (Hosley 2005). From the beginning, Coltsville was a neighborhood within an existing city, geographically contiguous with the rest of Hartford and connected to it by that city's first omnibus and horsecar lines (O'Connell et al. 2009, 27). Thus, housing was available to Colt employees elsewhere in Hartford, and Coltsville never housed more than a fraction of the company's workforce; the lives of its residents were therefore not as tightly controlled by the company as they were in some of the other company towns at that time. Nevertheless, the town's design incorporated Samuel Colt's ideas about an ideal community, and Coltsville stood as a good example of a planned industrial district of that era.

2.3.2. From the Civil War to the End of the Colts' Involvement

During the Civil War, when it employed 1,500 people (Grant 1982, 18) to produce 1,000 rifles a day (Hosley 2006, 30), the factory made a crucial contribution to the Union side's war effort. Upon Samuel Colt's death in 1862, Elizabeth Colt, his widow, became the controlling stockholder of the Colt's Patent Fire Arms Company. She would control the enterprise for over thirty years, overseeing the rebuilding of the factory after the disastrous fire that destroyed much of it in 1864.

Elizabeth Colt had no hand in the design of the factory's products or the way they were made, and she did not manage its operations; these tasks were the responsibility of other individuals, such as her brother Richard Jarvis, the company's longtime president. Rather, her role was that of a philanthropist who applied her late husband's fortune to immortalizing his name and ensuring that the positive aspects of his legacy would be remembered. She endowed the Wadsworth Atheneum, to which she later donated her art collection, and was involved in a wide range of other charitable activities. Probably the most notable of these was the construction of a major Hartford landmark, the Church of the Good Shepherd and, later, its Caldwell Colt Memorial Parish House (Simon 1997). Even so, the ownership of a large industrial enterprise by a woman was highly unusual at the time; a century later, it apparently helped the backers of national park status for

Coltsville argue for the site's uniqueness (US Department of the Interior 2004). In 1901, amid considerable labor unrest, Elizabeth Colt sold the company, ending the Colt family's involvement with it; she died in 1905, willing the Colt family mansion's garden to the City of Hartford for use as a park, known today as Colt Park (Simon 1997).

In times of sagging demand for firearms, the factory subcontracted manufacturing for other companies or rented production space out to them. Thus, besides the famous .45 revolver and the Gatling gun (an early machine gun), such goods as adding machines, printing presses, portable steam engines, sewing and typesetting machines, lawn mowers, and ticket punches for trains and trolleys would be produced at the factory after the Civil War (O'Connell et al. 2009, 20-21). A practice begun under Samuel Colt was to provide space in the factory to "inside contractors," engineers who produced certain gun parts under contract for Colt but who were allowed to take on business from other factories and employ their own workers. Thus, many engineers became familiar with the production techniques in use at the Colt armory before spreading them elsewhere. A number of onetime "inside contractors" or Colt employees would go on to become manufacturing innovators and prominent industrialists in their own right. Among them were machine-tool manufacturers Francis Pratt and Amos Whitney; Charles B. Richards, steam-engine innovator and, later, chair of the Department of Mechanical Engineering at the Yale University Sheffield Scientific School; William Gleason, bevel gear industry pioneer; machine gun designer Benjamin B. Hotchkiss; and Henry Leland, automotive engineer and founder of the automakers Lincoln and Cadillac. In addition, firearms designers Richard J. Gatling and John M. Browning chose the Colt factory for the testing, machining, and mass production of their designs on the strength of the reputation the company then enjoyed for its ability to produce parts at the close tolerances required in firearms manufacturing (23). In 1880, a report on the firearms industry in the United States produced by the U.S. Census Bureau still described Colt as a leader in precision manufacturing techniques (19).

2.3.3. The Factory in Later Years

World War I was a time of tremendous expansion at Colt; of the ten surviving factory buildings, six were constructed during the war (Gosselin 2012). The Colt factory was one of only two facilities in the United States capable of producing machine guns when the country entered the war and the U.S. military urgently needed large numbers of these weapons. Colt's experience producing machine guns almost ever since the advent of those weapons stood the company in good stead at that time (O'Connell et al. 2009, 25). The interwar era was a time of diversification for the company; acquisitions were made or new business units established that made Colt a manufacturer of electrical goods, plastics, and commercial dishwashers (Grant 1982, 103-104). Also during this time, Colt was the sole producer of the Thompson submachine gun, or "tommy gun". The 1930s were marred by labor unrest and a "devastating" flood on the Connecticut River. During World War II, the factory would once again produce machine guns, and employment surged from 2,600 workers in 1939 to the all-time high figure of 16,000 in 1944, although this number includes satellite plants in the Hartford area (O'Connell et al. 2009, 25). Colt received the Army-Navy "E" award for wartime production; however, despite the enormous wartime need for weapons, the company made a loss starting in 1943 (26) and began to struggle to meet production goals as the war went on. Colt's leaders had grown complacent about the company's success, allowing their management style, production techniques, and physical plant to start becoming outmoded; the consequences of this obsolescence would be acutely felt for the first time during World War II (Grant 1982, 162-4).

At the end of World War II, military demand for weapons trailed off while Colt's reputation was tarnished by the company's wartime problems, and the postwar era was characterized by a gradual decline of the Colt factory in Hartford. As early as 1954, the management was considering moving the factory to a suburban site (Grant 1982, 172). After a takeover in 1955, which saw Colt become part of the Penn-Texas conglomerate, such a site became available to the company in West Hartford (179). The Vietnam War brought a temporary revival to the Hartford factory, as the M16 assault rifle was produced there (McConnell et al. 2009), but eventually most operations—as well as, in 1981, the company's headquarters—moved to the West Hartford site. By 1982, arms were produced only in Building R, with most of the old factory "leased to various small enterprises and government agencies" (Grant 1982, 196). In or around 1980, various artists began moving into the South Armory, occupying the vacant building as squatters at first (US Department of the Interior, 2004). Eventually the real-estate partnership that owned the site—since the 1950s, Colt had been leasing rather than owning the factory—began to cooperate with them, transforming the vacant space into artists' lofts and studios "well ahead of that trend" (Hosley 2005). In 1994 Colt's Manufacturing Company, as it was known by then, consolidated all operations at the West Hartford plant, vacating the last spaces it still used at the Hartford site (Condon 2002), and the stage was set for comprehensive rather than piecemeal rehabilitation of the historic but run-down manufacturing complex.

2.3.4. After Gun Making: Attempts at Adaptive Reuse and the National Park Effort

In the years since 1998, a succession of developers has been attempting adaptive reuse of the former gun factory, each modifying or completely changing their predecessor's plans. During the last decade of the 20th century, Hartford's real-estate market was weak, with the area slow to recover from the 1987 recession that brought the growth of the Hartford's financial-service sector to an abrupt halt (Leung 1998) and further hurt by the downsizing of the area's defense industries with the end of the Cold War. Additionally, not only Hartford but its entire metropolitan area suffered from a business-unfriendly image (Coakley 1995). The efforts of developers were further hampered by lead, petroleum, PCBs, and other pollutants which contaminated the site after approximately a century and a half of gun making (Condon 2002) and by the recession of 2007. All of these factors apparently deterred investment, and rehabilitation work on the old factory proceeded fitfully.

By 2012, Chevron TCI, a subsidiary of the energy corporation Chevron through which the multinational invests in historic properties in return for tax credits, was said to be "very much in control" of the former factory. Chevron's involvement seems to have brought financial stability; the same developer, the fourth since the factory's closure, who originally became involved with the old factory with Chevron TCI's backing, has been in charge of the site since 2010 (Gosselin 2016).

As of April 2016, "hundreds" of apartments are being built in downtown Hartford (Gosselin 2016), perhaps in connection with the upcoming relocation there of the University of Connecticut's Greater Hartford campus, a development that may also spell progress for Coltsville. Work on the adaptive reuse of most former Colt factory buildings is either underway or completed, with the developer expressing optimism about the prospects of new apartments there, as well. In April of 2016, the start of renovation work was imminent on the North Armory, the last major building to remain dilapidated. The biggest tenant on the site, leasing more than a quarter of the current 630,000 square feet of space, is the Capitol Region Education Council, whose operations in Coltsville include a middle-school arts academy, a magnet high school, and a school for children with autism (Gosselin 2016). Other tenants are Insurity, a maker of software for the insurance industry; Foley Carrier Services (Gosselin 2014), a provider of services such as background checks and drug and alcohol testing to transportation firms (Foley Carrier Services 2016); and JCJ Architecture, a Hartford-based architectural firm. As of April of 2016, another local architectural firm, Tecton Architects, had recently signed a letter of intent to move into the North Armory (Gosselin 2016). Under a previous developer, a rent hike and construction noise dispersed the artists' colony in the South Armory (D'Ambrosio 2009), but the new apartments in that building are now fully leased. (A minor setback has been the recent closure of Café Colt, also in the South Armory.) (Gosselin 2016). Industrial contaminants on the site have been at least partly cleaned up (D'Ambrosio 2009) and the site’s heating and air-conditioning infrastructure completely refurbished (*Hartford Courant* 2004).

Figure 5. View toward the south along Van Dyke Avenue near Sequassen Street, showing the East Armory (with the blue dome) and the former Colt office building.

During visits to the site, renovation work was observed to be very much in progress on the East Armory, whose iconic dome has been refurbished as well (City of Hartford Planning Staff 2000). Also witnessed was the ongoing installation of brick sidewalks on nearby streets; presumably, these and other streetscape improvements, such as benches, bicycle racks, and vintage-style lampposts, are connected to Coltsville’s impending national-park status. Labadia et al. also mention plans for “upgrades to the pedestrian bridges on the east side of the East Armory” (1-2), which may refer to attempts to better connect the national park to the riverfront. However, the Hartford Botanical

Garden plans, which seemed to be moving toward fruition in the 2000s (Pionzio 2006), have apparently stalled since then. The project's website seems to have been offline since 2011 (Tai Soo Kim Partners 2006), and no gardens or any work toward them were observed during several visits to Colt Park.

In parallel with these developments, there has long been an awareness of the need for formal recognition of Coltsville's historical significance. Armsmear, which, since Elizabeth Colt's death, has served as a residential complex for retired single women operated by the Episcopal Church, was designated a National Historic Landmark in 1966. A Colt Industrial District was delineated and placed on the National Register of Historic Places in 1976, its boundary expanding somewhat in 2001 (O'Connell et al. 2009, 7). In or soon after 1999 (*Hartford Courant* 2014), a group of various Hartford-area stakeholders known as the Coltsville Ad Hoc Committee began to seek national historical park status for Coltsville. A 2008 study by the consulting firm Museum Insights lists the wide range of institutions, officials, and community organizations making up the Committee, among them the *Hartford Courant*, the Connecticut Historical Society, the City of Hartford, Colt's Manufacturing Company, the Connecticut General Assembly, and Riverfront Recapture (Museum Insights et al. 2008, 7). The Committee's goals were to encourage the preservation of the Colt armory buildings and to make the story of their historical importance more widely known so as to "catalyze neighborhood revitalization" and "elevate Hartford's visibility as a heritage destination of national significance" by enhancing Hartford's reputation "as a city with a diverse cultural infrastructure" (6). In essence, the Ad Hoc Committee members sought to emulate the experience of such cities as Lowell and New Bedford, Massachusetts, which have had some success raising the number of visitors by preserving and publicizing their industrial heritage. As a first step toward park status, the committee worked to obtain national historic landmark designation for Coltsville, an effort championed by U.S. Representative John Larson, the *Hartford Courant*, and U.S. Senator Christopher J. Dodd. In 2002, Dodd, Larson, and US Senator Joseph Lieberman initiated a congressional study to assess Coltsville's suitability for national historic landmark designation (States News Service 2011). At first, in 2006, the application for national historic landmark status was rejected; this may have been due to concerns, raised by James Griffin, former head of Colt's government relations department, that conversion of some of the factory buildings to apartments would destroy the site's "integrity" (Cohen 2006). A National Park Service advisory board made the landmarks committee reconsider the rejection, and national historic landmark status for Coltsville was achieved in October of 2008 (*Hartford Courant* 2008).

Apart from the various stakeholders' conflicting visions, a hurdle on the way to national-park designation was the National Park Service's reluctance, for budgetary reasons, to take on additional responsibilities. Furthermore, the NPS voiced the concern that a national park focused on Coltsville's manufacturing legacy would duplicate the existing Springfield Armory historical site (US Department of the Interior 2004). Nevertheless, Representative John Larson and other proponents of a national park in Coltsville argued that such a park would complement rather than duplicate the park in Springfield (Taylor 2003), and eventually they succeeded in convincing the NPS of this. Final congressional approval for the creation of a Coltsville National Historical Park came in December of 2014. The new park's opening date was not known at that point, and it was universally agreed that much time would need to elapse before the potential of the new park is fully realized (Hladky 2014).

In 2008, the Mystic, CT-based consulting firm Museum Insights published a study examining possible scenarios for the development of the future national park in Coltsville and the types of visitor experience there. The study, commissioned by the Connecticut Trust for Historic Preservation, suggests three possible courses of action for the NPS and other stakeholders to pursue. The so-called "basic scenario," the least costly but also drawing the fewest visitors to the park, involves minimal action by the NPS, which would merely maintain a contact station in the East Armory, where a small interpretive area would be located and an introductory film shown. The contact station would be open mainly on weekends and staffed by rangers from the Springfield Armory, who would conduct tours of the site. Elsewhere in the district, interpretive signage for self-guided tours would be placed at key locations. An intermediate, or "East Armory," scenario would add more interpretive space, which would be found on every floor of that building; a multimedia "elevator tour" of the all the floors; a larger contact station open daily; and more cooperation with related exhibitors such as the Wadsworth Atheneum and the Museum of Connecticut History, from which various Colt-related artifacts would be leased. Lastly, the "full site" scenario would involve even more interpretive or educational programs with "potential for related historical and cultural activities developed by other organizations"; landscape redevelopment including connections to the riverfront; and cooperation with the Hartford Botanical Garden, Riverfront Recapture, and other entities to create a “fully developed and interpreted cultural heritage landscape,” pedestrian-friendly and similar to that found in the Lowell National Historical Park. This scenario would be the costliest, but also attract the most visitors (Museum Insights et al. 2008, 14-25). For each scenario, the study forecast annual visitor numbers, which were derived by studying the experience of comparable heritage sites in Hartford and elsewhere in the northeastern United States (54-58). The projected visitor figures for the three scenarios form one of the inputs to my analysis.

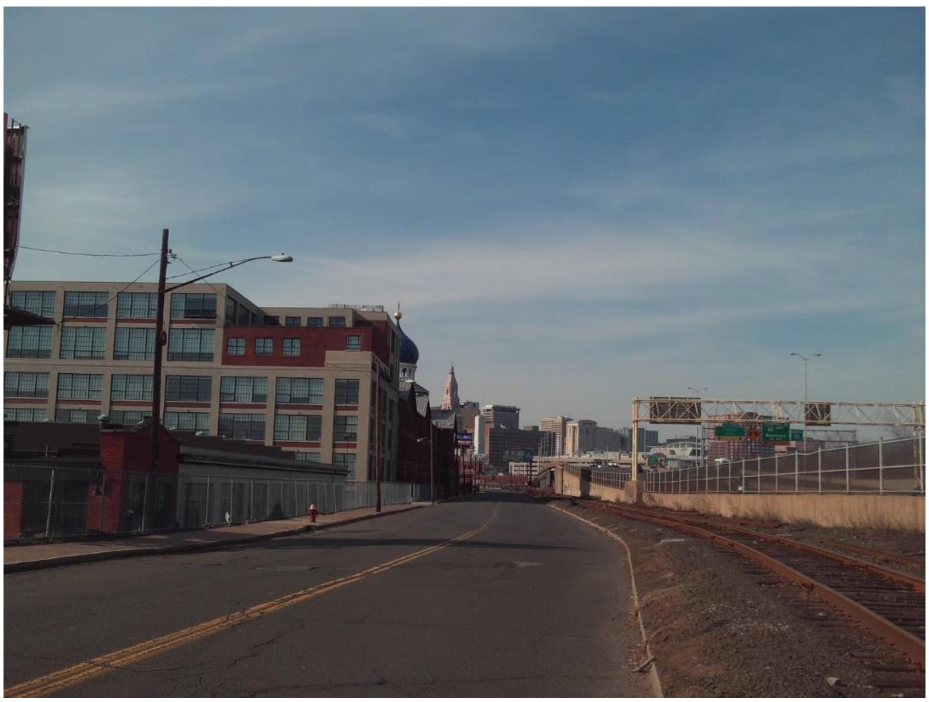

Figure 6. View along Van Dyke Avenue from slightly north of Masseek Street toward downtown Hartford. The Connecticut River is beyond the railroad track and Interstate Highway 91 on the right.

Figure 7. View of the factory complex from Huyshope Avenue and Sequassen Street. The still-unrestored Foundry and Forge Shop, the low buildings in the foreground, are slated to house the future visitor center and museum (Gosselin 2016).

Figure 8. Worker tenements on Van Block Avenue, looking toward the southeast from Sequassen Street.

Figure 9. The south side of the former factory, the Machine Shop (foreground) and East Armory (background). Taken from Masseek Street between Van Dyke and Huyshope Avenues.


Figure 10. View of the factory complex from the north; photo taken from Van Dyke Avenue near Vredendale Avenue, looking southward.

Figure 11. View from Wethersfield Avenue across Colt Park toward the former factory.

Figure 12. Residential building near the former Colt factory (east side of Van Block Avenue near Nepaquash Street).

Figure 13. Residential building near the former Colt factory (corner of Van Block Avenue and Luis Ayala Lane).

Figure 14. Residential street near the former Colt factory (Osten Boulevard between Luis Ayala Lane and Stonington Street).

Chapter 3: Data

3.1 Spatial Data

Unsure whether census blocks, block groups, or some other type of polygon should serve as the zones into which to divide my study area, I decided to perform the analysis using both blocks and block groups; shapefiles of both were downloaded from the UConn Map and Geographic Information Center (MAGIC) website; they already contained a population attribute. Also downloaded from the MAGIC website were data on town lines in Connecticut; these were used for display purposes when illustrating my results, and also for clipping other data by the Hartford city limits if necessary.

Data on the location of the proposed national park were obtained by georeferencing a map of the Coltsville Historic District found in the 2008 Museum Insights study and digitizing the park boundary and the outlines of the various buildings from it. A centroid of the historic district's boundary was computed and used for approximating the park's location. A zoning polygon shapefile was obtained from the City of Hartford website, as were shapefiles of neighborhood boundaries. Street data were downloaded from the Esri website and used to build a street network. Data on railroads and water bodies were not inputs to any analysis, but were used for display purposes when preparing maps illustrating the location of the future park; these data were downloaded from the Connecticut Department of Energy and Environmental Protection (DEEP) website.

3.2 Other Data

Projected annual visitor figures under each of the three park development scenarios came from the Museum Insights study (Museum Insights et al. 2008, 14-25). A 2015 report by the National Park Service was discovered, detailing the economic impacts of non-local visitors made the previous year at all sites operated by the NPS. Those impacts include the number of jobs generated, directly or indirectly, by visitor spending in each site's "gateway region," defined as a 60-mile radius of each park's boundary. Of the two metrics employed by the NPS, economic contributions and economic impacts, it was decided to rely on the latter, since it only considers the inflow of additional money into the local economy due to spending by visitors from outside the "gateway region" (US Department of the Interior 2015, 2-3). The authors of the report derived the figures by means of input-output analysis utilizing IMPLAN software and data (6). From these figures, a multiplier was derived by linear regression for translating annual visitor figures into the number of jobs supported by visitor spending in the gateway region.

Table 2. National Park Service sites used for calculating visitor impact multiplier

Site	Non-local recreational visitors, 2014	Jobs in gateway region
Lowell NHP	432,200	413
Springfield Armory NHS	17,300	16
Salem Maritime NHS	339,157	320
Saugus Iron Works NHS	9,392	9
New Bedford Whaling NHP	237,908	214
Thomas Edison NHP	43,130	36
Frederick Law Olmsted NHS	7,281	7
Governors Island NM	586,512	483

Source: US Department of the Interior 2015, 26-36.

Chapter 4: Methodology

4.1 Methodology Overview

The goal of my analysis was to determine the impact of visitors to the new national park in terms of the number of additional jobs made possible by visitor spending and their spatial distribution within the study area. Initially, I intended to carry out the analysis by means of the Garin-Lowry model, which was suggested to me by my academic advisor, Professor Dean Hanink. Although ultimately my methodology departed considerably from this, the Garin-Lowry model did inform my eventual use of a singly-constrained gravity model for allocating the jobs throughout the study area.

Originally developed by Ira Lowry in the 1960s (Rodrigue 1997, 261) to forecast land-use distribution in Pittsburgh (Lew and McKercher 2006, 405), the Lowry model has been widely used to make forecasts about the economic impact of some new development on a study area. The most popular version of the model incorporates the improvements suggested by R. A. Garin, namely casting the model in matrix notation and incorporating the gravity theory to model spatial interaction (Lee 1973, 95-96).

The Garin-Lowry model is a phenomenological model in which rules are derived empirically; in its classic version it is a static, equilibrium-seeking model without a time component (Chadwick 1971, 219-20). The model forecasts a facility's impact in terms of the number and location of new residents in the study area; the number is determined based on the existing populations of the tracts, or zones, into which the study area is divided and their accessibility to the facility under study. The Garin-Lowry model both forecasts and allocates land use. Inputs to the model are the level and location of "basic" employment, or employment in industries that provide export revenues for the study area, and the ratios for determining the number of dependents supported by each worker and the number of service-sector employees supported by each basic-sector employee. The study area is divided into zones of more or less equal size, and during the model's first iteration, the "basic" employees are allocated to their zones of residence based on the probability of interaction between each zone and the location of basic employment. The model assumes that these basic employees (and their dependents) will support a service sector. Thus the study area's population is incremented as other, service-sector employees are allocated to the model's various zones, again by means of the gravity model. It is assumed that these service-sector employees will themselves need services, spurring a further, smaller, population increase on the model's next iteration. Once the increases become insignificant, the model stops running and computes the total population in both the basic and the service sector in each zone (Lee 1973, 89-98). With every iteration, land in each zone is allocated to basic employment, service employment such as retail, and housing, in this order. The total amount of land allocated to each use is calculated once the model stops running (Chadwick 1971, 219-21). Physical and legal constraints on land use can also be inputs to the model. In my case, zoning types were identified that could conceivably contain establishments catering to park visitors, and used as a constraint, with no allocation made to other types of zoning.

A number of significant departures from the Garin-Lowry methodology were found to be necessary, mainly due to the nature of the phenomenon being modeled. The economic impact of a tourist on the study area was assumed to be radically different from that of a new resident employed in a “basic” industry, as annual visitors are not all found in the study area at the same time, do not typically have dependents not engaged in the “basic” activity (in this case, tourism), and do not permanently increase the study area’s population. (Indeed, those on day trips do not increase the nighttime population even temporarily.) Also, land-use change attributable to the park’s visitors was presumed to be negligible, at least outside the park itself. Therefore, the visitors were not allocated among the model’s various zones, but were presumed to congregate at Coltsville. A gravity model similar to that suggested by Garin was still used to allocate service-sector employment throughout the study area, but the number of these service employees was derived by a different method, described below, using data from the 2015 NPS report as inputs.

4.2 Estimating the Impact of Visitors

There were three expected numbers of service-sector jobs, one for each of the three scenarios for park development suggested by Museum Insights et al. A multiplier for translating annual visitor numbers into tourism-related jobs in the study area was obtained by linear regression. Data for the regression analysis came from the 2015 National Park Service report. Eight national parks (see table 2) were identified as being comparable to Coltsville; the criteria for comparability were location in an urban setting in New England or the Mid-Atlantic states and a focus on industrial heritage or some other relatively obscure, not widely celebrated aspect of history.

Regression analysis was performed on the National Park Service data by means of SAS 9.4 software, with the annual visitor numbers as the independent variable and the resulting job numbers as the response or dependent variable. For existing national parks similar to Coltsville, annual non-local visitor numbers were found to correlate to new park-related jobs as follows:

$$J = 4.63096 + 0.00087332 * V,$$

where J is the number of jobs and V, the number of annual visitors. The Basic, East Armory, and Full Site scenarios were forecast by Museum Insights to result in 25,000, 60,000, and 200,000 visitors each year, respectively (Museum Insights et al. 2008, 14-25). By substituting these figures into the above equation, I determined that 26 new jobs would be attributable to Coltsville visitor spending under the Basic scenario, 57 under the East Armory scenario, and 179 in the event the Full Site scenario is implemented.

4.3 Allocating the Visitor Impact within the Study Area

The next step of my analysis involved determining the likely location of these jobs within my study area or possibly beyond its limits.

Lowry's original model relied on inter-zonal potentials for allocating activity, with the following formula:

$$P_j = G \sum_{i=1}^{n} \frac{E_i}{d_{ij}}$$

where Pj is the amount of population allocated to any zone j,

E_i is the amount of basic employment in zone *i*,

d_{ij} is distance or some other measure of accessibility for traveling from zone *i* to zone *j*,

G is a "scaling factor" to ensure that the sum of population allocated to the model's various zones does not exceed the total population growth forecast.

However, the suggestions made by Garin in 1966 include measuring the likelihood of interaction between zones by means of a gravity model. In particular, a singly-constrained gravity model is used to ensure that the number of jobs allocated by the model does not exceed the study area total. The basic formula for such a gravity model is

$$T_{ij} = E_i A_i P_j d_{ij}^{-1},$$

where E_i is the amount of activity to be allocated from zone *i*,

T_{ij} is the amount of activity allocated from zone *i* to any zone *j*,

$A_i P_j d_{ij}^{-1}$ is the probability of interaction between zones *i* and *j*,

where P_j is zone *j*'s measure of attraction, and

$A_i = \left(\sum_{j=1}^{n} P_j d_{ij}^{-1}\right)^{-1}$ (Lee 94-5).

This gravity model was used in my analysis for allocating service-sector jobs, with three important modifications. According to Lee, in all applications of the model "to date," a zone's pre-existing population was used as the measure of attraction (96). I felt that tourists would not necessarily strive to maximize their contact with Hartford's nighttime population, but a business catering to national-park visitors may want to consider such population in order to be better positioned to serve it as well as tourists.

Therefore, a weighted average of population and suitably-zoned land was used instead of simple population as the zones' measure of attraction; the amount of land was given more weight, as residing in any zone is not a prerequisite for being a customer of that zone's businesses, but the presence of a sufficient amount of land is a prerequisite for development. The factor by which the importance of land exceeded that of population was 2.5, an arbitrary figure. The weighted average was computed as

$$(Z_s * 2.5 + P)/3.5,$$

where Z_s is the amount of suitably-zoned land and *P*, the zone's population.

The capabilities of today's GIS software and the presence in my road data of a speed limit attribute meant that travel times to Coltsville NHP could be calculated, and it was decided to use travel times rather than distance as a more accurate measure of accessibility. Finally, a friction factor was introduced into the model to simulate the inconvenience of travel. Higher friction factors mean that travel is somehow less convenient, and consequently more of the impacts of a new facility would fall closer to that facility. Advances in transportation technology or improvements to the transport network can make travel less inconvenient, resulting in a lower friction factor. Conversely, a situation in which population grows but the transportation network does not would make travel more of an inconvenience, causing the friction factor to rise. Three such factors were used in my analysis. Masser (1972, 151) points out that, in simple-power distance decay functions, the friction coefficient generally does not exceed three. Therefore, the three coefficients in my analysis were 0.5, 1.5, and 2.5. The gravity model thus took on the following shape:

$$T_{ij} = E_i A_i P_j \left(m^{\beta}\right)_{ij}^{-1},$$

where T_{ij} is the amount of jobs allocated to any one zone *j*,

E_i is the total amount of activity to be allocated from zone i (i.e., the total expected number of service-sector jobs under each scenario),

m is the travel time, in minutes, from Coltsville to any zone *j*, unlike distance, or *d*, in the traditional version of the model,

β is a friction factor or measure of travel inconvenience,

T_{ij} is the amount of activity allocated from Coltsville NHP to any zone *j*, and

$A_i P_j t_{ij}^{-1}$ is the probability of interaction between Coltsville and zone *j*,

where P_j is zone *j*'s measure of attraction, and $Ai = \left(\sum_{j=1}^{n} P_j t^{\beta}{}_{ij}^{-1}\right)^{-1}$.

Because my analysis considered all three scenarios examined by Museum Insights et al., my analysis was performed a total of eighteen times, for each combination of park development scenario, friction factor, and type of model zone (block or block group). To make the analysis faster and more repeatable, a model of the workflow was constructed in ArcGIS's ModelBuilder visual programming language.

Believing it to be unrealistic to assume that all of the new park's impacts would fall inside Hartford city limits, I decided to simulate some of them accruing outside of the study area. A buffer of six miles (sufficiently large to encompass all of Hartford yet not large enough to include an unnecessarily cumbersome amount of road features outside the study area) was computed around the city's centroid, and then Harford's outline was erased from it. The resulting polygon, which surrounded, but did not include, the city itself, was then added to both the census block and the block group dataset.

The streets dataset was clipped by the boundary of Hartford County and used for building a network dataset. Elevations (for simulating bridges, overpasses, and tunnels) were modeled using the elevation fields present in the Esri road data; a "minutes" field was calculated and its contents used to model travel time to the park. Turns were modeled, and the one-way restriction was enforced. A left turn was modeled as requiring 24 seconds and a right turn, 12 seconds; going straight through an intersection was assumed to take six seconds and making a U-turn, half a minute.

After a zoning feature class was obtained, Hartford's zoning types were examined to identify zoning types suitable for development oriented to park visitors. Zones I-2 (industrial), C-1 (commercial), B-1 (downtown development district), B-2 (downtown development perimeter district), B-3 (linear business district), B-4 (neighborhood shopping district), and RO-1 through RO-3 (residential-office district) were identified as permitting the types of establishments that could conceivably cater to tourists (City of Hartford 2015). These polygons were selected and exported to a new "suitable land" feature class.

The next step was to determine the amount of suitable land in each zone (census block or block group). The suitable land polygons and the zone polygons were overlaid by means of the Union tool in ArcMap and then a selection by attributes was performed on the resulting feature class, selecting only those polygons that overlaid a polygon of suitable land. The area of the selected polygons (calculated automatically since all the feature classes under discussion were stored in geodatabases) was then summarized by census block or block group number. By joining attribute tables, a feature class was obtained of zones showing the amount of suitably-zoned land in each zone (see appendix C for a Python script of this workflow).

Each of the model's zones was then converted to a point feature by computing its centroid, with the points being used for determining the driving time from each zone to the park in Coltsville. This step was performed by closest facility analysis in ArcGIS (see appendix D), with the zone centroids, the park centroid, and the road network as inputs. Impedance was measured in minutes and U-turns were permitted. The data on "incidents" (zone centroids) were exported and the resulting table joined back to the centroid feature class, giving it an attribute for travel time to Coltsville.

The attribute table of the resulting feature class was exported to an Excel spreadsheet and thence to a SAS dataset. The expected jobs under each Museum Insights scenario, as determined by regression analysis, were then allocated by means of the gravity model to the various zones with suitably-zoned land, as well as to the zone outside the study area.

The SAS script (see appendix F) allocated the jobs to the model's various zones as follows:

$$T_{ij} = E_i \left(\frac{E_i P_j A_i}{\sum_{j=1}^{n}(E_i P_j A_i)} \right),$$

where T_{ij} is the amount of jobs allocated to any one zone j,

E_i is the number of jobs to be allocated (26, 57, or 179, depending on the scenario);

P_j is a zone's measure of attraction, calculated as a weighted average of population and suitably-zoned land, as described earlier, and

A_i is each zone's likelihood of interaction with Coltsville, calculated as follows:

$$\frac{(m^{\beta})^{-1}}{\sum_{j=1}^{n}(m^{\beta})^{-1}},$$

where m is the travel time, in minutes, from each zone j to Coltsville, and β is a friction coefficient (either 0.5, 1.5, or 2.5) signifying the rate at which the new park's effects trail off as distance to the park increases.

The models were run a total of eighteen times, once for each value of the friction coefficient and each park scenario, for both blocks and block groups. The resulting data were exported to Excel spreadsheets and then to tables that were joined back to the zone polygon feature class (see appendix E).

The fact that the number of expected jobs was comparable to that of model zones under some scenarios meant that the largest number of jobs received by any zone was likely to be small, and there were usually multiple zones with a similar number. Therefore, to better visualize the models' forecasts, it was decided to summarize the results of my analysis by a more recognizable geometry. Hartford's neighborhoods, officially delineated by the City of Hartford, were used for this (see appendix E).

Chapter 5: Conclusions and Discussion

Before carrying out the analysis, I expected Sheldon-Charter Oak, Downtown, and South Meadows to receive the most jobs under most combinations of analysis settings (owing to their proximity to Coltsville), with the zone outside the study area benefitting only when the friction factor was low. Many benefits were also expected to accrue to South Meadows and Downtown due to the abundance of suitably-zoned land there. Therefore, the final results of my analysis held hardly any surprises. South Meadows did, indeed, consistently turn out to be the main beneficiary of the visitor traffic to the new park. Of the eighteen combinations of analysis settings, fifteen resulted in South Meadows receiving the largest number of jobs, with the most benefits accruing to Sheldon-Charter Oak in the remaining three.

When census block groups were used as the model's zones, South Meadows was always the neighborhood most affected by tourist traffic, while Downtown was invariably the second most affected. The third place varied depending on the friction coefficient, North Meadows if the figure was 0.5, Asylum Hill when the coefficient was 1.5, and Sheldon-Charter Oak itself under 2.5.

Results were more varied when census blocks were the units of analysis. With that setting, the most affected neighborhood was Sheldon-Charter Oak when the friction coefficient was set to 2.5, South Meadows otherwise. The second place was held by North Meadows, Sheldon-Charter Oak, and South Meadows if the friction coefficients were 0.5, 1.5, and 2.5, respectively. This was somewhat not in line with my expectations, as

Sheldon-Charter Oak, the neighborhood closest to the park, was expected to benefit the most if the factor of travel inconvenience was at its highest. The most likely explanation is the relative scarcity of suitably-zoned land in that largely residential neighborhood. The third place was consistently held by Downtown whenever census blocks were the unit of analysis. Census blocks, or polygons of comparable size, permit a more fine-grained analysis and should probably be the model zone in future analyses of this type.

Table 3. Job allocation under the Basic scenario by zone type and friction coefficient

Neighborhood	Block Groups, 0.5	Block Groups, 1.5	Block Groups, 2.5	Census Blocks, 0.5	Census Blocks, 1.5	Census Blocks, 2.5
Asylum Hill	2.68	2.20	1.55	2.23	1.28	0.25
Barry Square	0.78	0.87	0.84	0.71	0.58	0.16
Behind-the-Rocks	0.90	0.56	0.31	0.65	0.28	0.04
Blue Hills	0.37	0.17	0.06	0.36	0.12	0.01
Clay-Arsenal	0.49	0.37	0.23	0.54	0.32	0.06
Downtown	3.04	3.83	4.04	2.83	2.96	1.16
Frog Hollow	0.77	0.85	0.81	0.87	0.69	0.19
North Meadows	2.79	1.30	0.51	3.30	1.78	0.33
Northeast	1.14	0.66	0.32	1.10	0.48	0.07
Outside study area	1.48	0.49	0.13	1.39	0.33	0.03
Parkville	0.72	0.48	0.27	0.81	0.41	0.07
Sheldon-Charter Oak	0.75	1.52	3.05	1.43	6.87	19.63
South End	0.43	0.44	0.39	0.91	0.74	0.20
South Green	0.97	1.52	2.00	1.07	1.25	0.50
South Meadows	7.98	10.31	11.25	7.06	7.58	3.26
South West	0.02	0.01	0.01	0.05	0.02	0.00
Upper Albany	0.36	0.22	0.11	0.44	0.20	0.03
West End	0.33	0.21	0.11	0.24	0.11	0.02

Table 4. Job allocation under the East Armory scenario by zone type and friction coefficient

Neighborhood	Block Groups, 0.5	Block Groups, 1.5	Block Groups, 2.5	Census Blocks, 0.5	Census Blocks, 1.5	Census Blocks, 2.5
Asylum Hill	5.88	4.82	3.40	4.89	2.80	0.55
Barry Square	1.70	1.91	1.84	1.56	1.27	0.35
Behind-the-Rocks	1.96	1.23	0.67	1.42	0.62	0.09
Blue Hills	0.81	0.37	0.14	0.78	0.27	0.03
Clay-Arsenal	1.08	0.81	0.51	1.17	0.69	0.14
Downtown	6.66	8.39	8.86	6.21	6.49	2.53
Frog Hollow	1.69	1.87	1.79	1.90	1.51	0.41
North Meadows	6.11	2.85	1.11	7.24	3.91	0.72
Northeast	2.50	1.44	0.70	2.41	1.06	0.16
Outside study area	3.24	1.07	0.29	3.06	0.73	0.06
Parkville	1.58	1.06	0.60	1.77	0.90	0.15
Sheldon-Charter Oak	1.65	3.33	6.69	3.14	15.07	43.02
South End	0.94	0.97	0.85	2.00	1.62	0.44
South Green	2.13	3.33	4.38	2.35	2.74	1.09
South Meadows	17.50	22.61	24.67	15.48	16.61	7.14
South West	0.05	0.03	0.02	0.12	0.05	0.01
Upper Albany	0.78	0.47	0.24	0.96	0.44	0.07
West End	0.72	0.45	0.24	0.52	0.24	0.04

Table 5. Job allocation under the Full Site scenario by zone type and friction coefficient

Neighborhood	Block Groups, 0.5	Block Groups, 1.5	Block Groups, 2.5	Census Blocks, 0.5	Census Blocks, 1.5	Census Blocks, 2.5
Asylum Hill	18.47	15.13	10.69	15.37	8.78	1.72
Barry Square	5.35	5.99	5.78	4.90	3.97	1.10
Behind-the-Rocks	6.17	3.86	2.10	4.47	1.93	0.29
Blue Hills	2.56	1.16	0.44	2.45	0.84	0.10
Clay-Arsenal	3.38	2.55	1.61	3.68	2.17	0.43
Downtown	20.91	26.36	27.83	19.50	20.39	7.95
Frog Hollow	5.30	5.87	5.61	5.96	4.73	1.30
North Meadows	19.20	8.95	3.50	22.75	12.27	2.26
Northeast	7.85	4.52	2.21	7.57	3.32	0.49
Outside study area	10.18	3.35	0.92	9.60	2.31	0.19
Parkville	4.96	3.31	1.87	5.56	2.82	0.48
Sheldon-Charter Oak	5.20	10.44	21.00	9.88	47.33	135.11
South Green	2.95	3.04	2.68	6.29	5.08	1.39
South Green	6.69	10.46	13.75	7.38	8.60	3.42
South Meadows	54.97	70.99	77.46	48.62	52.17	22.41
South West	0.15	0.10	0.05	0.37	0.16	0.02
Upper Albany	2.46	1.48	0.75	3.02	1.38	0.21
West End	2.27	1.43	0.76	1.64	0.75	0.12

For each of the three Museum Insights scenarios, an average was calculated of the six possible combinations of friction coefficient and model zone type. When sorted by the number of jobs received, in descending order, they turned out to have the same rankings in all three scenarios; only the numbers of jobs differed. South Meadows, Sheldon-Charter Oak, and Downtown, in this order, were the three neighborhoods most affected by Coltsville's visitor traffic. Asylum Hill and North Meadows were in the fourth and fifth place, respectively. Both Asylum Hill and North Meadows are located along interstate highways, making for somewhat reduced travel times to Coltsville, and North Meadows, while very sparsely populated, has plenty of suitably zoned land. Asylum Hill is the location of two of Hartford's best-known landmarks, the Harriet Beecher Stowe Center and the Mark Twain House; this factor, together with its relatively short travel time to Coltsville, makes this neighborhood a good candidate for the location of tourism-related infrastructure in real life.

North Meadows and South Meadows, lying next to the Connecticut River, have historically been flood-prone and thus not highly desirable as places of residence. Therefore, both have come to specialize in commercial and industrial land uses. Some of these are space-intensive, such as car dealerships, many of which exist in North Meadows, or Brainard Airport in South Meadows. Also found in South Meadows are a waste-to-energy plant and Hartford's Regional Market, a perishable-food distribution facility, at 32 acres the largest of its kind between New York and Boston (LiveHartford 2014). Both neighborhoods also have abundant suitably-zoned land. Thus, services that stand to benefit, directly or not, from increased tourist traffic and that do not themselves need to be near a point of interest may well choose a location in North or South Meadows in real life.

Surprisingly little tourist traffic accrued to land outside the study area, even when the travel friction coefficient was at its lowest at 0.5. When averages of results for each Museum Insights scenario were calculated, that zone ranked in the rather modest ninth place, with 0.6, 1.4, and 4.4 jobs under the Basic, East Armory, and Full Site scenarios, respectively (see tables 6, 7, and 8). I suspect that my analysis gave Hartford's suburbs an unrealistically low share of the benefits of increased tourist traffic to Hartford. Primarily residential neighborhoods far from interstate highways, such as South West and Blue Hills, were the least affected by the park. The most jobs accruing to any neighborhood, 135, were received by Sheldon-Charter Oak under the Full Site scenario, with census blocks as the model zone and travel difficulty assumed to be 2.5.

Table 6. Job allocation under the Basic scenario (average of all settings)

Neighborhood	Jobs Allocated
South Meadows	7.9
Sheldon-Charter Oak	5.54
Downtown	2.98
Asylum Hill	1.7
North Meadows	1.67
South Green	1.22
Frog Hollow	0.7
Barry Square	0.66
Outside study area	0.64
Northeast	0.63
South End	0.52
Parkville	0.46
Behind-the-Rocks	0.46
Clay-Arsenal	0.33
Upper Albany	0.23
Blue Hills	0.18
West End	0.17
South West	0.02

Table 7. Job allocation under the East Armory scenario (average of all settings)

Neighborhood	Jobs Allocated
South Meadows	17.33
Sheldon-Charter Oak	12.15
Downtown	6.53
Asylum Hill	3.72
North Meadows	3.66
South Green	2.67
Frog Hollow	1.53
Barry Square	1.44
Outside study area	1.41
Northeast	1.38
South End	1.14
Parkville	1
Behind-the-Rocks	1
Clay-Arsenal	0.73
Upper Albany	0.49
Blue Hills	0.4
West End	0.37
South West	0.05

Table 8. Job allocation under the Full Site scenario (average of all settings)

Neighborhood	Jobs Allocated
South Meadows	54.44
Sheldon-Charter Oak	38.16
Downtown	20.49
Asylum Hill	11.69
North Meadows	11.49
South Green	8.38
Frog Hollow	4.79
Barry Square	4.52
Outside Study Area	4.4
Northeast	4.33
South End	3.57
Parkville	3.17
Behind-the-Rocks	3.14
Clay-Arsenal	2.3
Upper Albany	1.55
Blue Hills	1.26
West End	1.16
South West	0.14

Chapter 6: Suggestions for Future Research

The methodology described here grossly oversimplifies the complex processes that shape a city's layout and determine how much, if any, impact a development such as a new national park would have on the city. For instance, it is unlikely that visitors to a city would confine themselves to any one tract of land there, or that travel times to that tract would be one of the few predictors of the location of the impacts of their spending. A much more complex methodology is needed to adequately model those factors. Much in my analysis, such as the various friction coefficients or the relative importance of land and population, were completely arbitrary. In future analyses, these figures would need to be derived empirically, and other factors that shape the behavior of park visitors and businesses catering to them need to be identified. My suggestion is to interview actual visitors to comparable parks to identify the acceptable travel time to the park so as to empirically arrive at a more accurate friction coefficient. Stakeholders such as developers may also need to be interviewed to better understand the relative importance of population levels and the many other factors that influence their location decisions.

Although census blocks and block groups were deemed adequate for this type of analysis by my academic advisor, it is conceivable that other types of polygons may be more suitable. Lowry's original model utilized city blocks aggregated into units as close in size to a square mile and as close in shape to a square as possible (Lowry 1964, 59). Aggregating census blocks into similar units should be considered in similar analyses of this type. Alternatively, a grid of regular cells may be generated and superimposed on the study area, with each cell's population estimated based on the populations of census blocks that the cell overlaps.

My analysis lumped together any impacts falling beyond the limits of my study area. The methodology could be improved by allocating the impacts in a more precise way, for example forecasting their distribution in some type of multiple zones outside the study area as well. The centroid of the zone representing land outside the study area in my analysis happened to fall in East Hartford, where a cluster of hotels is situated across the river from downtown Hartford. Nevertheless, there are certainly other spots outside Hartford where visitors to that city are likely to stay during their visits, and these need to be identified in future analyses, since the visitors' impacts are more likely to be felt near such places. Another overly simplistic assumption was that visitor impacts would always fall closer to the park and diminish with distance from it. Within the study area, there may well be other locations that tourists may want to visit and near which their economic impacts would tend to fall. This, too, needs to be taken into consideration in the future.

A better understanding is needed of the methodology utilized by the National Park Service for translating visitor numbers to tourism-related job figures if one wishes to replicate those methods. The IMPLAN software relies on input-output analysis to model economic impacts (US Department of the Interior 2015, 6). Input-output analysis involves economic multipliers that vary from place to place. If one were to repeat the NPS's analysis specifically for Coltsville NHP, multipliers specific to the greater Hartford area would need to be known. The NPS also assumes a NPS unit's "gateway region" to be a sixty-mile radius of the unit's boundary (14). The 2015 NPS report considers all NPS units, including those in the western states, where distances are large and populations are sparse. A larger study area means that the effects of visitor spending are likelier to fall inside it, resulting in larger multipliers (6). More research is needed to decide whether the sixty-mile radius is appropriate in a region such as central Connecticut, where travel times to various services are likely to be shorter than in some other regions.

In their article on estimating the impacts of the proposed downtown trolley line in Cincinnati, Mokadi, Mitsova, and Wang describe a completely different approach to forecasting an amenity's impacts. From news articles, public reports, and personal communication, the authors determined the probabilities of land-use changes near trolley stops (taking into account the narratives of both supporters and opponents of the trolley line). After dividing their study area into grid cells, each cell representing the current land use there, the authors used these transition probabilities to construct a cellular automaton that forecast future land use by means of Markov chains (2013, 136-146).

Time constraints did not allow me to research a sufficient amount of literature on land-use change near urban national parks, and I did not have the clearance to interview experts or stakeholders. However, it is tempting to recommend such a methodology for future research. Unlike Mokadi, Mitsova, and Wang, I would be able to derive the transition probabilities empirically by studying the experience of such cities as Lowell, Springfield, and New Bedford, Massachusetts. Those cities with long-established urban national parks are comparable in size to Hartford and are situated in the same region. Two datasets of land use would be obtained, one historical (showing land use at some point before the establishment of national parks there) and another current, and transition probabilities would be derived by comparing the two. Then I would seek ways to apply these transition probabilities to forecasting any land-use change in Hartford resulting from Coltsville NHP becoming operational. Alternatively, such probabilities could be derived by interviewing residents or other stakeholders in Lowell, Springfield, and New Bedford and by examining public reports and news articles there. The next step would be to determine the factors that can amplify or hamper park-related development; Mokadi, Mitsova, and Wang believe (2013, 138) that tourism's impact on land use is uneven; for instance, it is amplified in proximity to certain public facilities, such as parks and transit stops.

As yet, it is uncertain how transformative the effects of visitors to Coltsville NHP will be. A number of other factors, many of them beyond the control of the National Park Service and the Coltsville Ad Hoc Committee, will contribute to the success or failure of the newest unit of the National Park System. What is certain, however, is that Hartford is now taking specific steps to fill the void created by the reduced role of the defense and insurance industries, the city's longtime source of livelihood. As the controversy over the Yard Goats stadium illustrates, the debate is not over as to whether entertainment and leisure can fill this void; the same can be said about heritage tourism. More studies about the impacts of amenities on cities will be needed, and the suggestions made at the end of this paper should help future researchers forecast any such impacts with greater accuracy.

Appendix A: Photographs

Figure 15. Corner of East Armory (foreground, left), North Armory (background), and U-Shaped (office) building, Van Dyke Avenue at Sequassen Street

Figure 16. Streetscape improvements, Nepaquash Street and Charter Oak Avenue

Figure 17. Church of the Good Shepherd

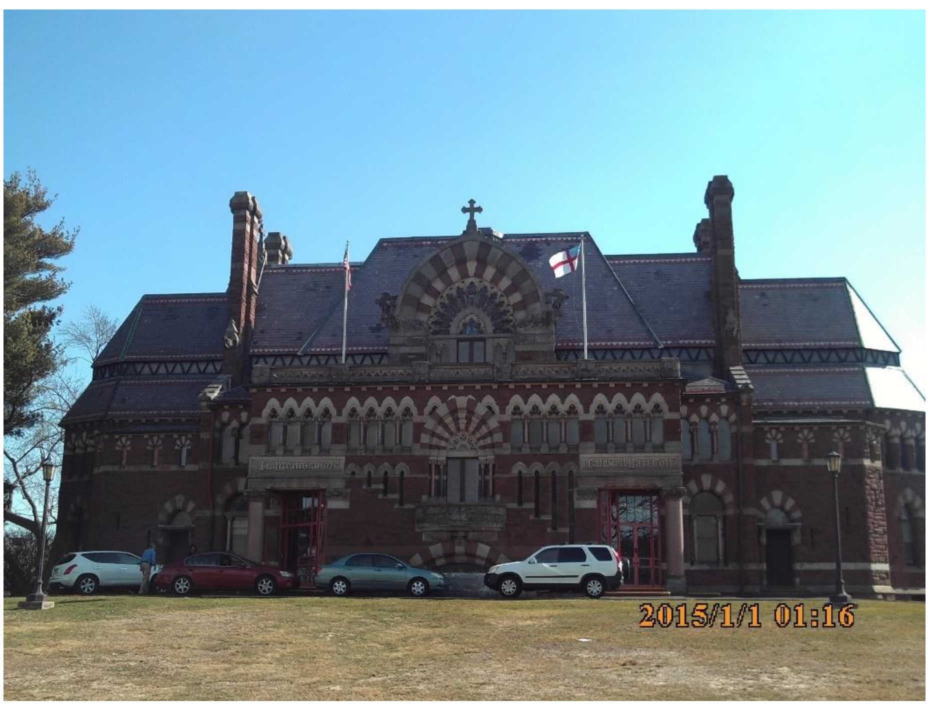

Figure 18. The Caldwell Colt Parish House

Figure 19. Detail of the Caldwell Colt Parish House

Figure 20. The North Armory (background) and Forge Shop (foreground), still awaiting restoration

Figure 21. South Armory building

Figure 22. Machine Shop (Building R), now Insurity headquarters

Figure 23. South Armory building (right) and worker housing (left), Huyshope Avenue, view toward downtown Hartford

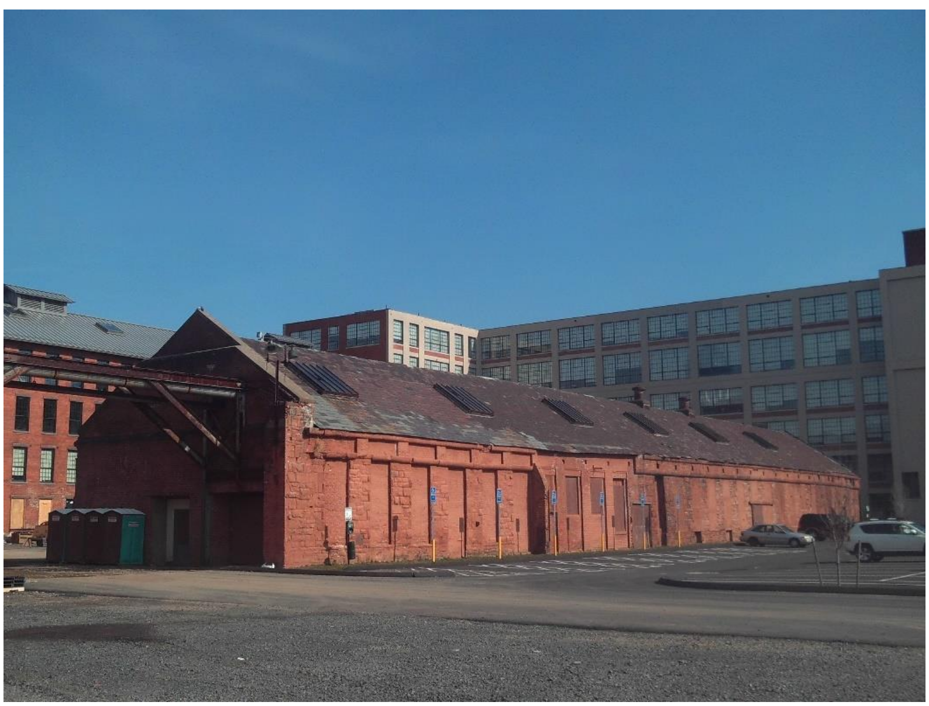

Figure 24. The Foundry building, one of the two surviving structures from 1855

Figure 25. "Potsdam Cottages," another type of worker housing, Curcombe Street

Figure 26. Building in Colt Park


Figure 27. Samuel Colt monument in Colt Park


Figure 28. Armsmear, the Colt family's former mansion on Wethersfield Avenue

Appendix B: Maps of the Expected Job Allocations under Each Combination of Analysis Settings

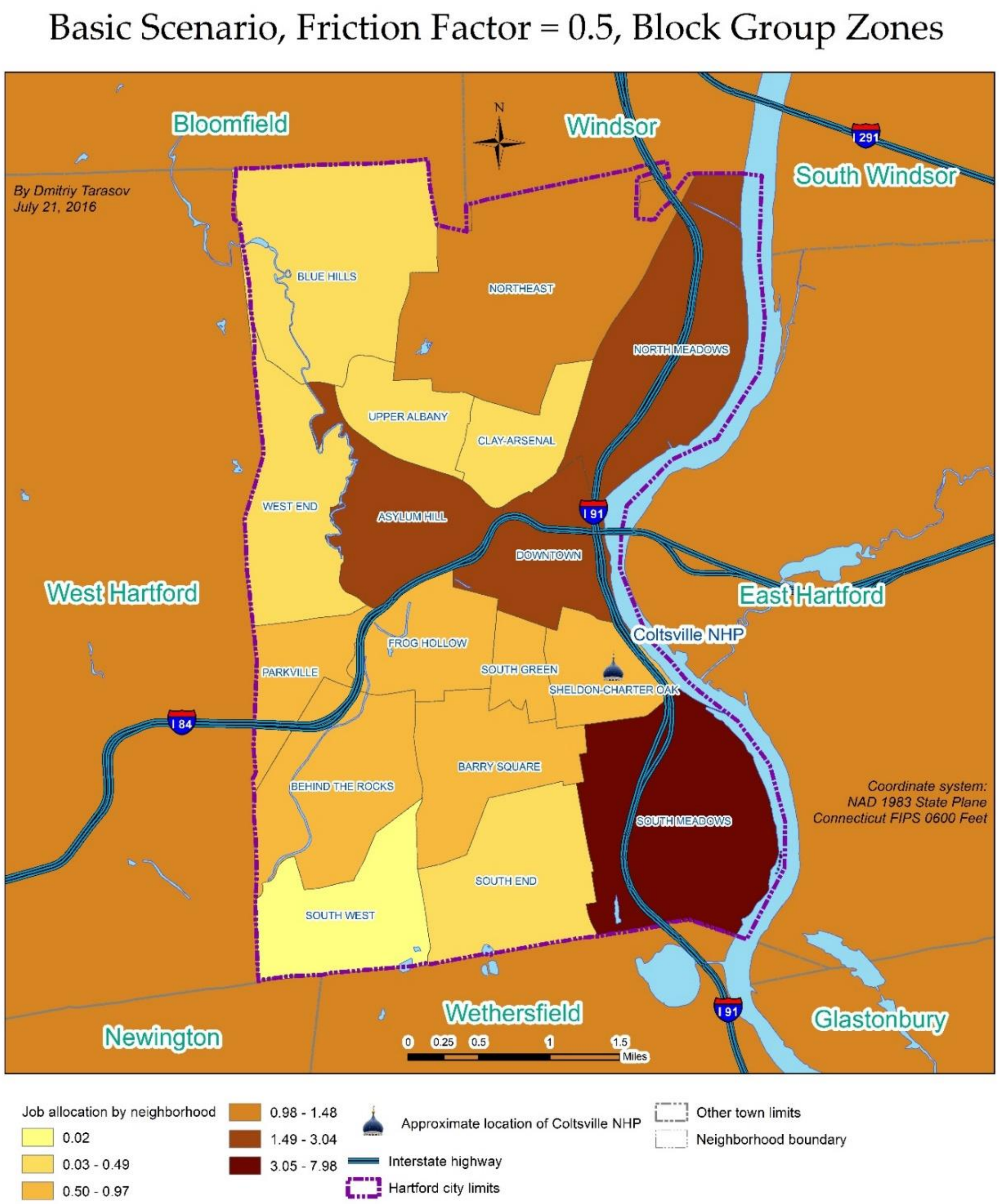

Figure 29. Job allocation under the Basic scenario with a friction factor of 0.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

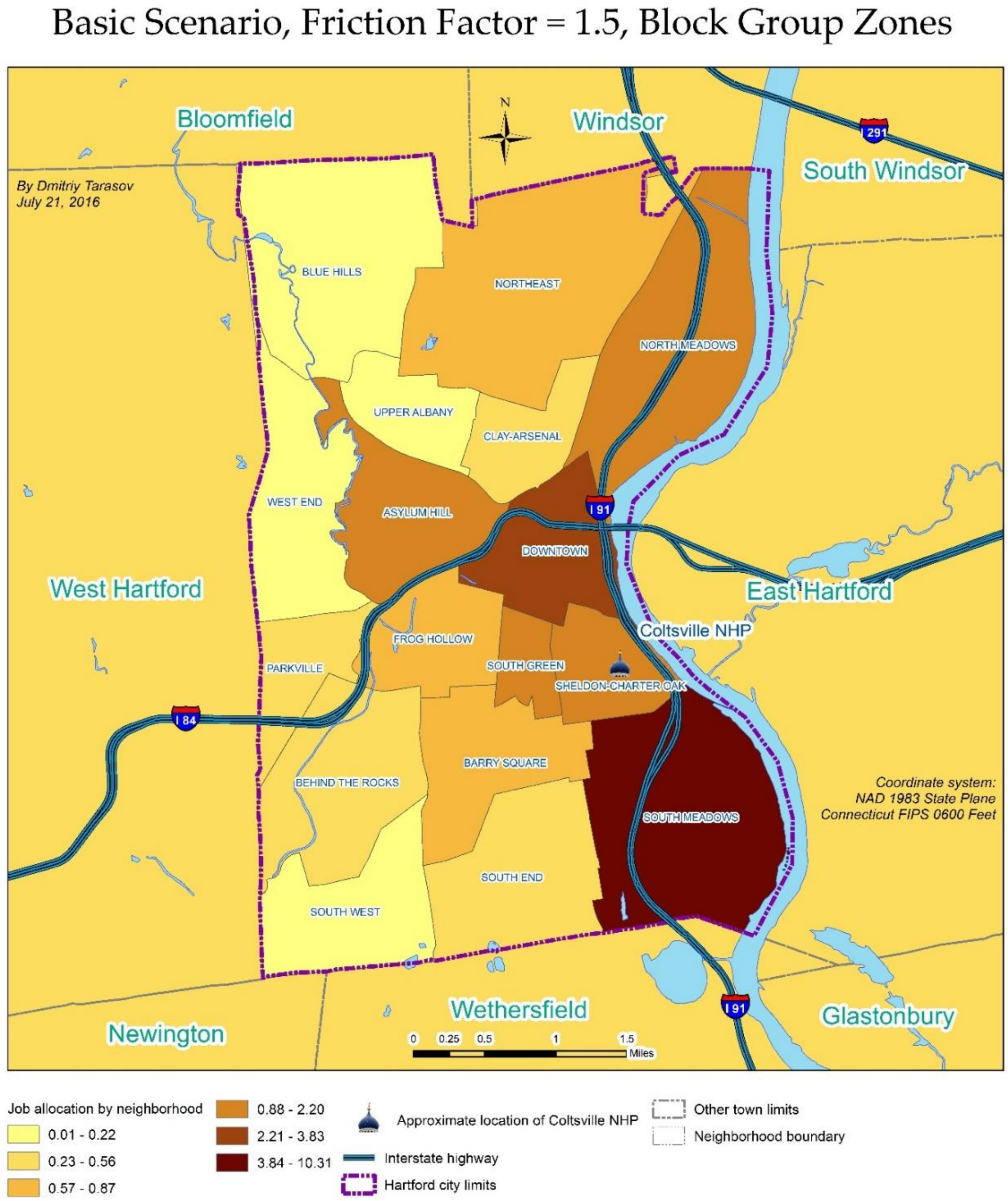

Figure 30. Job allocation under the Basic scenario with a friction factor of 1.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

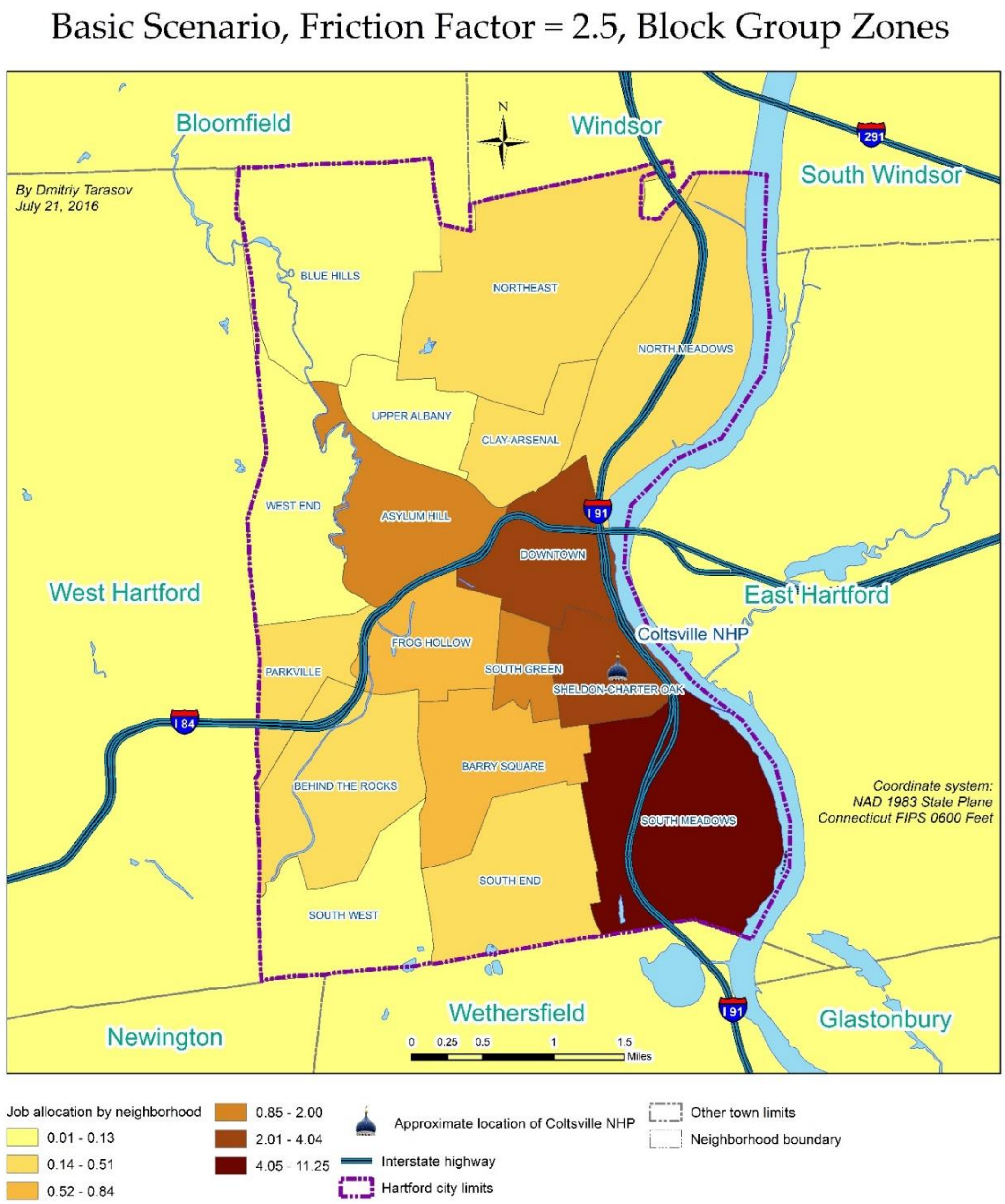

Figure 31. Job allocation under the Basic scenario with a friction factor of 2.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

East Armory Scenario, Friction Factor = 0.5, Block Group Zones

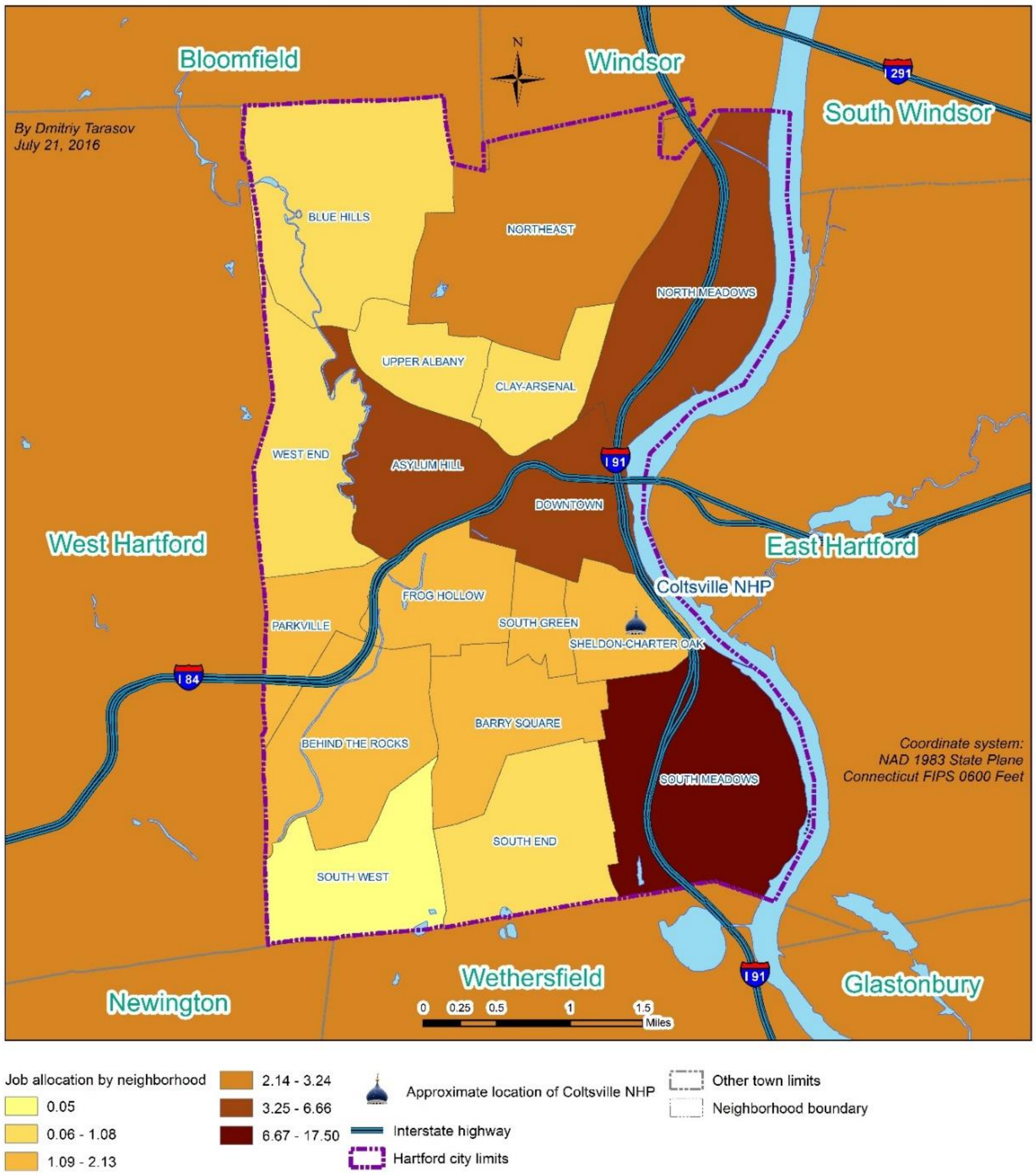

Figure 32. Job allocation under the East Armory scenario with a friction factor of 0.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

East Armory Scenario, Friction Factor = 1.5, Block Group Zones

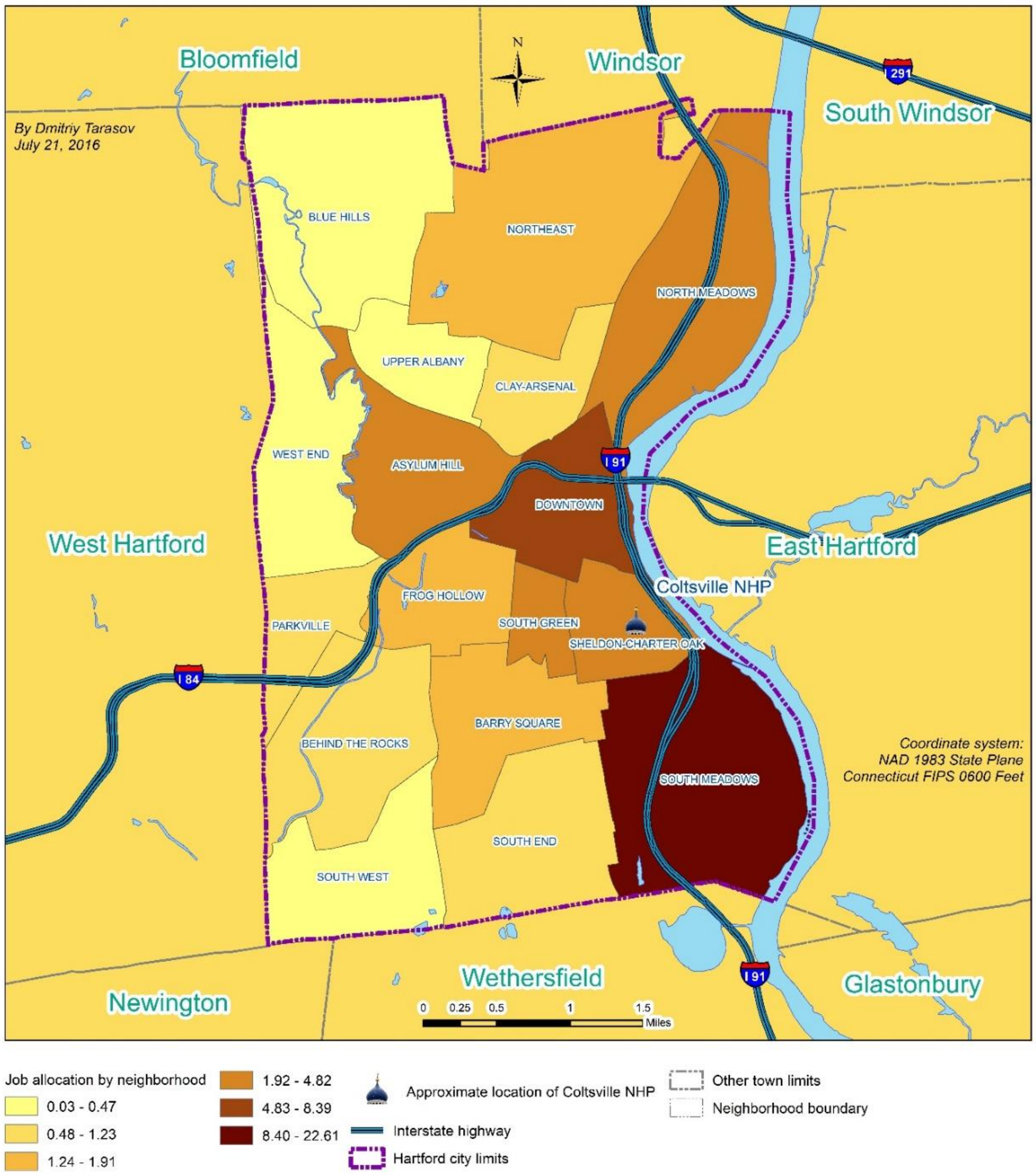

Figure 33. Job allocation under the East Armory scenario with a friction factor of 1.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

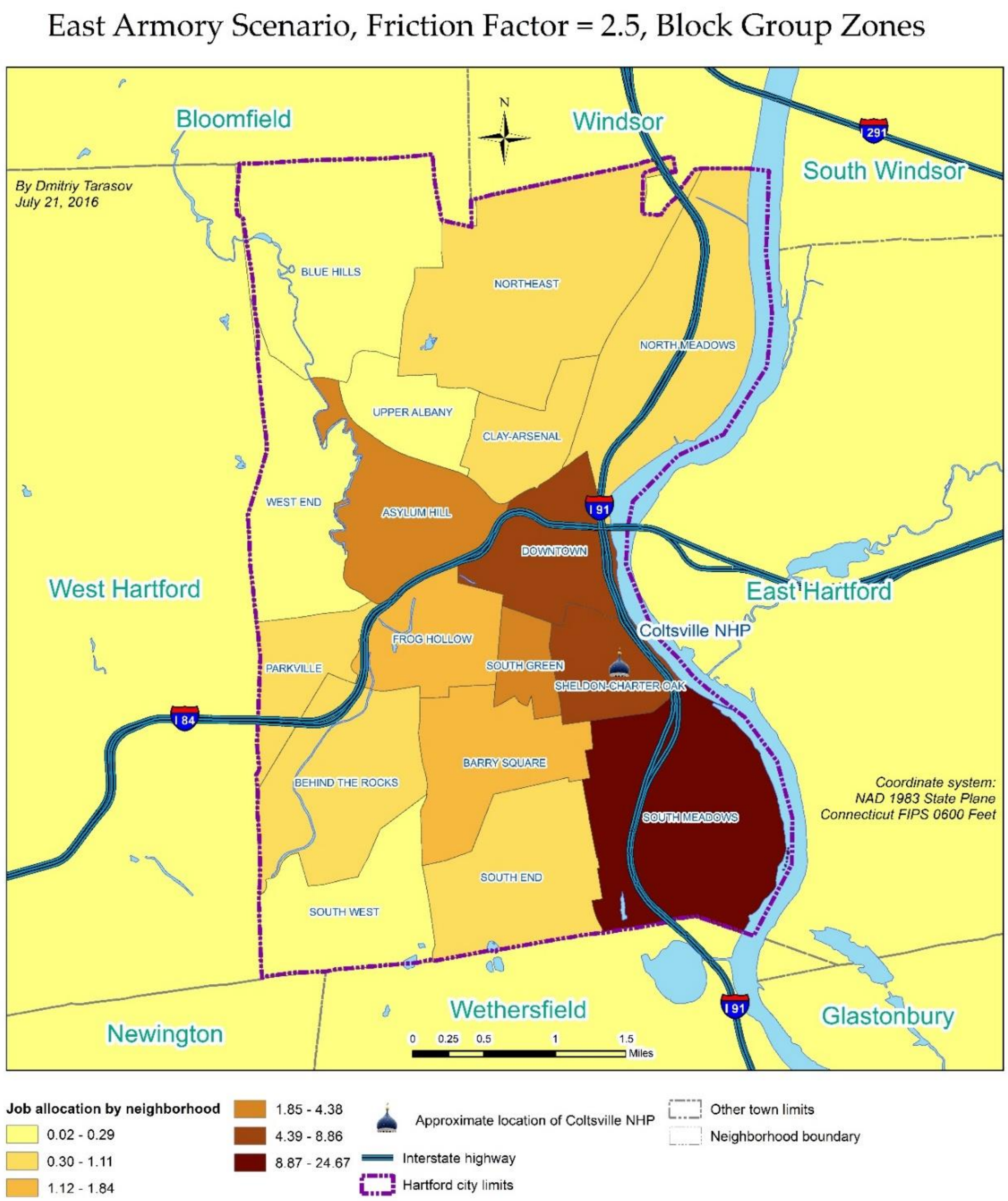

Figure 34. Job allocation under the East Armory scenario with a friction factor of 2.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

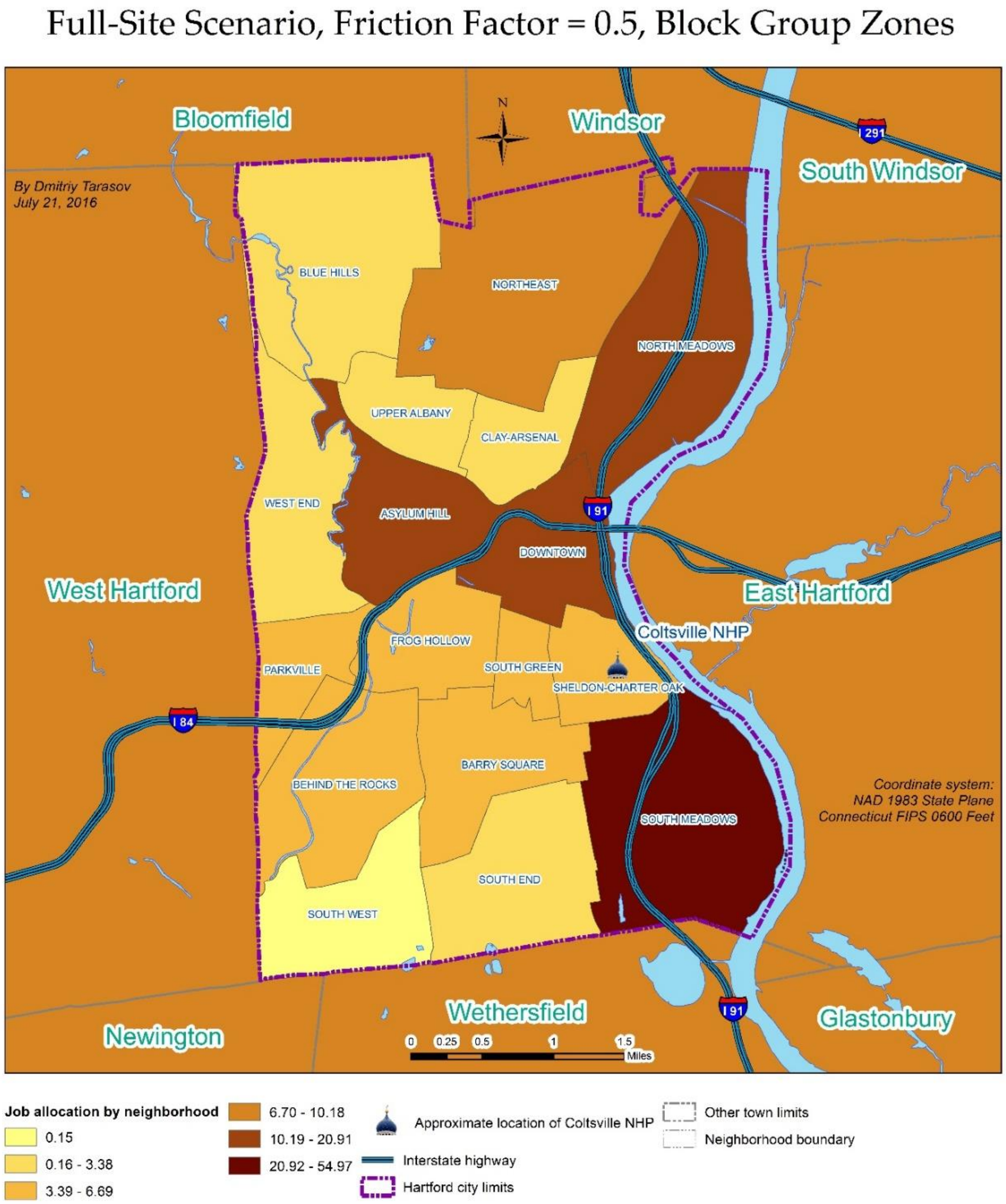

Figure 35. Job allocation under the Full Site scenario with a friction factor of 0.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

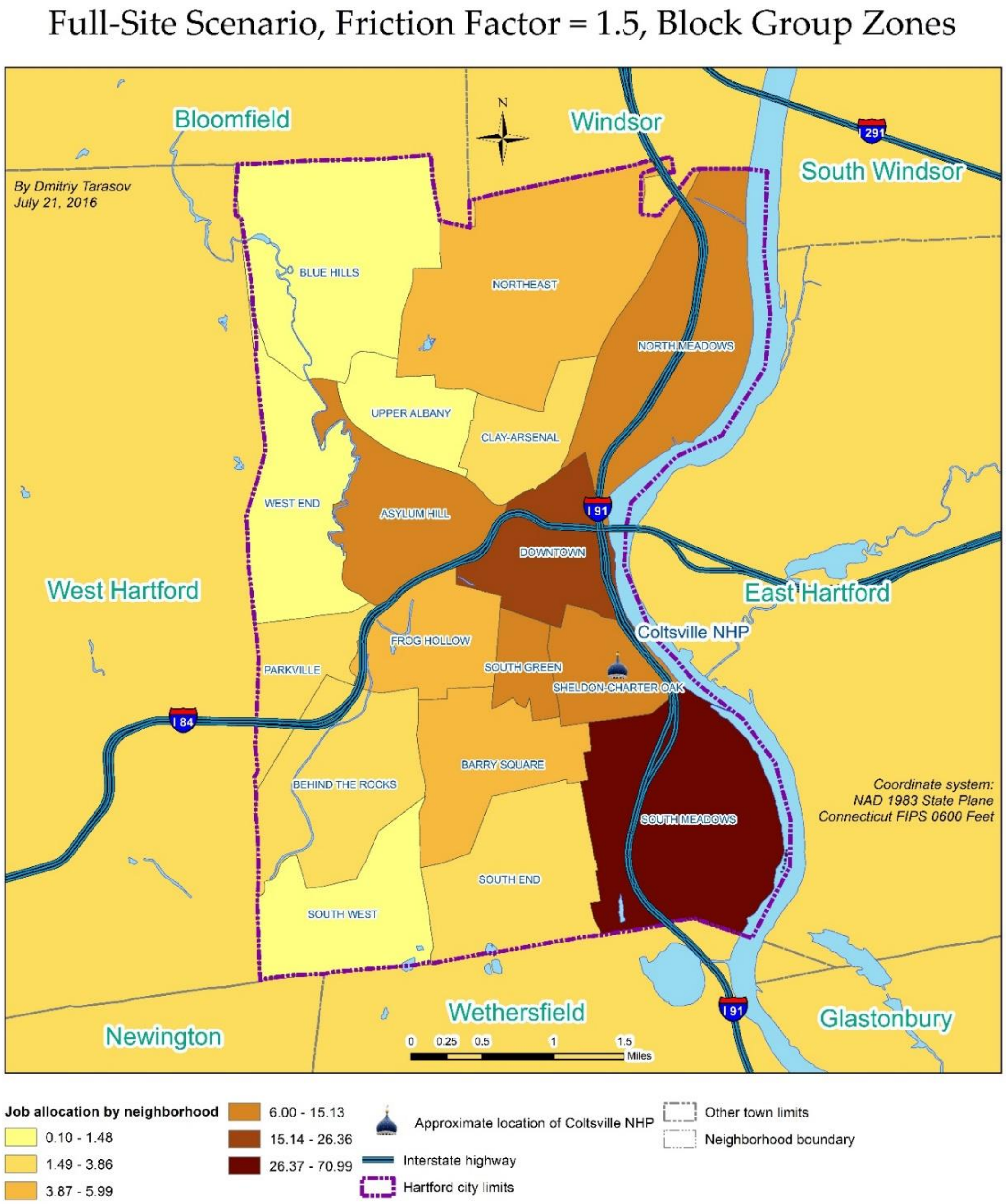

Figure 36. Job allocation under the Full Site scenario with a friction factor of 1.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

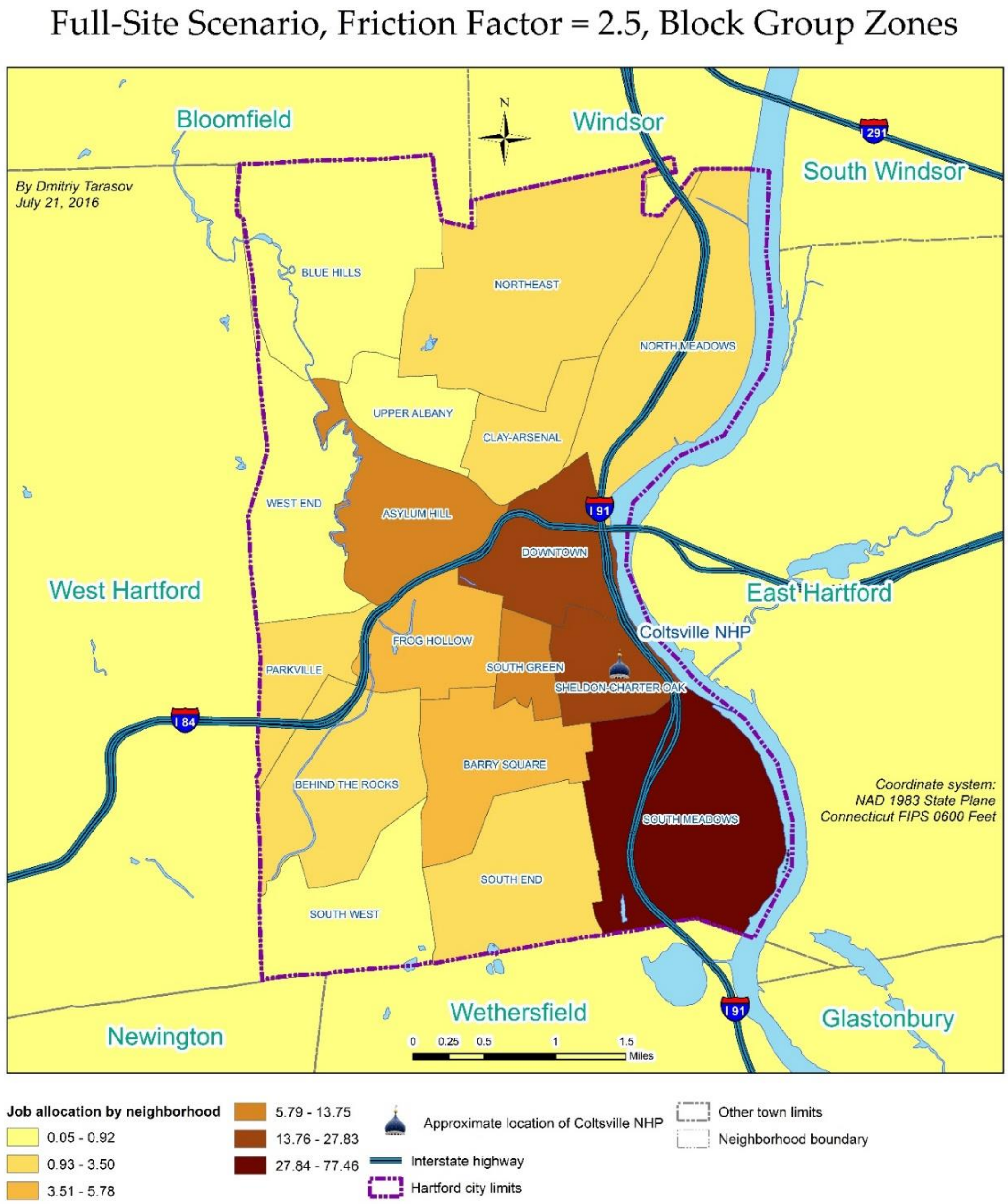

Figure 37. Job allocation under the Full Site scenario with a friction factor of 2.5, block group zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2012.

Basic Scenario, Friction Factor = 0.5, Census Block Zones

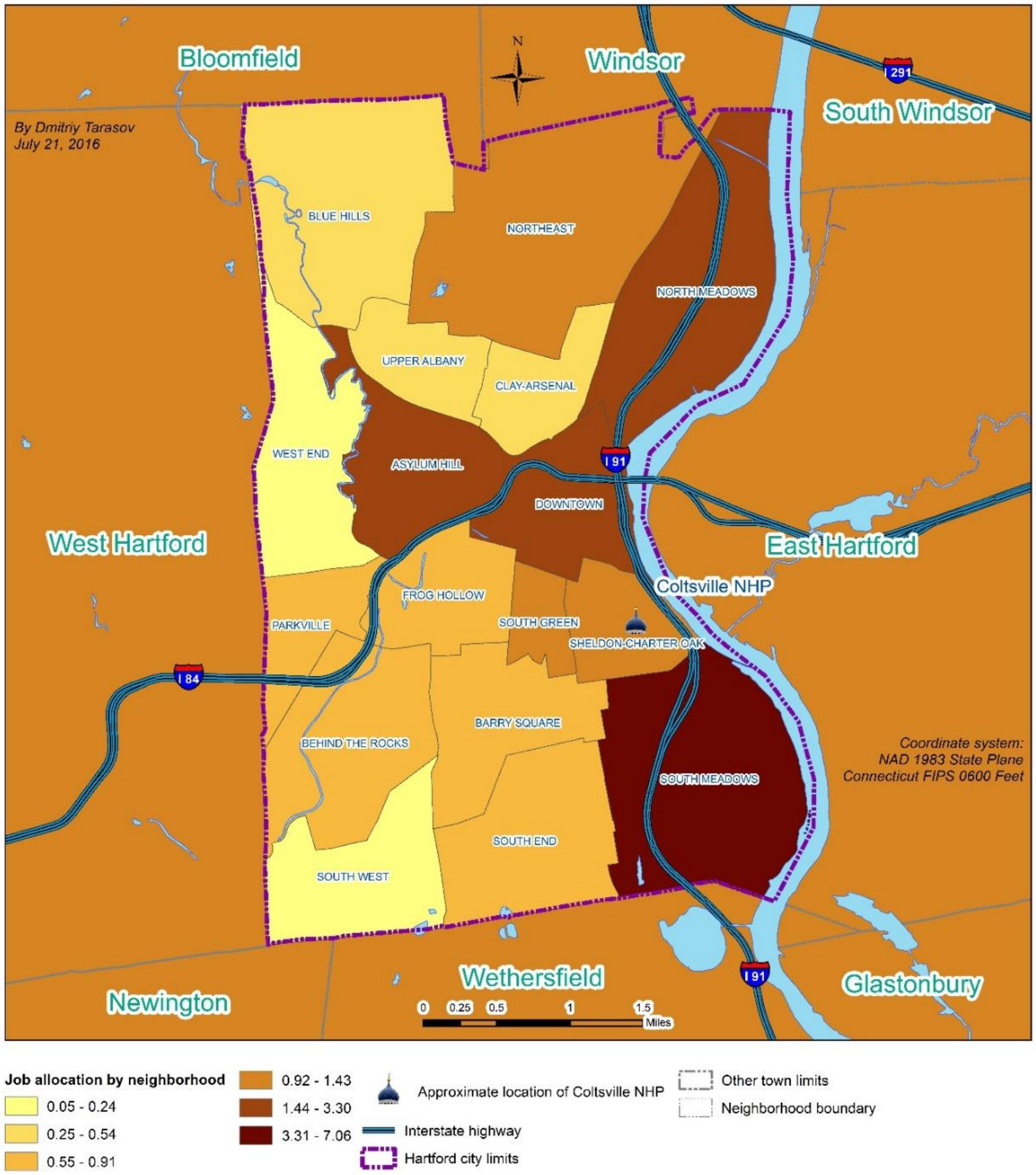

Figure 38. Job allocation under the Basic scenario with a friction factor of 0.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

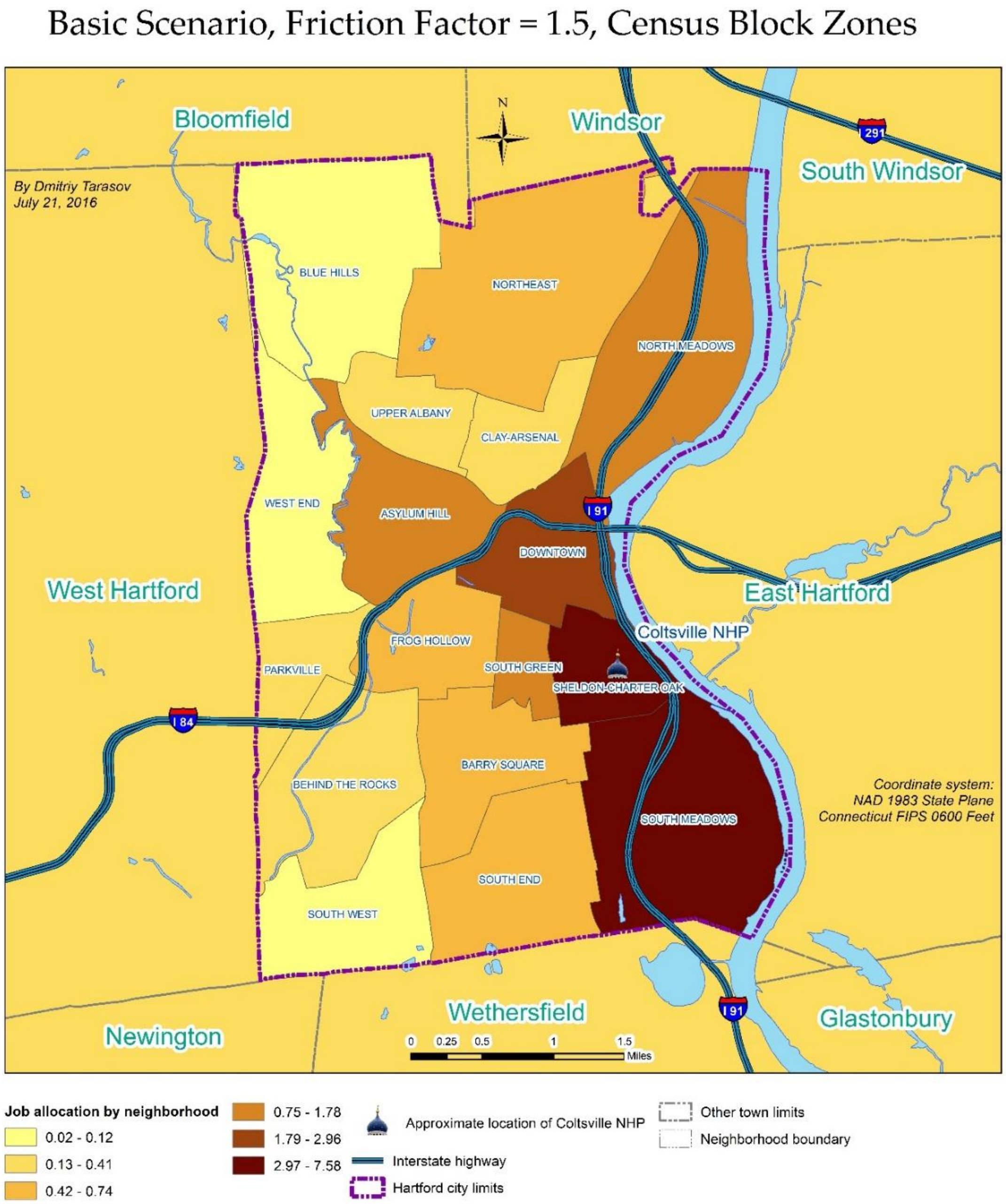

Figure 39. Job allocation under the Basic scenario with a friction factor of 1.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

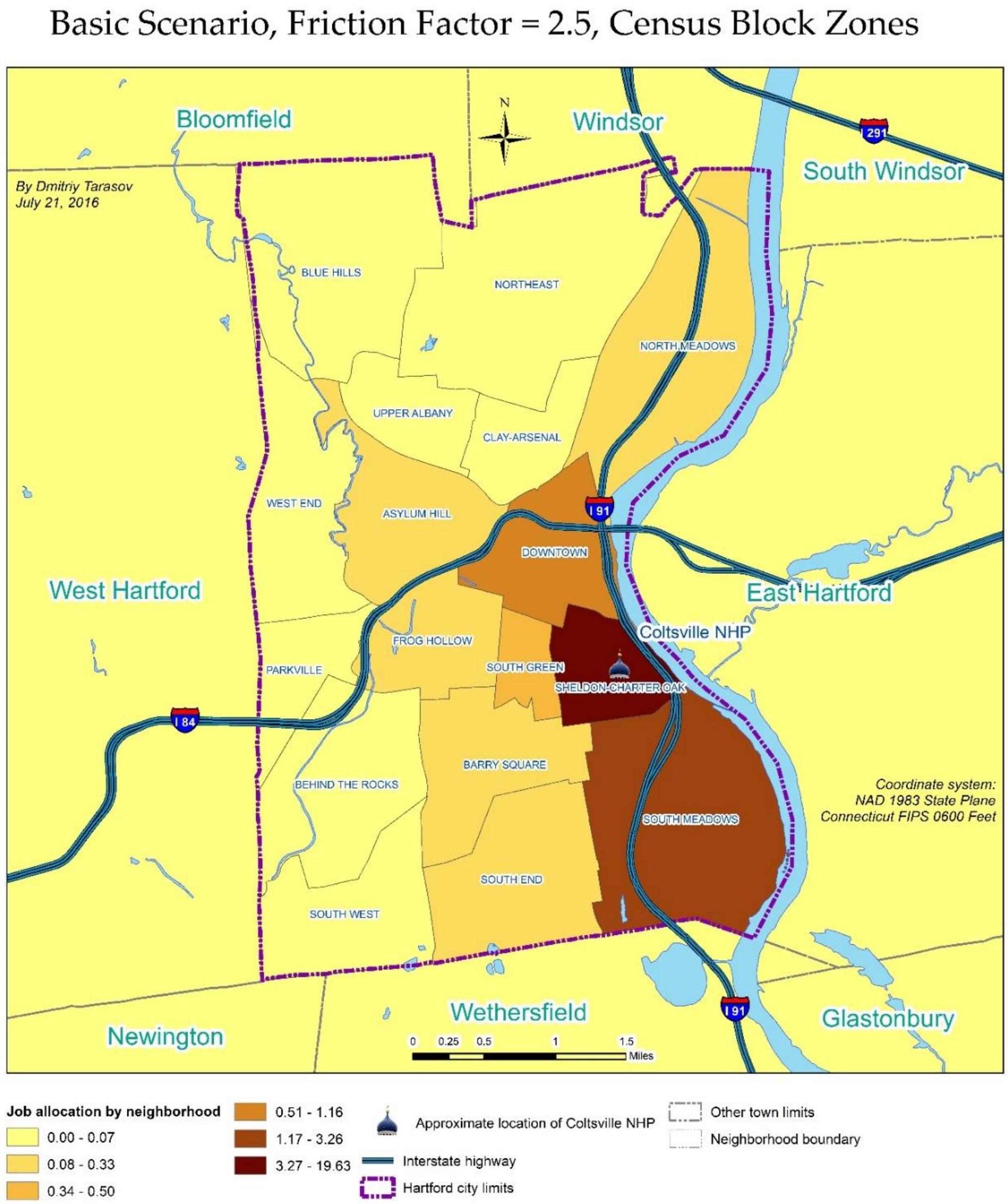

Figure 40. Job allocation under the Basic scenario with a friction factor of 2.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

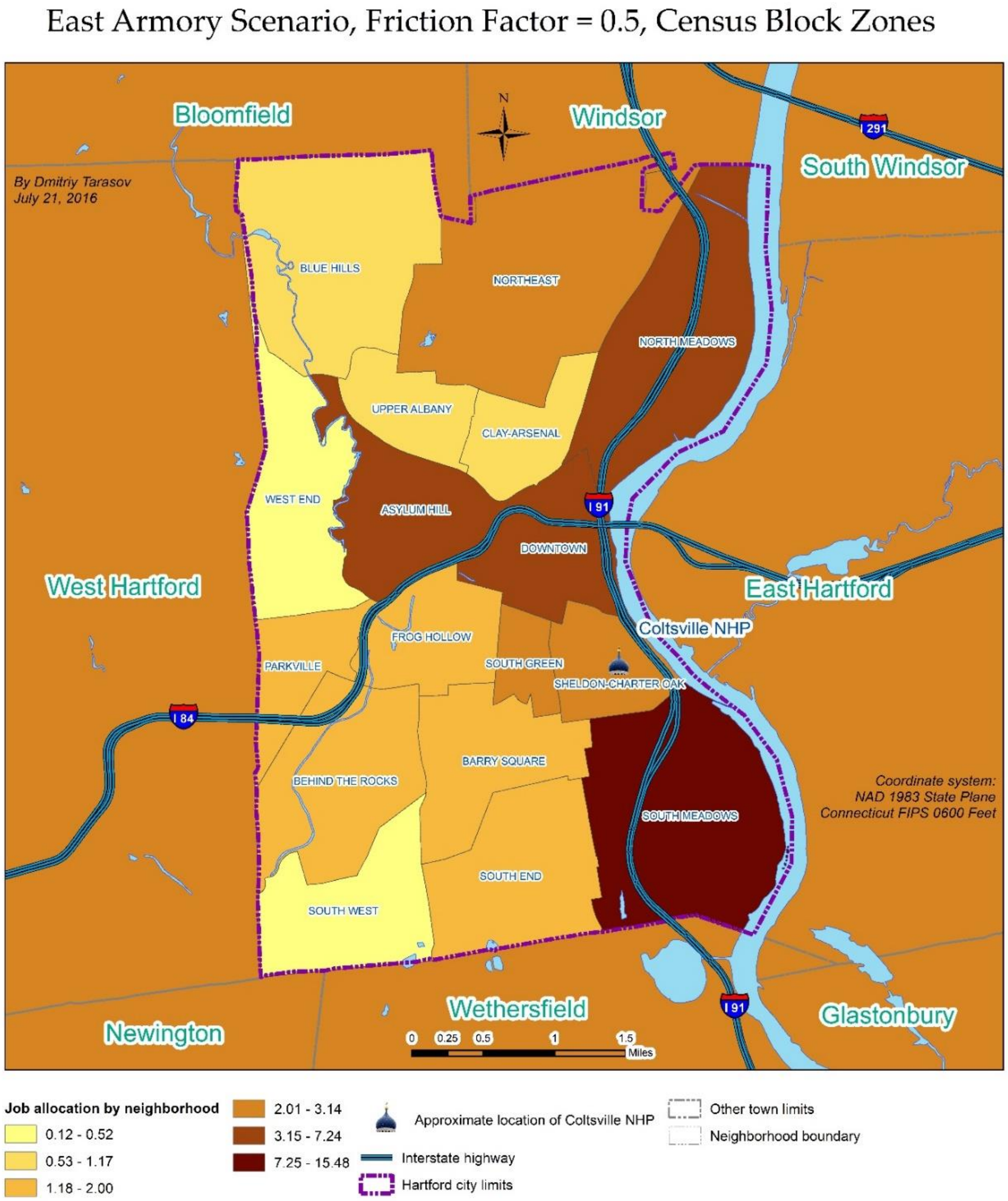

Figure 41. Job allocation under the East Armory scenario with a friction factor of 0.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

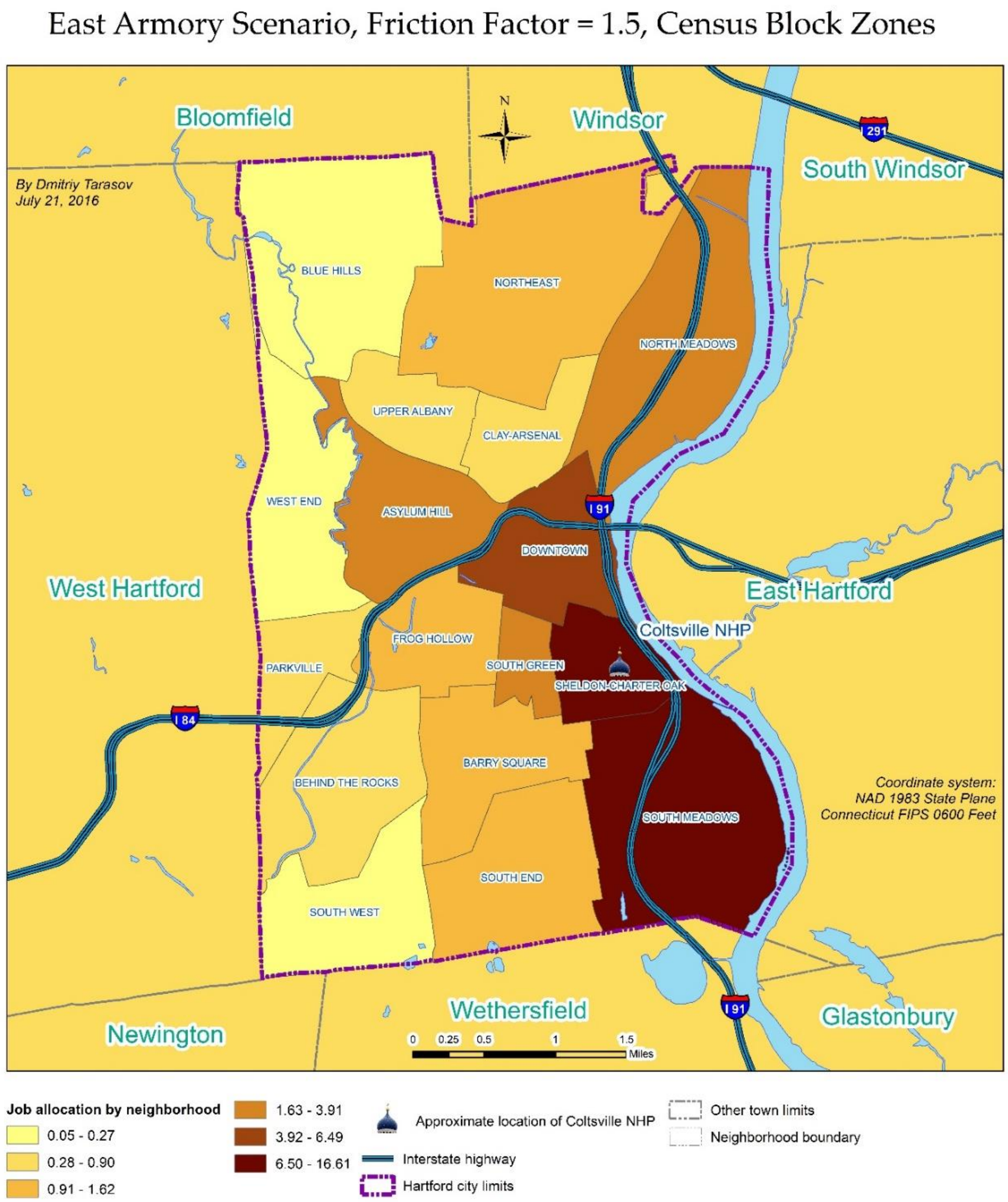

Figure 42. Job allocation under the East Armory scenario with a friction factor of 1.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

East Armory Scenario, Friction Factor = 2.5, Census Block Zones

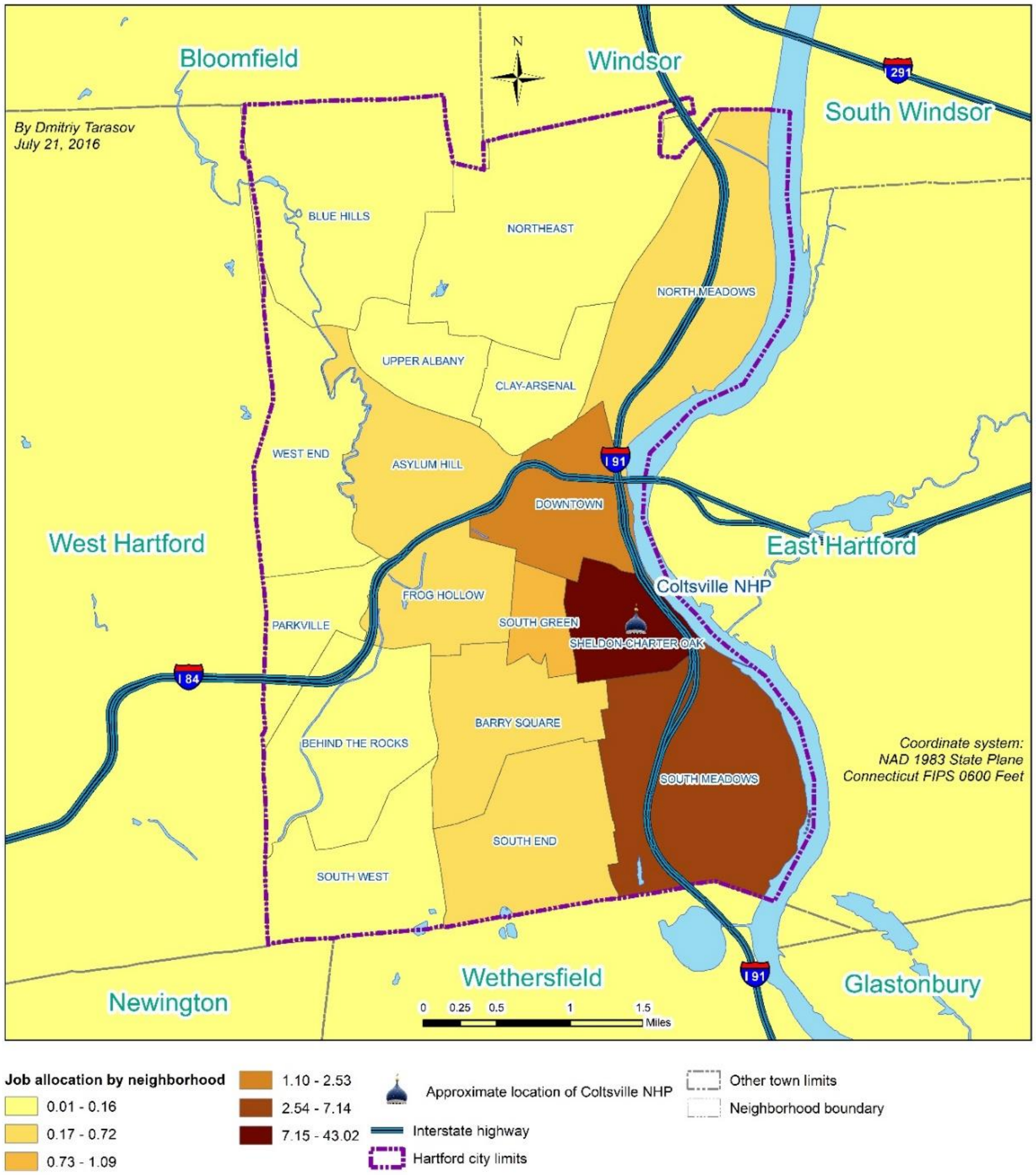

Figure 43. Job allocation under the East Armory scenario with a friction factor of 2.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

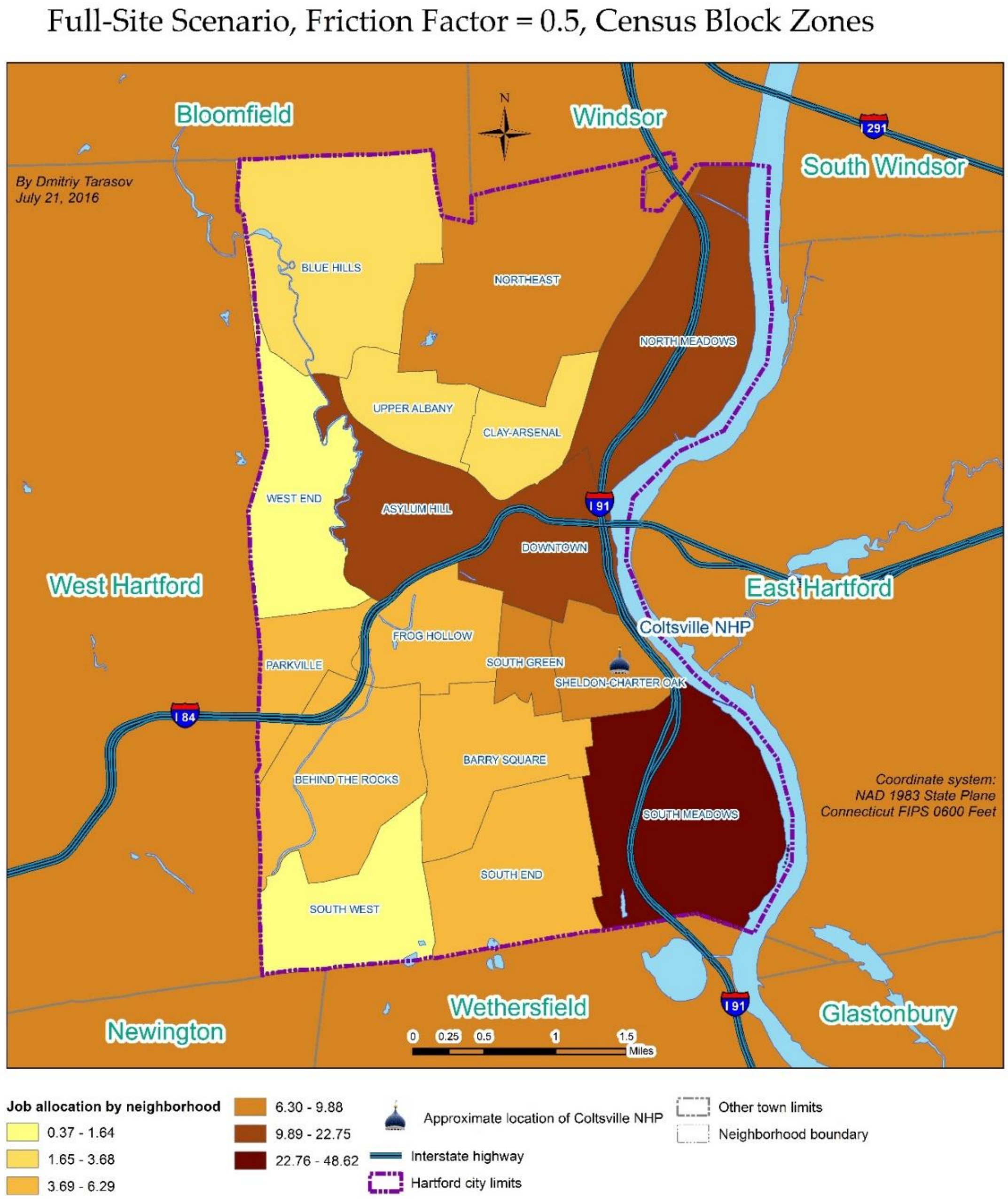

Figure 44. Job allocation under the Full Site scenario with a friction factor of 0.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

Full-Site Scenario, Friction Factor = 1.5, Census Block Zones

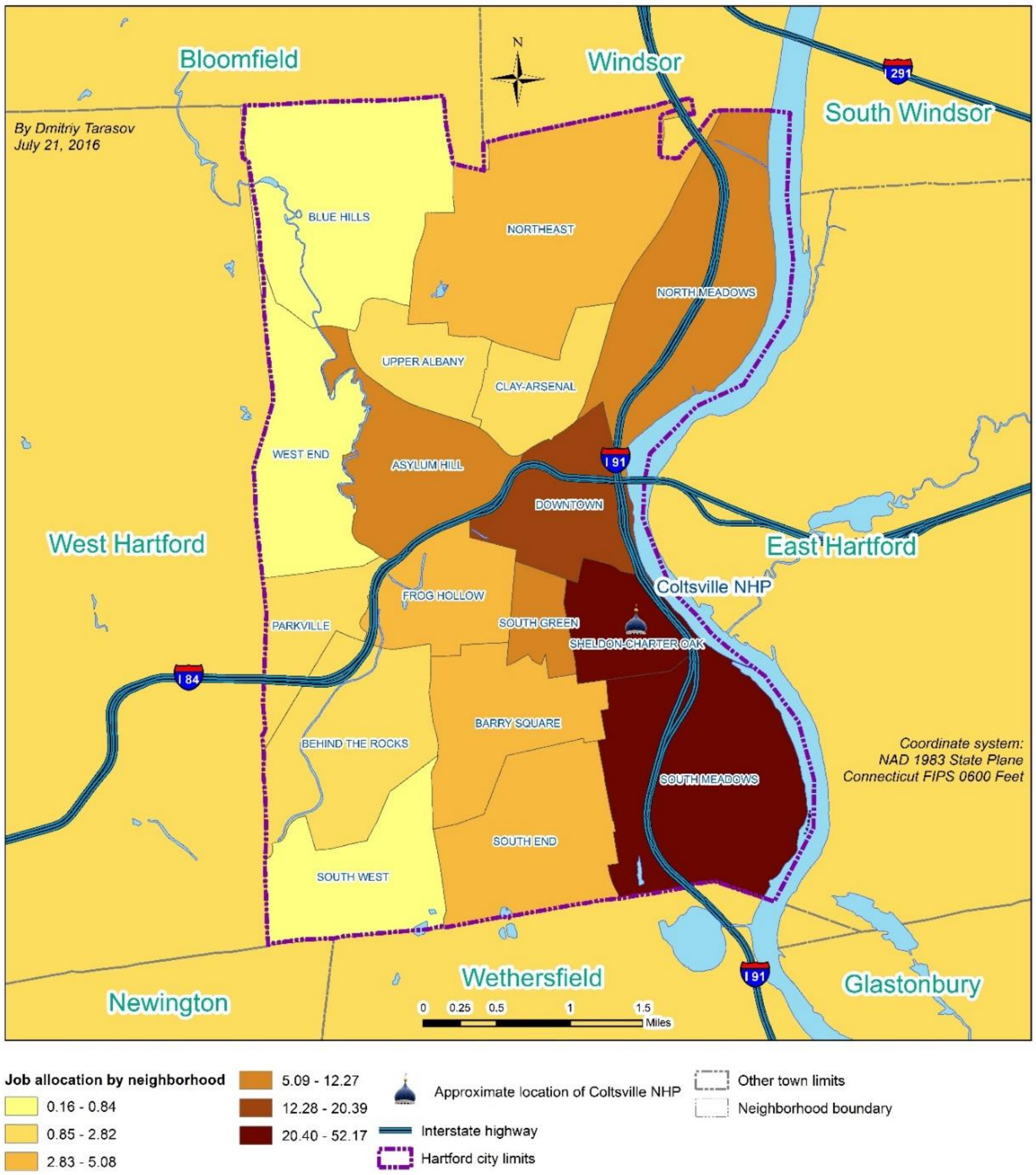

Figure 45. Job allocation under the Full Site scenario with a friction factor of 1.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

Full-Site Scenario, Friction Factor = 2.5, Census Block Zones

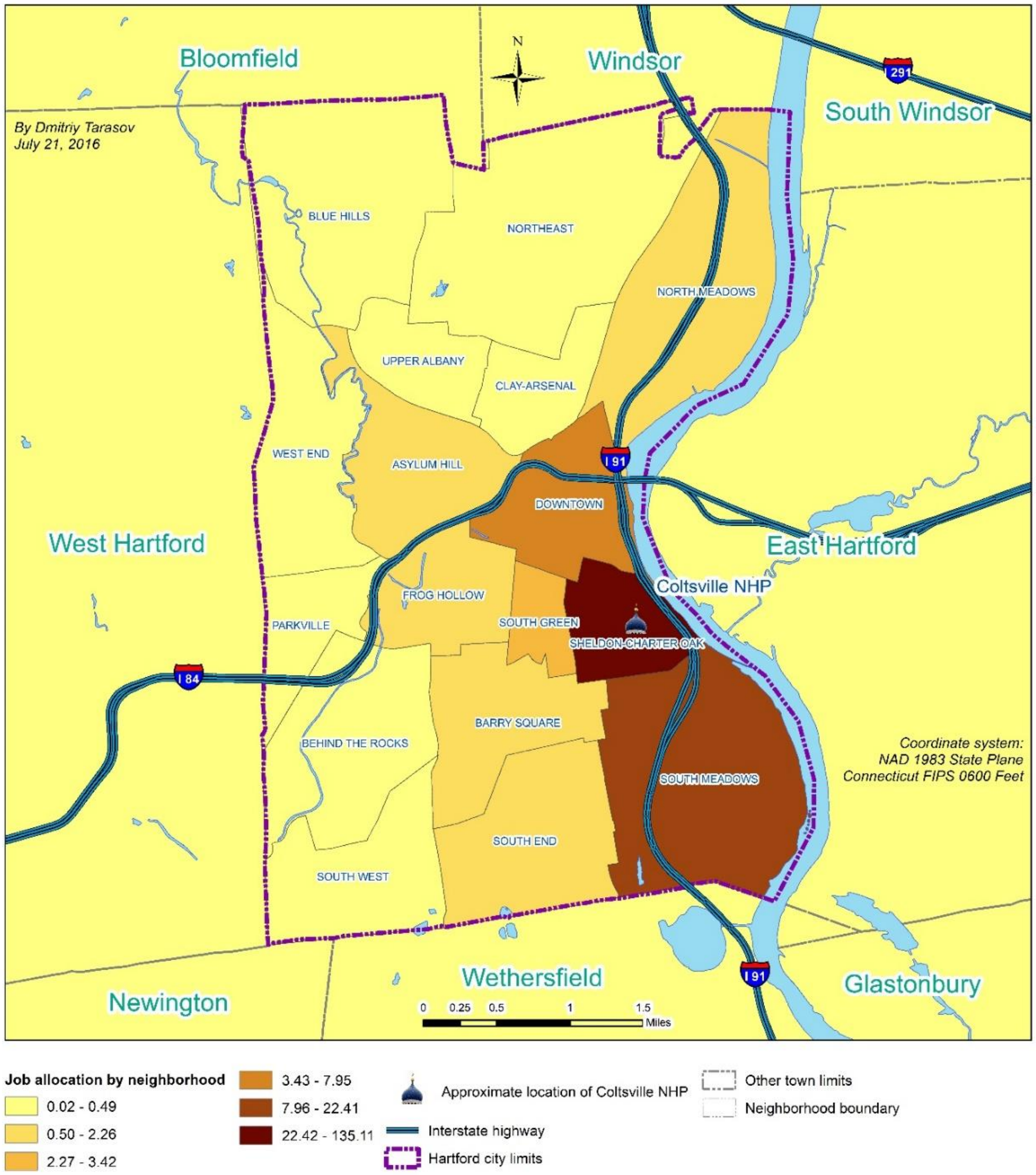

Figure 46. Job allocation under the Full Site scenario with a friction factor of 2.5, census block zones

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010b, 2012.

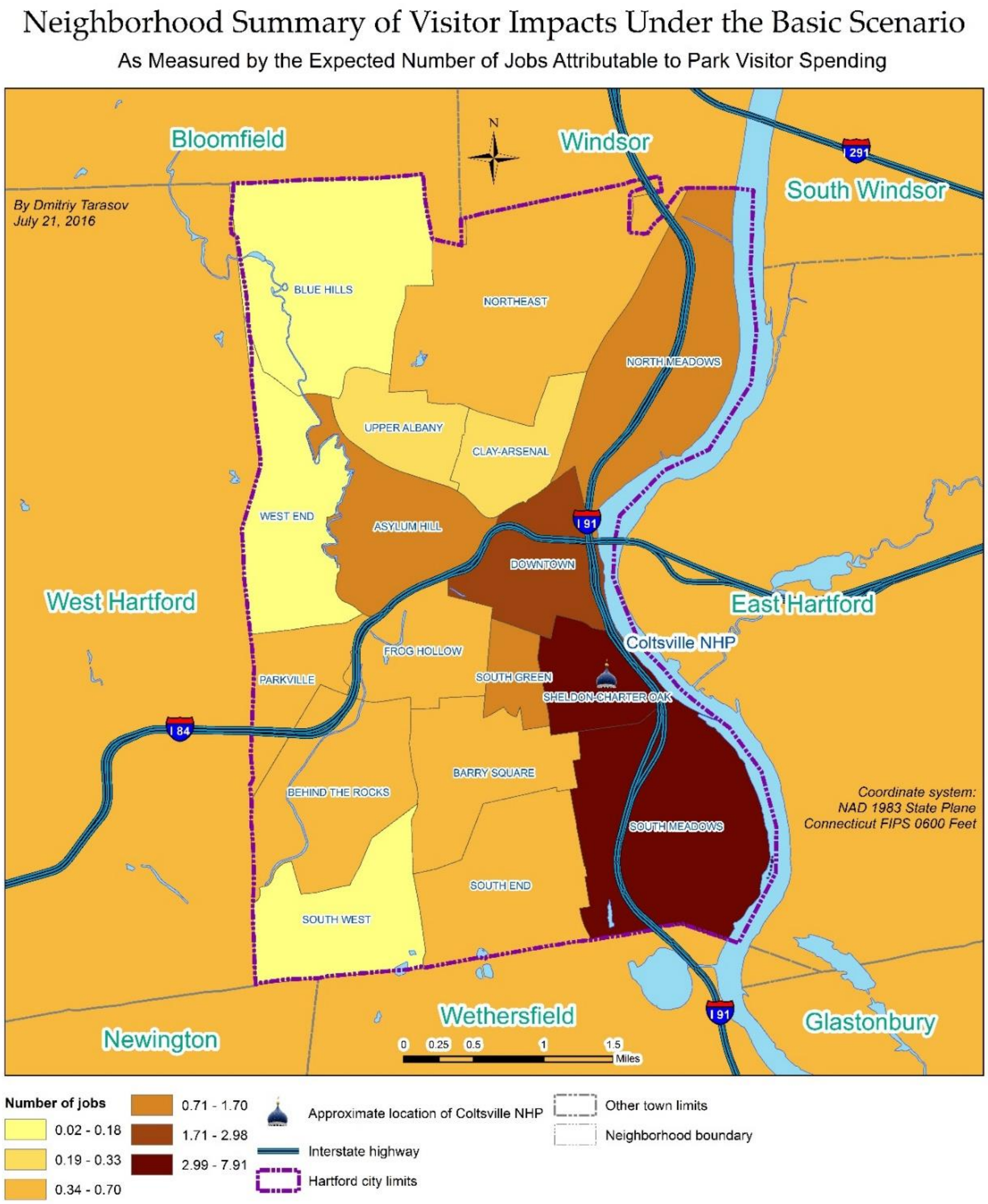

Figure 47. Job allocation under the Basic scenario, average of all settings.

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2010b, 2012.

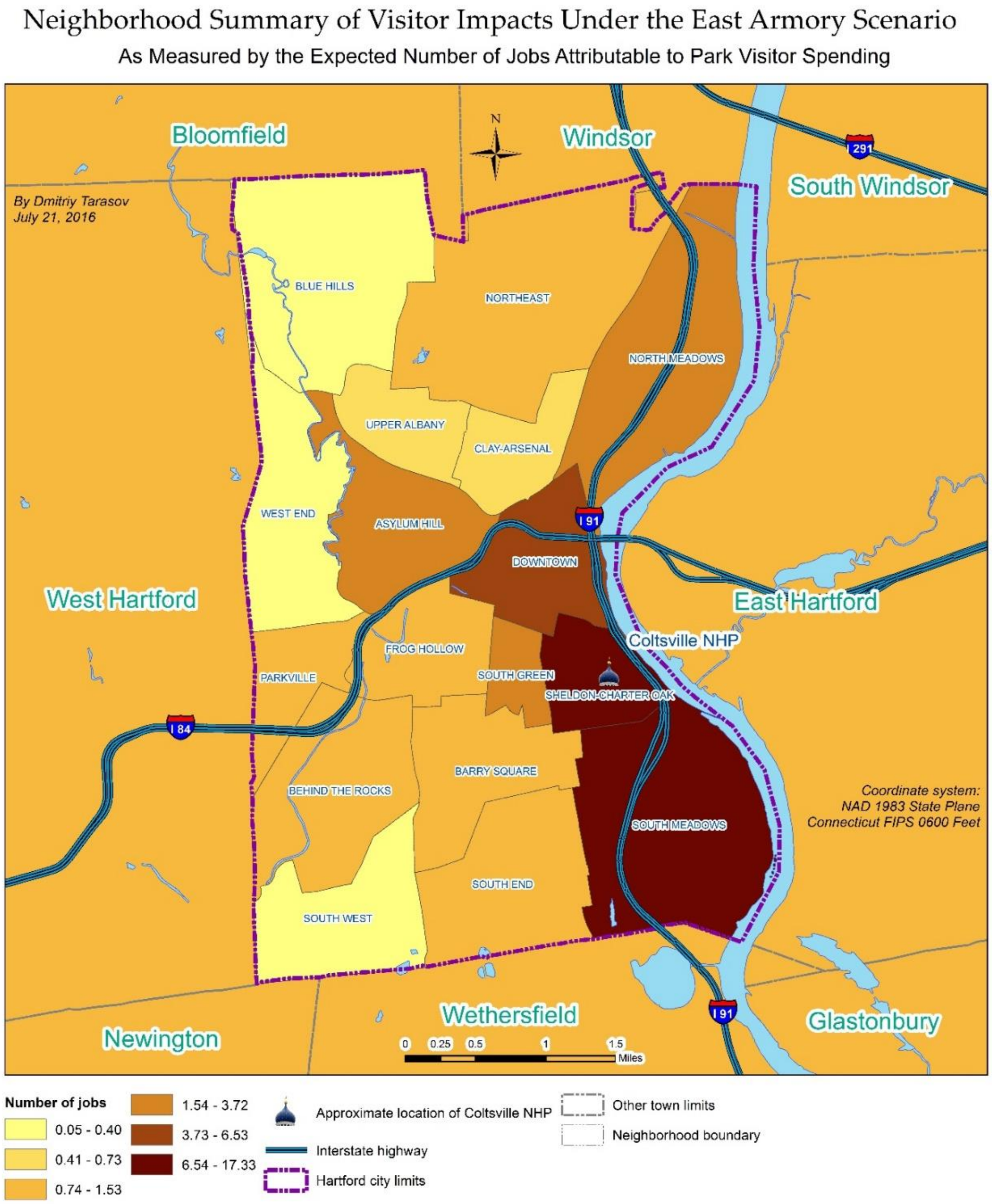

Figure 48. Job allocation under the East Armory scenario, average of all settings.

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2010b, 2012.

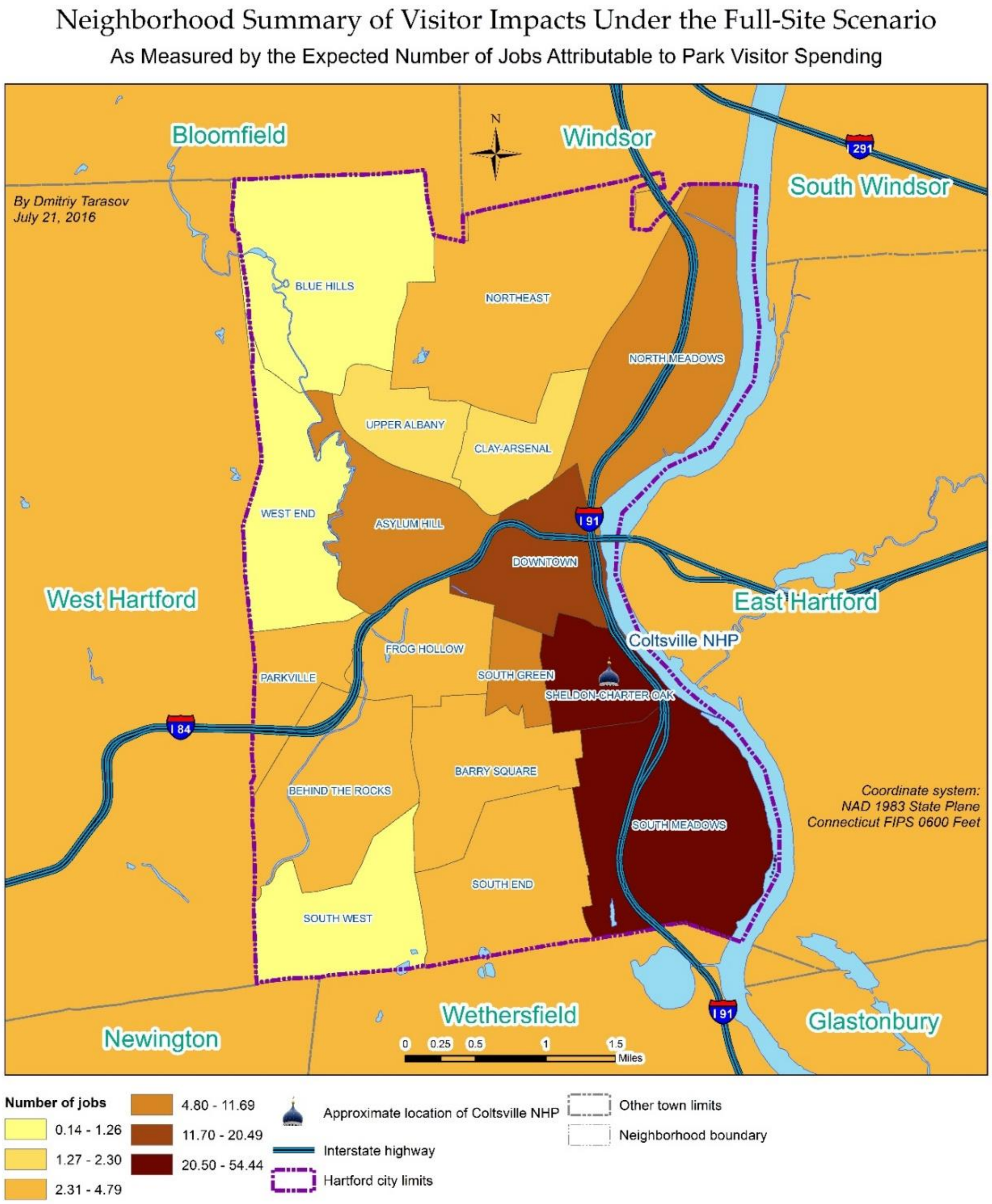

Figure 49. Job allocation under the Full Site scenario, average of all settings.

Sources: Data from Bogar 2012; Esri ArcGIS Content Team 2011; Flodine 2015a; Museum Insights et al. 2008, 8; US Census Bureau 2010a, 2010b, 2012.

Appendix C: Spatial Analysis Workflow as Python Script, Part 1

The first stage of my analysis involved finding the amount of suitably zoned land in each of the zones (census blocks or block groups) making up my study area. The steps needed for this procedure were modeled by means of the ModelBuilder visual programming language in ArcGIS, with the model's output a feature class of the various zones and their attractiveness to tourism-related development. The model, exported to a Python script, is shown below.

```
# -*- coding: utf-8 -*-
# ---------------------------------------------------------------------------
# ModelScript1.py
# Created on: 2016-08-23 16:49:23.00000
#   (generated by ArcGIS/ModelBuilder)
# Usage: ModelScript1 <Zoning> <Model_Tracts> <City_Limits> <Census_Block_Centroids>
# Description: The first of three parts of my geoprocessing workflow, this script determines,
# for each of my model's zones, the amount of land with a zoning type suitable for tourism-
related
# development.
# ---------------------------------------------------------------------------

# Set the necessary product code
# import arcinfo


# Import arcpy module
import arcpy

# Load required toolboxes
arcpy.ImportToolbox("Model Functions")

# Script arguments
Zoning = arcpy.GetParameterAsText(0)
if Zoning == '#' or not Zoning:
    Zoning = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\zoning" # provide a default
value if unspecified

Model_Tracts = arcpy.GetParameterAsText(1)
if Model_Tracts == '#' or not Model_Tracts:
```

```
    Model_Tracts = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\blocks" # provide a default
value if unspecified

City_Limits = arcpy.GetParameterAsText(2)
if City_Limits == '#' or not City_Limits:
    City_Limits = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\city_limits" # provide a
default value if unspecified

Census_Block_Centroids = arcpy.GetParameterAsText(3)
if Census_Block_Centroids == '#' or not Census_Block_Centroids:
    Census_Block_Centroids = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Census_Block_Centroids" # provide a default
value if unspecified

# Local variables:
Tracts_Backup = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Tracts_Backup"
Available_Land_by_Tract = Tracts_Backup
Suitable_Zoning = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Suitable_Zoning"
Overlay_of_Tracts_and_Zoning = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Tracts_and_Zoning_Overlay"
Suitable_Land_with_Tract_ID = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Tracts_and_Zoning_Suitable_Only"
Table_of_Available_Land = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Suitable_Land_by_Tract"
Tracts_with_Available_Land = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Tracts_with_Available_Land"
Tracts_with_Available_Land__1_ = Tracts_with_Available_Land
Population_Summarized = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Population_Summarized"
Population_Total = Population_Summarized
Suitable_Land_Summarized = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Available_Land_Summarized"
Suitable_Land_Total = Suitable_Land_Summarized
Tracts_with_Available_Land__2_ = Tracts_with_Available_Land__1_
Tracts_with_Available_Land__3_ = Tracts_with_Available_Land__2_
Tracts_with_Available_Land__4_ = Tracts_with_Available_Land__3_
Tracts_with_Available_Land__5_ = Tracts_with_Available_Land__4_
Tracts_with_Available_Land__6_ = Tracts_with_Available_Land__5_
Tracts_with_Available_Land__7_ = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land"
City_Centroid = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\City_Centroid"
City_Centroid_Buffer = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\City_Centroid_Buffer"
City_Limits_Backup = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\City_Limits_Backup"
Outer_Tract = "C:\\Users\\Dmitriy
```

```
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract"
Outer_Tract__1_ = Outer_Tract
Outer_Tract__2_ = Outer_Tract__1_
Outer_Tract__3_ = Outer_Tract__2_
Outer_Tract__4_ = Outer_Tract__3_
Outer_Tract__5_ = Outer_Tract__4_
Outer_Tract__6_ = Outer_Tract__5_
All_Tracts = "C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\All_Tracts"

# Set Geoprocessing environments
arcpy.env.XYResolution = "15 Feet"
arcpy.env.scratchWorkspace = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb"
arcpy.env.cartographicPartitions = ""
arcpy.env.randomGenerator = "0 ACM599"
arcpy.env.outputCoordinateSystem =
"PROJCS['NAD_1983_StatePlane_Connecticut_FIPS_0600_Feet',GEOGCS['GCS_North_Ame
rican_1983',DATUM['D_North_American_1983',SPHEROID['GRS_1980',6378137.0,298.25722
2101]],PRIMEM['Greenwich',0.0],UNIT['Degree',0.0174532925199433]],PROJECTION['Lambert
_Conformal_Conic'],PARAMETER['False_Easting',999999.999996],PARAMETER['False_Northi
ng',499999.999998],PARAMETER['Central_Meridian',-
72.75],PARAMETER['Standard_Parallel_1',41.2],PARAMETER['Standard_Parallel_2',41.86666
666666667],PARAMETER['Latitude_Of_Origin',40.83333333333334],UNIT['Foot_US',0.304800
6096012192]]"
arcpy.env.transferDomains = "false"
arcpy.env.snapRaster = ""
arcpy.env.cartographicCoordinateSystem = ""
arcpy.env.qualifiedFieldNames = "true"
arcpy.env.referenceScale = ""
arcpy.env.extent = "749397.062598884 563972.124988317 1251988.9999983
943113.312570557"
arcpy.env.XYTolerance = "4 Feet"
arcpy.env.geographicTransformations = ""
arcpy.env.workspace = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb"

# Process: Make copy of tracts
arcpy.CopyFeatures_management(Model_Tracts, Tracts_Backup, "", "0", "0", "0")

# Process: Select to find suitable zoning
arcpy.Select_analysis(Zoning, Suitable_Zoning, "LABEL = 'I-2' OR LABEL = 'C-1' OR LABEL =
'B-1' OR LABEL = 'B-2' OR LABEL = 'B-3' OR LABEL = 'B-4' OR LABEL = 'RO-1' OR LABEL =
'RO-2' OR LABEL = 'RO-3'")

# Process: Overlay tracts and zoning
arcpy.Union_analysis("'C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\blocks' #;'C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Suitable_Zoning' #",
Overlay_of_Tracts_and_Zoning, "ALL", "4 Feet", "GAPS")

# Process: Select to find parts of tracts on suitable land
```

```
arcpy.Select_analysis(Overlay_of_Tracts_and_Zoning, Suitable_Land_with_Tract_ID,
"FID_suitable_zoning > -1")

# Process: Summarize by model tract
arcpy.Statistics_analysis(Suitable_Land_with_Tract_ID, Table_of_Available_Land,
"Shape_Area SUM", "GEOID10")

# Process: Join summary back to tracts
arcpy.JoinField_management(Tracts_Backup, "GEOID10", Table_of_Available_Land,
"GEOID10", "GEOID10;SUM_Shape_Area")

# Process: Omit tracts with no suitable land
arcpy.Select_analysis(Available_Land_by_Tract, Tracts_with_Available_Land,
"SUM_Shape_Area IS NOT NULL")

# Process: Sum up population
arcpy.Statistics_analysis(Tracts_with_Available_Land, Population_Summarized, "P0010001
SUM", "")

# Process: Get population total
arcpy.GetFieldValue_mb(Population_Summarized, "SUM_P0010001", "Double", "0")

# Process: Sum up available land
arcpy.Statistics_analysis(Tracts_with_Available_Land, Suitable_Land_Summarized,
"SUM_Shape_Area SUM", "")

# Process: Get available land total
arcpy.GetFieldValue_mb(Suitable_Land_Summarized, "SUM_SUM_Shape_Area", "Double",
"0")

# Process: Add field to hold tract ID
arcpy.AddField_management(Tracts_with_Available_Land, "TRACT_ID", "SHORT", "", "0", "",
"", "NULLABLE", "NON_REQUIRED", "")

# Process: Add clearer name for available land
arcpy.AddField_management(Tracts_with_Available_Land__1_, "AVAILABLE_LAND",
"DOUBLE", "", "", "", "", "NULLABLE", "NON_REQUIRED", "")

# Process: Add clearer name for population field
arcpy.AddField_management(Tracts_with_Available_Land__2_, "POPULATION", "LONG", "",
"", "", "", "NULLABLE", "NON_REQUIRED", "")

# Process: Calculate tract ID field
arcpy.CalculateField_management(Tracts_with_Available_Land__3_, "TRACT_ID",
"autoIncrement()", "PYTHON", "rec=0\\ndef autoIncrement():\\n global rec\\n pStart = 5001
#adjust start value, if req'd \\n pInterval = 1 #adjust interval value, if req'd\\n if (rec == 0): \\n  rec
= pStart \\n else: \\n  rec = rec + pInterval \\n return rec\\n")

# Process: Calculate population field
arcpy.CalculateField_management(Tracts_with_Available_Land__4_, "POPULATION",
"[P0010001]", "VB", "")
```

```
# Process: Calculate available land field
arcpy.CalculateField_management(Tracts_with_Available_Land__5_, "AVAILABLE_LAND",
"[SUM_Shape_Area]", "VB", "")

# Process: Omit tracts with no dry land
arcpy.Select_analysis(Tracts_with_Available_Land__6_, Tracts_with_Available_Land__7_,
"ALAND10 >  0")

# Process: Compute city centroid
arcpy.FeatureToPoint_management(City_Limits, City_Centroid, "INSIDE")

# Process: Buffer
arcpy.Buffer_analysis(City_Centroid, City_Centroid_Buffer, "6 Miles", "FULL", "ROUND",
"NONE", "", "PLANAR")

# Process: Make copy of city limits
arcpy.CopyFeatures_management(City_Limits, City_Limits_Backup, "", "0", "0", "0")

# Process: Erase
arcpy.Erase_analysis(City_Centroid_Buffer, City_Limits_Backup, Outer_Tract, "4 Feet")

# Process: Add field to hold tract ID (1)
arcpy.AddField_management(Outer_Tract, "TRACT_ID", "SHORT", "", "", "", "", "NULLABLE",
"NON_REQUIRED", "")

# Process: Add clearer name for available land (1)
arcpy.AddField_management(Outer_Tract__1_, "AVAILABLE_LAND", "DOUBLE", "", "", "", "",
"NULLABLE", "NON_REQUIRED", "")

# Process: Add clearer name for population field (1)
arcpy.AddField_management(Outer_Tract__2_, "POPULATION", "LONG", "", "", "", "",
"NULLABLE", "NON_REQUIRED", "")

# Process: Calculate tract ID field (1)
arcpy.CalculateField_management(Outer_Tract__3_, "TRACT_ID", "5000", "VB", "")

# Process: Calculate population field (1)
arcpy.CalculateField_management(Outer_Tract__4_, "POPULATION", "%Population Total% /
10", "PYTHON_9.3", "")

# Process: Calculate available land field (1)
arcpy.CalculateField_management(Outer_Tract__5_, "AVAILABLE_LAND", "%Suitable Land
Total% / 10", "PYTHON_9.3", "")

# Process: Merge
arcpy.Merge_management("'C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land';'C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract'", All_Tracts, "GEOID10
\"GEOID10\" true true false 15 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,GEOID10,-1,-1,C:\\Users\\Dmitriy
```

Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,GEOID10,-1,-1;ALAND10 \"ALAND10\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,ALAND10,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,ALAND10,-1,-1;AWATER10 \"AWATER10\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,AWATER10,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,AWATER10,-1,-1;Shape_Length \"Shape_Length\" true true true 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,Shape_Length,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,Shape_length,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,Shape_Length,-1,-1;Shape_Area \"Shape_Area\" true true true 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,Shape_Area,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,Shape_area,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,Shape_Area,-1,-1;TRACT_ID \"TRACT_ID\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,TRACT_ID,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,TRACT_ID,-1,-1;AVAILABLE_LAND \"AVAILABLE_LAND\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,AVAILABLE_LAND,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,AVAILABLE_LAND,-1,-1;POPULATION \"POPULATION\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,POPULATION,-1,-1,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,POPULATION,-1,-1;P0010001 \"P0010001\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,P0010001,-1,-1;GEOID10_1 \"GEOID10_1\" true true false 15 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,GEOID10_1,-1,-1;SUM_Shape_Area \"SUM_Shape_Area\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Dry_Land,SUM_Shape_Area,-1,-1;STATEFP10 \"STATEFP10\" true true false 2 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,STATEFP10,-1,-1;COUNTYFP10 \"COUNTYFP10\" true true false 3 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,COUNTYFP10,-1,-1;COUSUBFP10 \"COUSUBFP10\" true true false 5 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,COUSUBFP10,-1,-1;COUSUBNS10 \"COUSUBNS10\" true true false 8 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,COUSUBNS10,-1,-1;NAME10 \"NAME10\" true true false 100 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,NAME10,-1,-1;NAMELSAD10 \"NAMELSAD10\" true true false 100 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,NAMELSAD10,-1,-1;LSAD10 \"LSAD10\" true true false 2 Text 0 0 ,First,#,C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,LSAD10,-1,-1;CLASSFP10

```
\"CLASSFP10\" true true false 2 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,CLASSFP10,-1,-1;MTFCC10
\"MTFCC10\" true true false 5 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,MTFCC10,-1,-1;CNECTAFP10
\"CNECTAFP10\" true true false 3 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,CNECTAFP10,-1,-
1;NECTAFP10 \"NECTAFP10\" true true false 5 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,NECTAFP10,-1,-
1;NCTADVFP10 \"NCTADVFP10\" true true false 5 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,NCTADVFP10,-1,-
1;FUNCSTAT10 \"FUNCSTAT10\" true true false 1 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,FUNCSTAT10,-1,-
1;INTPTLAT10 \"INTPTLAT10\" true true false 11 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,INTPTLAT10,-1,-1;INTPTLON10
\"INTPTLON10\" true true false 12 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,INTPTLON10,-1,-
1;GEOID_AFF2 \"GEOID_AFF2\" true true false 254 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,GEOID_AFF2,-1,-
1;GEOID_AFF1 \"GEOID_AFF1\" true true false 254 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,GEOID_AFF1,-1,-1;ORIG_FID
\"ORIG_FID\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,ORIG_FID,-1,-1;BUFF_DIST
\"BUFF_DIST\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Outer_Tract,BUFF_DIST,-1,-1")

# Process: Feature To Point
arcpy.FeatureToPoint_management(All_Tracts, Census_Block_Centroids, "INSIDE")
```

Appendix D: Spatial Analysis Workflow as Python Script, Part 2

The second stage of my analysis involved determining each zone's accessibility to Coltsville NHP in terms of travel time, measured in minutes. To find the travel time, a model was constructed in ModelBuilder, with the first stage of my analysis (see appendix C) a submodel of it. The output of this model contains all the variables necessary for job allocation to the various zones by means of a gravity model. After the model is run, its output is exported to a MS Excel spreadsheet and thence to a SAS 9.4 dataset for the actual allocation. Below is the model exported to a Python script.

```
# -*- coding: utf-8 -*-
# ---------------------------------------------------------------------------
# ModelScript2.py
# Created on: 2016-08-23 16:54:36.00000
#   (generated by ArcGIS/ModelBuilder)
# Usage: ModelScript2 <Street_Network> <Scratch_gdb> <Colt_Centroid>
# Description: The second of the three parts of my workflow, this script determines, by
# means of ArcGIS's Find Closest Facility tool, the driving time, in minutes, from each zone
(census
# block or block group) in my analysis to the Coltsville NHP. The output of this model is
exported to
# a MS Excel spreadsheet and thence to SAS 9.4 to perform the actual allocation of thte
expected
# service-sector jobs.
# ---------------------------------------------------------------------------

# Set the necessary product code
# import arcinfo


# Import arcpy module
import arcpy

# Load required toolboxes
arcpy.ImportToolbox("C:/Users/Dmitriy Tarasov/Desktop/Thesis/Geodata/BlockProcess.tbx")

# Script arguments
Street_Network = arcpy.GetParameterAsText(0)
```

```
if Street_Network == '#' or not Street_Network:
    Street_Network = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Transport\\Street_ND" # provide a
default value if unspecified

Scratch_gdb = arcpy.GetParameterAsText(1)
if Scratch_gdb == '#' or not Scratch_gdb:
    Scratch_gdb = "C:\\Users\\Dmitriy Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb" #
provide a default value if unspecified

Colt_Centroid = arcpy.GetParameterAsText(2)
if Colt_Centroid == '#' or not Colt_Centroid:
    Colt_Centroid = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\colt_centroid" # provide a
default value if unspecified

# Local variables:
Routes = Colt_Centroid
Directions = Colt_Centroid
Closest_Facilities = Colt_Centroid
Zoning = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\zoning"
Census_Blocks = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\blocks"
City_Limits = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\CityLayout\\city_limits"
Census_Block_Centroids = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Census_Blockl_Centroids"
Point_Barriers = "in_memory\\{3DE6720D-78E9-4A31-B52C-0C6C8FA89462}"
Line_Barriers = "in_memory\\{CDCAEEC1-7F7B-4351-ADD1-141A8A471BA6}"
Polygon_Barriers = "in_memory\\{5BD18927-6E1C-4399-A591-B96EC18E06C4}"
Attribute_Parameter_Values = "in_memory\\{E265F6ED-34FA-4780-83C3-18CC79BD9BE6}"
Solve_Succeeded = "true"
Closest_Facilities__1_ = Closest_Facilities
Closest_Facilities__2_ = Closest_Facilities__1_
Closest_Facilities__3_ = Closest_Facilities__2_
Closest_Facilities__4_ = Closest_Facilities__3_
Census_Blocks_xls = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\ToSAS\\Census_Blocks.xls"

# Set Geoprocessing environments
arcpy.env.XYResolution = "15 Feet"
arcpy.env.scratchWorkspace = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb"
arcpy.env.cartographicPartitions = ""
arcpy.env.randomGenerator = "0 ACM599"
arcpy.env.outputCoordinateSystem =
"PROJCS['NAD_1983_StatePlane_Connecticut_FIPS_0600_Feet',GEOGCS['GCS_North_Ame
rican_1983',DATUM['D_North_American_1983',SPHEROID['GRS_1980',6378137.0,298.25722
2101]],PRIMEM['Greenwich',0.0],UNIT['Degree',0.0174532925199433]],PROJECTION['Lambert
_Conformal_Conic'],PARAMETER['False_Easting',999999.999996],PARAMETER['False_Northi
```

```
ng',499999.999998],PARAMETER['Central_Meridian',-
72.75],PARAMETER['Standard_Parallel_1',41.2],PARAMETER['Standard_Parallel_2',41.86666
666666667],PARAMETER['Latitude_Of_Origin',40.83333333333334],UNIT['Foot_US',0.304800
6096012192]]"
arcpy.env.transferDomains = "false"
arcpy.env.snapRaster = ""
arcpy.env.cartographicCoordinateSystem = ""
arcpy.env.qualifiedFieldNames = "true"
arcpy.env.referenceScale = ""
arcpy.env.extent = "749397.062598884 563972.124988317 1251988.9999983
943113.312570557"
arcpy.env.XYTolerance = "4 Feet"
arcpy.env.geographicTransformations = ""
arcpy.env.workspace = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb"

# Process: Part1
arcpy.gp.toolbox = "C:/Users/Dmitriy Tarasov/Desktop/Thesis/Geodata/BlockProcess.tbx";
# Warning: the toolbox C:/Users/Dmitriy Tarasov/Desktop/Thesis/Geodata/BlockProcess.tbx
DOES NOT have an alias.
# Please assign this toolbox an alias to avoid tool name collisions
# And replace arcpy.gp.Model22(...) with arcpy.Model22_ALIAS(...)
arcpy.gp.Model22(Zoning, Census_Blocks, City_Limits, Census_Block_Centroids)

# Process: Find Closest Facilities
arcpy.FindClosestFacilities_na(Colt_Centroid, Census_Block_Centroids, "Minutes",
Street_Network, Scratch_gdb, "Routes", "Directions", "Blocks_as_Facilities", "556", "",
"TRAVEL_TO", "", "NOT_USED", "GEO_LOCAL", "ALLOW_UTURNS", Point_Barriers,
Line_Barriers, Polygon_Barriers, "Minutes", "Minutes", "Length", "Feet", "NO_HIERARCHY",
"Oneway", Attribute_Parameter_Values, "", "20 Kilometers", "\"streets\"
#;\"Street_ND_Junctions\" #", "TRUE_LINES_WITH_MEASURES", "10 Meters",
"NO_DIRECTIONS", "en", "Miles", "NA Desktop", "", "", "", "", "", "", "",
"NO_SAVE_OUTPUT_LAYER", "CUSTOM")

# Process: Join Field
arcpy.JoinField_management(Closest_Facilities, "ORIG_FID", Routes, "FacilityOID",
"Total_Minutes")

# Process: Delete Field
arcpy.DeleteField_management(Closest_Facilities__1_,
"GEOID10;ALAND10;AWATER10;P0010001;GEOID10_1;SUM_Shape_Area;STATEFP10;CO
UNTYFP10;COUSUBFP10;COUSUBNS10;NAME10;NAMELSAD10;LSAD10;CLASSFP10;MT
FCC10;CNECTAFP10;NECTAFP10;NCTADVFP10;FUNCSTAT10;INTPTLAT10;INTPTLON10;
GEOID_AFF2;GEOID_AFF1;ORIG_FID;BUFF_DIST;ORIG_FID_1")

# Process: Add attraction field
arcpy.AddField_management(Closest_Facilities__2_, "ATTRACTION", "DOUBLE", "", "", "", "",
"NULLABLE", "NON_REQUIRED", "")

# Process: Calculate Field
arcpy.CalculateField_management(Closest_Facilities__3_, "ATTRACTION", "(
```

```
!AVAILABLE_LAND! * 2.5 + !POPULATION!) / 3.5", "PYTHON", "")

# Process: Table To Excel
arcpy.TableToExcel_conversion(Closest_Facilities__4_, Census_Blocks_xls, "NAME", "CODE")
```

Appendix E: Spatial Analysis Workflow as Python script, Part 3

The SAS script for allocating jobs to my study area's various zones exports its results as a MS Excel spreadsheet. The following model, here exported to a Python script, takes the spreadsheet as an input and imports it to an ArcGIS table, which is then joined to a feature class representing the study area zones (census blocks in this example) and the job numbers are summarized by Hartford neighborhood.

```
# -*- coding: utf-8 -*-
# ---------------------------------------------------------------------------
# ModelScript3.py
# Created on: 2016-08-23 16:56:13.00000
#   (generated by ArcGIS/ModelBuilder)
# Usage: ModelScript3 <Excel_Spreadsheet> <Neighborhoods_Backup> <Census_Blocks_as_Facilities>
# Description: The third and final part of my analysis, the following script is run once the job
# allocation has been carried out. This submodel summarizes my findings by Hartford neighborhood
# polygon.
# ---------------------------------------------------------------------------

# Import arcpy module
import arcpy

# Script arguments
Excel_Spreadsheet = arcpy.GetParameterAsText(0)
if Excel_Spreadsheet == '#' or not Excel_Spreadsheet:
    Excel_Spreadsheet = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\FromSAS\\B_Group_Min_05.xlsx" # provide a default value if
unspecified

Neighborhoods_Backup = arcpy.GetParameterAsText(1)
if Neighborhoods_Backup == '#' or not Neighborhoods_Backup:
    Neighborhoods_Backup = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\AllocationResults.mdb\\Neighborhoods_BG05Min" # provide a
default value if unspecified

Census_Blocks_as_Facilities = arcpy.GetParameterAsText(2)
if Census_Blocks_as_Facilities == '#' or not Census_Blocks_as_Facilities:
    Census_Blocks_as_Facilities = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Blocks_as_Facilities" # provide a default value if
```

```
unspecified

# Local variables:
Neighborhoods = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t"
Final_Result = Neighborhoods_Backup
Block_group_centroids = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Centroids_Final"
Jobs_by_Tract = Block_group_centroids
Table_of_results = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\AllocationResults.mdb\\Visitor_Impact"
Tracts_and_Neighborhoods = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Tracts_and_Neighborhoods"
Neighborhood_Summary = "C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\Neighborhood_Summary"

# Process: Copy Features (2)
arcpy.CopyFeatures_management(Neighborhoods, Neighborhoods_Backup, "", "0", "0", "0")

# Process: Copy Features
arcpy.CopyFeatures_management(Census_Blocks_as_Facilities, Block_group_centroids, "", "0", "0", "0")

# Process: Excel To Table
arcpy.ExcelToTable_conversion(Excel_Spreadsheet, Table_of_results, "")

# Process: Join Field
arcpy.JoinField_management(Block_group_centroids, "TRACT_ID", Table_of_results, "TRACT", "JOBS")

# Process: Spatial Join
arcpy.SpatialJoin_analysis(Neighborhoods, Jobs_by_Tract, Tracts_and_Neighborhoods,
"JOIN_ONE_TO_MANY", "KEEP_ALL", "OBJECTID \"OBJECTID\" true true false 4 Long 0 0
,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,OBJECTID,-1,-1;HPD_NH_ID \"HPD_NH_ID\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,HPD_NH_ID,-1,-1;ID \"ID\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,ID,-1,-1;MAPNUM \"MAPNUM\" true true false 80 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,MAPNUM,-1,-1;NAME \"NAME\" true true false 80 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,NAME,-1,-1;GlobalID \"GlobalID\" true true false 80 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,GlobalID,-1,-1;Shapearea \"Shapearea\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,Shapearea,-1,-1;Shapelen \"Shapelen\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
```

```
t,Shapelen,-1,-1;GEOID10 \"GEOID10\" true true false 10 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,GEOID10,-1,-1;NAME10 \"NAME10\" true true false 100 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,NAME10,-1,-1;ALAND10 \"ALAND10\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,ALAND10,-1,-1;AWATER10 \"AWATER10\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,AWATER10,-1,-1;GEOID_AFF2 \"GEOID_AFF2\" true true false 254 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,GEOID_AFF2,-1,-1;GEOID_AFF1 \"GEOID_AFF1\" true true false 254 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,GEOID_AFF1,-1,-1;ORIG_FID \"ORIG_FID\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,ORIG_FID,-1,-1;BUFF_DIST \"BUFF_DIST\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,BUFF_DIST,-1,-1;New_Name \"New_Name\" true true false 50 Text 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,New_Name,-1,-1;Shape_Length \"Shape_Length\" false true true 8 Double 0 0
,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,Shape_Length,-1,-1;Shape_Area \"Shape_Area\" false true true 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\HartfordData.gdb\\Presentation\\neighborhoods_and_outer_trac
t,Shape_Area,-1,-1;TRACT_ID \"TRACT_ID\" true true false 2 Short 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\BG_Basic_05,TRACT_ID,-1,-1;AVAILABLE_LAND
\"AVAILABLE_LAND\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\BG_Basic_05,AVAILABLE_LAND,-1,-1;POPULATION
\"POPULATION\" true true false 4 Long 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\BG_Basic_05,POPULATION,-1,-1;Total_Minutes
\"Total_Minutes\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\BG_Basic_05,Total_Minutes,-1,-1;ATTRACTION
\"ATTRACTION\" true true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\BG_Basic_05,ATTRACTION,-1,-1;JOBS \"JOBS\" true
true false 8 Double 0 0 ,First,#,C:\\Users\\Dmitriy
Tarasov\\Desktop\\Thesis\\Geodata\\Scratch.gdb\\BG_Basic_05,JOBS,-1,-1", "INTERSECT", "", "")

# Process: Summary Statistics
arcpy.Statistics_analysis(Tracts_and_Neighborhoods, Neighborhood_Summary, "JOBS SUM",
"MAPNUM")

# Process: Join Field (2)
arcpy.JoinField_management(Neighborhoods_Backup, "MAPNUM", Neighborhood_Summary,
"MAPNUM", "")
```

Appendix F: SAS Script

The following script was used to determine allocation among Hartford's census blocks or block groups of service-sector jobs supported by the spending of visitors to Coltsville National Historical Park. Inputs to the model are a SAS dataset called Zones, containing the values for each zone's attractiveness to development and travel time, in minutes, to Coltsville NHP; a friction coefficient; and the expected number of jobs to be allocated.

```
proc iml;

friction = 2.5; *Friction coefficient or when traveling from a model tract to Coltsville NHP;

Basic = 26;
EastArmory = 57;
FullSite = 179;

impact = FullSite; *Expected number of jobs (26, 57, or 179 under the Basic, East Armory, and Full Site
scenario, respectively);

use sasdata.census_blocks; * Block groups data set;
read all var _ALL_ into zones[colname = varNames]; * Read all contents of data set into matrix called
zones;
close sasdata.census_blocks;

minutes = zones[, 5];
step1 = minutes ## friction; *Raise minutes, elementwise, to the power of the friction coefficient;
step2 = step1 ## -1; *Find the reciprocal of step 1;
step3 = sum(step2);
step4 = step2 / step3; *Scaling factor;
attraction = zones[, 6]; *attraction = attractiveness of a zone to development;
step5 = step4 # attraction; *Multiply each zone's accessibility by that zone's attraction;
step6 = step5 * impact; *Total impact (unconstrained);
step7 = sum(step6);
step8 = step6 / step7; *This and above: find each zone's share of total impact;
step9 = step8 * impact;

tractID = zones[, 2];

names = {Jobs, Tract};
result = j(nrow(zones), 2, 0);

result[, 1] = step9;
result[, 2] = tractID;
```

```
create sasdata.C_Block_Max_25 from result[colname = names]; *modify output name here;
append from result;
close sasdata.C_Block_Max_25; *modify output name here;
quit;

proc summary data = sasdata.C_Block_Max_25 sum print; *modify output name here;
var Jobs; * checks to see if the script works properly by ensuring that the number of jobs allocated
matches the model's input;
run;

*export the output to an Excel spreadsheet;
proc export
data = sasdata.C_Block_Max_25
dbms = xlsx
outfile = "P:\Statistics\FromSAS\C_Block_Max_25.xlsx"
replace;
run;
```

References

Bogar, James. 2012. “Connecticut Named Waterbody Polygon.” 2005 ed. Data file. Hartford, CT: Connecticut Department of Energy and Environmental Protection. Accessed September 28, 2015. http://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&deepNav_GID=#Hydrography.

Chadwick, George F. 1971. A Systems View of Planning: Towards a Theory of the Urban and Regional Planning Process. 1st ed. New York, Oxford: Pergamon Press.

City of Hartford. Planning and Zoning Commission. 2015. “Zoning Regulations.” Hartford, CT: City of Hartford. Accessed September 27, 2015. http://www.hartford.gov/images/Planning/Zoning_Regulations_041515.pdf.

City of Hartford Planning Staff and the Commission on the City Plan. 2000. “Three Proposed Ordinances Establishing Industrial Re-use Overlay Districts (IROD) in the Coltsville area.” December 5. E-mail. Archives of the City of Hartford Planning Division, Hartford, CT. Accessed November 25, 2014.

Clark, Terry Nichols, Richard Lloyd, Kenneth K. Wong, and Pushpam Jain. 2002. "Amenities Drive Urban Growth." *Journal of Urban Affairs* 24, no. 5: 493-515. Accessed November 12, 2015. http://ezproxy.lib.uconn.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=8738538&site=ehost-live&scope=site.

Coakley, Tom. 1995. “In Connecticut, a Center of Poverty.” *Boston Globe*, March 19, City Edition, sec. METRO/REGION. Accessed October 30, 2014. Factiva.

Cohen, Jeffrey B. 2006. “Landmark Will Get Second Look: U.S. To Reconsider Colt Factory’s Status.” *Hartford Courant*, December 16. Accessed October 6, 2014. Factiva.

Condon, Tom. 2002. “Blues Under the Dome.” *Hartford Courant*, January 27. Accessed November 14, 2014. http://articles.courant.com/2002-01-27/news/0201270036_1_armory-state-ethics-commission-restored.

Connecticut Department of Energy and Environmental Protection. 1984. “Connecticut Railroads.” Data file. Storrs, CT: Connecticut State Data Center. Accessed 10/21/2015. http://magic.lib.uconn.edu/connecticut_data.html#roads.

Connecticut Secretary of the State. 2013. “Population of Connecticut Towns 1970 – 2010.” Connecticut State Register and Manual Section VII: Local Government. Last modified September 5. Accessed May 1, 2016. http://www.sots.ct.gov/sots/cwp/view.asp?a=3188&q=392400.

D'Ambrosio, Daniel. 2009. "Creating Colt." *Hartford Advocate*, August 18. Accessed November 14, 2014. http://www.hartfordinfo.org/issues/documents/downtowndevelopment/htfd_advocate_081809.asp.

Esri ArcGIS Content Team. 2011. "U.S. and Canada Detailed Streets." Data file. Data & Maps for ArcGIS: StreetMap North America, 2012 ed. Redlands, CA: Environmental Systems Research Institute. Accessed May 1, 2016. https://www.arcgis.com/home/item.html?id=f38b87cc295541fb88513d1ed7cec9fd.

Flodine, Brett. 2015a. "Neighborhoods." Data file. Hartford, CT: City of Hartford. Accessed April 11, 2016. http://gisdata.hartford.gov/datasets/d3deb11bfd9242ce9c927187c512da9e_5.

———. 2015b. "Zoning." Data file. Hartford, CT: City of Hartford. Accessed November 16, 2015. http://gisdata.hartford.gov/datasets/b314086bee46409c91161ab2f0613a98_3.

Foley Carrier Services. 2016. "About Foley." Accessed September 8, 2016. https://www.foleyservices.com/about/.

Ford, Larry R. 2003. *America's New Downtowns: Revitalization or Reinvention?* Baltimore: Johns Hopkins University Press.

Gosselin, Kenneth R. 2012. "Urban Renewal: East Armory Getting Long-Awaited Makeover, Will House First Tenant Since Mid-'90s; Colt Factory Complex." *Hartford Courant*, July 23. Accessed October 9, 2014. Factiva.

———. 2014. "Under the Onion Dome." *Hartford Courant*, March 23. Accessed October 9, 2014. ProQuest.

———. 2016. "Steady Revival at Colt." *Hartford Courant*, April 24. Accessed August 21, 2016. http://www.courant.com/real-estate/property-line/hc-colt-complex-renovations-20160424-story.html.

Grant, Ellsworth S. 1982. The Colt Legacy: The Colt Armory in Hartford, 1855 – 1980. Providence, RI: Mowbray Co.

Hartford Courant. 2004. Editorial. October 11. Accessed November 22, 2014. ProQuest.

Hartford Courant. 2008. Editorial. October 19. Accessed March 15, 2016. ProQuest.

Hartford Courant. 2014. Editorial. December 12. Accessed August 10, 2016. http://www.courant.com/opinion/editorials/hc-ed-coltsville-wins-national-park-status-20141212-story.html.

Hartford Public Library and the Hartford Community Data Collaborative. 2012. "Hartford Trends." HartfordInfo.org. Last modified September 25. Accessed November 8, 2015. http://www.hartfordinfo.org/ht/ht-rslts_htfd.asp.

Hladky, Gregory B. 2014. "Coltsville National Historical Park Wins Final Approval." *Hartford Courant*, December 13. Accessed March 21, 2016. http://www.courant.com/news/connecticut/hc-coltsville-what-next-20141212-story.html.

Hosley, William. 1996. *Colt: The Making of an American Legend*. Amherst, MA: University of Massachusetts Press.

———. 2005. "Making a Success of Coltsville." Hog River Journal, November 1. Accessed March 20, 2016. www.hogriver.org/issues/v04n01/coltsville.htm.

Labadia, Catherine M., Kristen N. Keegan, Lucas Karmazinas, and William F. Keegan. 2012. "Phase IA Cultural Resources Assessment Survey of Proposed Streetscape Improvements for the Coltsville Corridor in Hartford, Connecticut." ConnDOT State Project 63–626. Newington, CT: Heritage Consultants, LLC. CHPC 1899. Thomas J. Dodd Research Center, University of Connecticut.

Lee, Colin. 1973. *Models in Planning; An Introduction to the Use of Quantitative Models in Planning*. 1st ed. Urban and Regional Planning Series, v. 4. Oxford, New York: Pergamon Press.

Leung, Shirley. 1998. "Reduced Hopes: In '90s, Hartford Thinks Small." *Wall Street Journal* New England ed., May 20. Accessed October 30, 2014. Factiva.

Lew, Alan, and Bob McKercher. 2006. "Modeling Tourist Movements: A Local Destination Analysis." *Annals of Tourism Research* 33, no. 2: 403–23. Accessed March 2, 2015. doi:10.1016/j.annals.2005.12.002.

LiveHartford. 2014. "South Meadows." MetroHartford Alliance and Studio O'Maxfield. Accessed August 14, 2016. http://www.livehartford.org/neighborhoods/southmeadows.aspx.

Lowry, Ira S. 1964. *A Model of Metropolis*. Santa Monica, CA: RAND Corporation.

Masser, Ian. 1972. *Analytical Models for Urban and Regional Planning*. New York: Halsted Press Division, J. Wiley.

Massey, Douglas S., and Nancy A. Denton. 1988. "Suburbanization and Segregation in U.S. Metropolitan Areas." *American Journal of Sociology* 94, no. 3 (November): 592-626. Accessed September 28, 2015. http://www.jstor.org/stable/2780255.

Mokadi, Elad, Diana Mitsova, and Xinhao Wang. 2013. "Projecting the Impacts of a Proposed Streetcar System on the Urban Core Land Redevelopment: The Case of Cincinnati, Ohio." *Cities* 35: 136–46. Accessed March 2, 2016. doi:10.1016/j.cities.2013.07.005.

Museum Insights, Roberts Consulting, ObjectIDEA, and Economic Stewardship Inc. 2008. *Coltsville National Park Visitor Experience Study*. Mystic, CT: Museum Insights. Accessed March 7, 2015. http://www.hartfordinfo.org/issues/wsd/history/Coltsville_Visitor_Experience_Study.pdf.

O'Connell, James C., Lisa Kolakowsky, Terence D. Moore, Duncan Hay, John Monroe, and David Clark. 2009. Coltsville Special Resource Study. Philadelphia, PA: National Park Service, Northeast Region, Division of Park Planning and Special Studies.

Peacock, Wayne. 2001. "Trends in the Region: Adriaen's Landing in Hartford, But Will He Bring Boom Times?" *The Bond Buyer*, January 8, sec. Northeast. Accessed May 2, 2016. Factiva.

Petersen, Andrea. 1997. "Developments: Recovery Comes Slowly to Hartford." The Wall Street Journal, March 7, sec. *The Property Report*. Accessed May 7, 2016. Factiva.

Pionzio, Melissa. 2006. "Botanical Garden Plan to be Discussed." *Hartford Courant*, May 25. Accessed August 21, 2016. http://articles.courant.com/2006-05-25/news/0605250039_1_colt-family-information-session-destination-garden.

Rodrigue, Jean-Paul. 1997. "Parallel Distributed Processing of Transportation/Land Use Systems: Theory and Modelling with Neural Networks." *Transportation Research* C 5 =(5): 259–71, accessed March 7, 2015, http://people.hofstra.edu/jean-paul_rodrigue/downloads/nnmodel.pdf.

Simon, Kenneth A. 2006. *Colt, Legend & Legacy*. DVD-ROM. Vol. 1, no. 4, Connecticut Collection. Hartford, CT and Middletown, CT: CPTV and the Connecticut Humanities Council.

States News Service. 2011. "Lawmakers See Coltsville Hearing as Positive Step for Project." October 19. Accessed August 20, 2016. LexisNexis Academic.

Tai Soo Kim Partners. 2006. "Hartford Botanical Garden – About Us." Hartford Botanical

Garden Committee. Last modified on July 26, 2011. www.hartfordbotanicalgarden.org/about.html. Accessed by Dmitriy Tarasov on August 20, 2016 at https://web.archive.org/web/20110726142232/http://www.hartfordbotanicalgarden.org/about.html.

Taylor, Jeffrey. 2003. "State of National Park Service in support of Coltsville Study Act before the House Resources Subcommittee on National Parks, Recreation & Public Lands." Office of U.S. Representative John B. Larson. Last modified April 8, 2003. Accessed April 30, 2016. http://www.larson.house.gov/index.php/news/press-release-archive/2003-press-releases/713-state-of-national-park-service-in-support-of-coltsville-study-act-before-the-house-resources-subcommittee-on-national-parks-recreation-a-public-lands.

US Census Bureau. 1950a. "Table NT1: Total Population." *1950 Census: Population and Housing Data [Tracts: Major Cities and Surrounds]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1950b. "Table NT16: Median Income." *1950 Census: Population and Housing Data [Tracts: Major Cities and Surrounds]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1950c. "Table NT25. Civilian Labor Force by Sex by Labor Force Status." *1950 Census: Population and Housing Data [Tracts: Major Cities and Surrounds]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1950d. "Table NT27: Employed Population by Sex by Major Occupational Group." *1950 Census: Population and Housing Data [Tracts: Major Cities and Surrounds]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1960a. "Table NT39: Persons 14 Years and Over by Sex by Employment Status." *1960 Census: Population & Housing Data [Tracts: Major Cities & Surrounds]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1960b. "Table NTSUP2: Total Persons." *1960 Census: Population & Housing Data [Tracts: Major Cities & Surrounds]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1961. Census of Population and Housing: 1960. Census Tracts: Final Report PHC(1)-61. Hartford, Conn. SMSA. Table P-1. Washington, DC: US Government Printing Office.

———. 1970. "Table NT126: 100% Population." *1970 Census: Count 4Pa*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1972a. Census of Population and Housing: 1970. Census Tracts: Final Report PHC (1)-87 Hartford, Conn. SMSA. Table P-3. Washington, DC: US Government Printing Office.

———. 1972b. Census of Population and Housing: 1970. Census Tracts: Final Report PHC (1)-87 Hartford, Conn. SMSA. Table P-4. Washington, DC: US Government Printing Office.

———. 1980a. "Table NT1A: Persons." *1980 Census: Summary Tape File 1*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1980b. "Table NT55A: Sex by Labor Force Status." *1980 Census: Summary Tape File 3*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1980c. "Table NT69: Median Household Income in 1979." *1980 Census: Summary Tape File 3*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1990a. "Table NP1: Persons." *1990 Census: Summary Tape File 1*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1990b. "Table NP70: Sex by Employment Status." *1990 Census: Summary Tape File 3*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 1990c. "Table NP80A: Median Household Income in 1989." *1990 Census: Summary Tape File 3*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2000a. "Table NP001A: Total Population." *2000 Census: Summary File 1a*. Data file. Minneapolis, MN: National Historical Geographic Information System:

Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2000b. "Table NP043E: Population 16 Years and Over by Sex by Employment Status." *2000 Census: Summary File 3a*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2000c. "Table NP053A: Median Household Income in 1999." *2000 Census: Summary File 3a*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2010a. "2010 Census Redistricting Data and Shapefiles (Public Law 94-171): Connecticut Block Groups". Data file. Storrs, CT: Connecticut State Data Center. Accessed 9/4/2015. http://ctsdc.uconn.edu/connecticut_census_data/#2010_redistricting.

———. 2010b. "2010 Census Redistricting Data and Shapefiles (Public Law 94-171): Connecticut Census Blocks". Data file. Storrs, CT: Connecticut State Data Center. Accessed 9/4/2015. http://ctsdc.uconn.edu/connecticut_census_data/#2010_redistricting.

———. 2010c. "Table B19013: Median Household Income in the Past 12 Months (in 2010 Inflation-Adjusted Dollars)." *2010 American Community Survey: 5-Year Data [2006-2010, Block Groups and Larger Areas]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2010d. "Table B25034: Year Structure Built." *2010 American Community Survey: 5-Year Data [2006-2010, Block Groups and Larger Areas]*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2010e. "Table P1: Total Population." *2010 Census: Summary File 1a*. Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2010f. "Table S2301: Employment Status". American Community Survey, 2010 American Community Survey 5-year estimates. Generated by Dmitriy Tarasov using American FactFinder. Accessed August 15, 2016. https://factfinder.census.gov/bkmk/table/1.0/en/ACS/10_5YR/S2301/1600000US0937000.

———. 2010g. "Table S2301: Employment Status". American Community Survey, 2010

American Community Survey 5-year estimates. Generated by Dmitriy Tarasov using American FactFinder. Accessed August 15, 2016. https://factfinder.census.gov/bkmk/table/1.0/en/ACS/10_5YR/S2301/1400000US09003500400|1400000US09003500500.

———. 2012. “2012 American Community Survey 1-Year Estimates: Connecticut Towns (County Subdivisions).” Data file. Storrs, CT: Connecticut State Data Center. Accessed 10/21/2015. http://ctsdc.uconn.edu/connecticut_census_data/#2012_ACS_1.

———. 2014a. “Table B19013: Median Household Income in the Past 12 Months (in 2014 Inflation-Adjusted Dollars).” 2014 American Community Survey: 5-Year Data (2010-2014, Block Groups & Larger Areas). Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

———. 2014b. “Table B19301: Per Capita Income in the Past 12 Months (in 2014 Inflation-Adjusted Dollars).” 2014 American Community Survey: 1-Year Data (2010-2014, Block Groups & Larger Areas). Data file. Minneapolis, MN: National Historical Geographic Information System: Version 2.0 [distributor]. Accessed June 17, 2015. http://www.nhgis.org.

US Department of the Interior. National Park Service. Northeast Region. Boston Support Office. 1998. *Connecticut River Valley: Special Resource Reconnaissance Study*: 31. Quoted in James O’Connell, Coltsville Special Resource Study (Boston, MA: National Park Service Northeast Region, 2009).

———. National Park Service. Northeast Region. 2004. *National Park Service Coltsville Study Meeting*. DVD. Hartford, CT: Connecticut Network. In the collection of the Connecticut State Library.

———. National Park Service. Natural Resources Stewardship and Science Directorate. 2015. *2014 National Park Visitor Spending Effects: Economic Contributions to Local Communities, States, and the Nation*, by Catherine Cullinane Thomas, Christopher Huber, and Lynne Koontz. NPS/NRSS/EQD/NRR-2015/947, April.

US Department of Labor. 2016. “Inflation Calculator.” Bureau of Labor Statistics. Accessed March 15, 2016. www.bls.gov/data/inflation_calculator.htm.

Utley, Robert M. 1967. *Frontiersman in Blue: The United States Army and the Indian, 1866-1890*: 26-27. Quoted in James O’Connell, Coltsville Special Resource Study (Boston, MA: National Park Service Northeast Region, 2009).

Ward, Stephen V. 1998. *Selling Places: The Marketing and Promotion of Towns and Cities*

1850 – 2000. London: Routledge.

Webb, Walter Prescott. 2003. *The Great Frontier*: 245. Quoted in James O'Connell, Coltsville Special Resource Study (Boston, MA: National Park Service Northeast Region, 2009).