

4-1-2012

# The Roc and the Hard Place: The Empirical Effects of Economic Development Projects on Property Value, and the Reurbanization of Rochester, NY

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## Recommended Citation

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*The Roc and the Hard Place: The Empirical Effects of Economic  
Development Projects on Property Value, and the Reurbanization of  
Rochester, NY*

By Henry Fitts



A Thesis Submitted in  
Partial Fulfillment of the  
Requirements for the Degree of  
Bachelors of Arts  
In Sociology, and Interdisciplinary Urban Studies

May 2012

*For  
Grandpa Dick  
(aka Richard Fitts)*

*My passion for Rochester would be nowhere without you.*

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# Introduction

## **My City**

Home is an important part of anyone's identity, and often one of the first details mentioned when introducing one's self to a stranger. When I introduce myself as from Rochester, NY, I often wonder what thoughts or images, if any, enter the head of the person I'm speaking to. Too often I catch searching eyes and an unconvincing head nod as they offer an unsure sounding affirmation. At Trinity and around Connecticut I've gotten this frequently, and I've even come to add the phrase "Upstate by Buffalo" to my introduction to avoid aggravatingly ignorant exchanges. Kodak, Genesee Breweries, and Wegmans often are the only things I can reference that young people may have heard of from the Rochester area. However, what was once Kodak's town now watches anxiously as the great provider files for an extension of the restructuring period of its Chapter 11 bankruptcy process. As a third generation Rochestarian, and descendant of two generations of Kodak employees, I look to the future of Rochester with a skeptical yet optimistic eye. How will Rochester fare in the next decade?

The truth is that being from Rochester has come to be the single most important aspect of my identity, defined my life goals and aspirations, as well as guided my study here at Trinity. This was only made possible by living away from Rochester, enjoying an extended internship with The City of Rochester's Department of Business and Housing Development (BHD), and experiencing the harsh contrasts that Hartford can present while studying at Trinity. Only through this comparative experience and study could I appreciate Rochester for the truly incredible place that it is, and realize how much this unassuming city has contributed to who I am. I've slowly become a Rochester fanatic with every passing year, and made it my mission to further Rochester in everything I do, especially as I eagerly accept post graduate employment with BHD.

This thesis stands to be a valuable contribution to Rochester's cause. With an in-depth analysis of the effect of BHD's economic development projects on surrounding property values, I hope to provide evidence in support of the public value of publicly funded economic development projects. Always a controversial and politically charged topic, these long term investments need all the backing they can get in changing political and staining economic times. As the United States witnesses the beginning of a shift of population and private investment back to cities, there is simultaneously decreasing federal funding. Hard work and optimism from local government professionals like myself will be required to help Rochester jumpstart the renaissance it is poised to enjoy.

### **Decoding the Title**

I've chosen a complex title for a my thesis. The line from the title, "The Roc and the Hard Place", has more than one meaning. Each layer of meaning imparts a truth about Rochester, about this piece, and about me.

At first it refers to one of Rochester's many affectionate local nicknames, taken in part from the abbreviated name of Rochester used in the world of travel: 'ROC'. This is seen printed on boarding passes, flight information screens, and other highly visible places when traveling by Air and Train. In my experience this nickname carries no meaning or association with the word 'Rock', while frequently used as it is here in childish titles and wordplay. While I don't use it often in speech, I use this ROC nickname frequently in social media, account passwords, and other written media.

The ROC nickname is inserted into the classic American idiom 'between a rock and a hard place' that normally refers to choosing between two unpleasant outcomes. I use the idiom here to refer the pessimistic view of Rochester that some segments of the community and many outsiders share. While Rochestarians are some of the most down to earth and well-educated populations I've come across, they can also be some of the biggest complainers. The biggest topics of complaint are the foul winter

weather, high taxes, and that there is nothing to do in Rochester. I of course have persuasive arguments against each of these.

In another idiom however, a 'rock' can also refer to someone or something that is unchanging, dependable, and reliable. Applied to Rochester, this description holds much truth for me and other Rochesterians. In the context of the title, it means that the ROC is a dependable, reliable, yet challenging place to live. I have only recently come to realize the value of Rochester's stable and tight-knit communities, high degree of public safety, and outstanding educational, and natural resources contributed to my childhood. Going away to college I was always comforted by thoughts of coming home to Rochester, my family, and the life I could lead there.

Lastly, the title alludes to Hartford, 'the hard place', and the day-to-day contrast and comparison that has brought me to a greater appreciation of Rochester. While by no means a terrible place, Hartford has several major flaws in my eyes that have made my time at Trinity straining at times. The roads and highways are abysmal, offering me daily frustration on my journey to crew practice at our East Hartford boathouse. The wealth divide is far more severe than that of Rochester, and all too apparent on the borders of Trinity's campus. The fragmented governance of the Hartford metropolitan area and tight tax control by traditional New England town governments leaves the Hartford MSA as the richest in the country, while Hartford itself is one of the poorest cities. This seems to be a reflection of the mindset of Connecticuters overall, who seem more self oriented and inconsiderate than most.

I hope that when thinking back on the meaning of this title you will be reminded of my conceptualization and idealization of Rochester drawn through my personal contrasts to Hartford, and study at Trinity.

## **Research Questions, and Hypothesis**

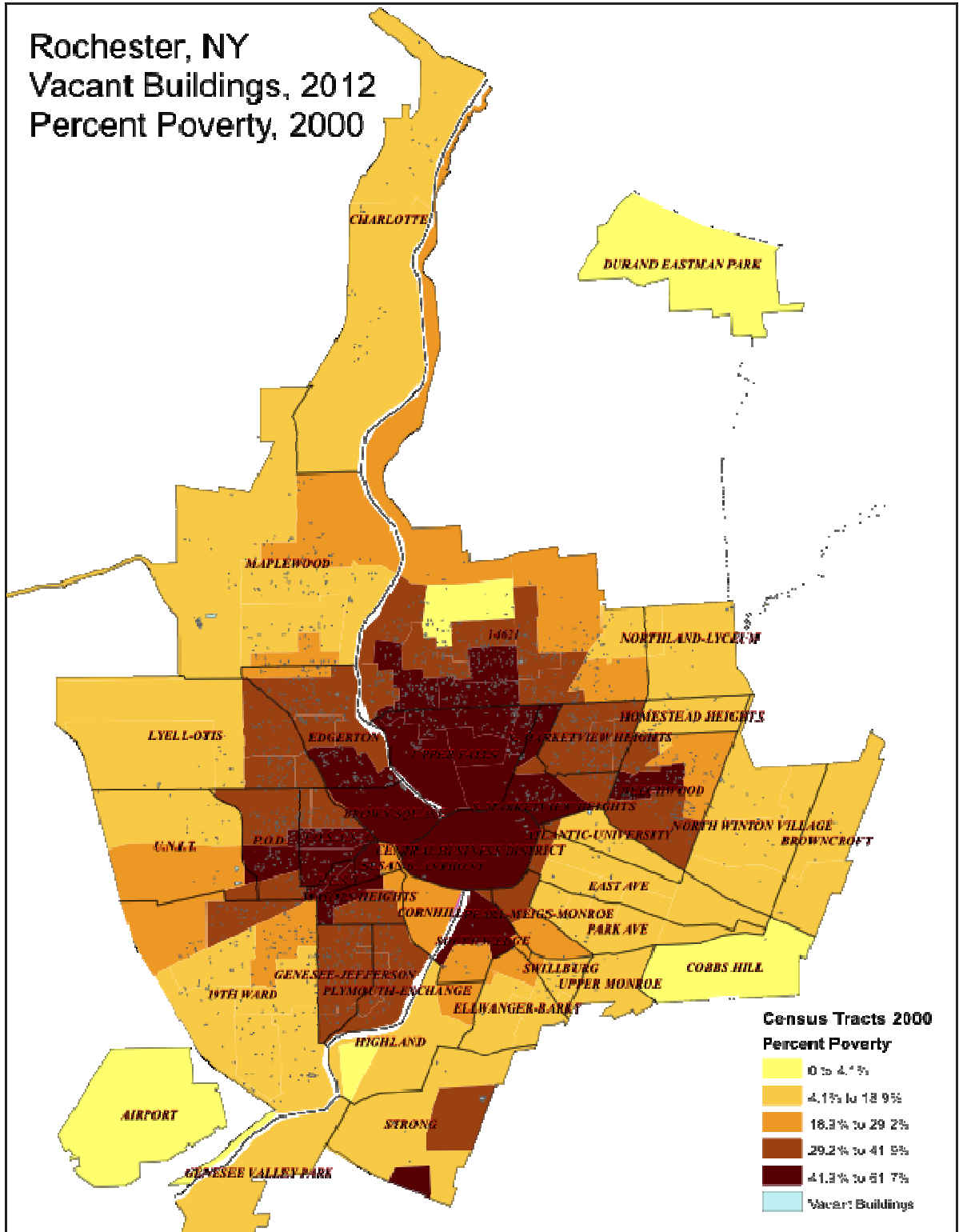
In formulating the direction of this project, I knew I wanted to answer the following key question regarding economic development in Rochester:

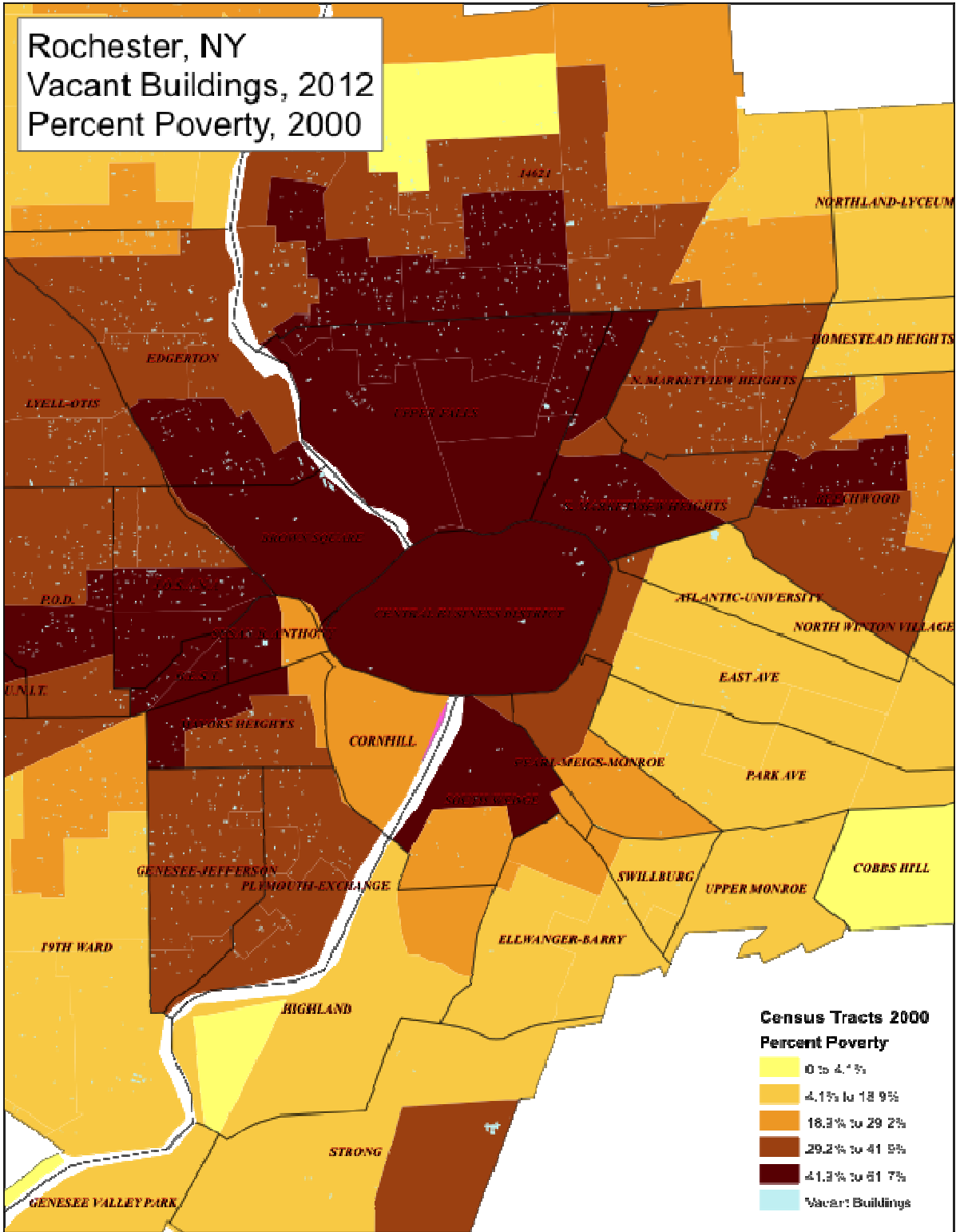
1. Do economic development projects have a measurable impact on the value of nearby parcels? If so, what is the tangible effect on values?

This curiosity is based largely on my extensive personal experience working with The City of Rochester's Department of Business and Housing Development. Previous literature review and initial review of data also helped steer this study.



Rochester, NY  
 Vacant Buildings, 2012  
 Percent Poverty, 2000





# Contextualizing Rochester

## **Initial Maps**

The preceding maps are meant to introduce Rochester in three layers that will aid in understanding the remaining discussion and the Rochester context. While only scratching the surface, these elements paint an accurate picture of Rochester's economic landscape.

In black, I have labeled the neighborhoods I will refer to repeatedly. The oddly shaped circle in the middle labeled 'Central Business District' (CBD) encompasses the majority of 'downtown' Rochester, while small areas to the East and North also are officially included. To the south of the CBD is the South Wedge, an increasingly important neighborhood as you will read. Traversing the city from east to west is the I-490 highway, and forms the bottom edge of the CBD. The Inner Loop, a short and underused extension, encircles the rest and forms the bean shape of the CBD. To the East of the CBD, the 'East Ave' and 'Park Ave' neighborhoods are also important neighborhoods. The Genesee River is the white sliver that snakes north through the entire city and would bisect the CBD in a more accurate map. It's historically important High Falls are located at the northern edge of the CBD.

I have also colored the base census tract map by the proportion in poverty in 2000 to give you a sense of the wealth distribution in the city. The dark orange areas have the highest proportion of poverty and are primarily located to the North and areas surrounding downtown. This economic geography remains primarily true today while the South Wedge neighborhood has decreased in its proportion of poverty due to forces of gentrification. Downtown has also decreased in this statistic with an influx of high earning professionals occupying newly developed housing.

Lastly, I have plotted all the vacant buildings as of 2010 in blue to give a sense of the vacancy problem in Rochester. These vacant buildings are geographically clustered in areas with higher poverty rates, but in a band at a distance from the downtown. This may be due to a variety of factors, but most

likely has much to do with the higher demand for housing closer to downtown. This is in line with established work on urban real estate and property values. These vacant buildings pose a huge issue for the city as they can harbor all manner of criminal activity, serve as targets for arson, drag down property values, and pose further public safety concerns. Around a hundred of the worst properties are torn down annually, leaving open lots between other functioning houses. Driving down some of the most effected streets, one may see only a few remaining homes, and offers startling images of what Rochester's population decline has meant for the housing stock. Vacant buildings also have potential for sustainable and historically sound residential redevelopment if received before significant damage is incurred. I go into several City development initiatives that utilize this resource later in this paper.

### **Area Geography**

Rochester is located in the Northwestern portion of New York, on the shores of Lake Ontario, just off the New York State Thruway I-90 between Syracuse and Buffalo. Its municipal borders encompass the intersection of the Genesee River and the Erie Canal, two massive waterfalls, and miles of gorgeous Lake Ontario coastline. Nearby, and within the five county metropolitan area, are all manner of well kept parks, breathtaking countryside, and other natural resources that have tangible value.

Rochester is part of the unique Upstate New York cultural and economic region that stands somewhat separate and at odds with the New England and Downstate New York regions. I for one hold much allegiance with 'Upstate', and have written on the subject of Upstate regional identity and regionalism for other courses. Rochester is also part of the Finger Lakes region, which stretches from Syracuse to the south of Rochester, and boasts growing agricultural, culinary, and tourism acclaim.

Rochester's separation from established economic centers such as New York and Boston are the cause of some skepticism as to Rochester being a viable location for business headquarters and

investment. However ties to the Toronto and Buffalo/Niagara metro areas are strong and continue to add to Rochester's potential, as well as high level of existing industrial and transportation infrastructure. Technology also continues to decrease some demands for physical proximity.

## **History**

Rochester is one of America's great forgotten cities. Today ranked 51<sup>st</sup> largest metropolitan area by population, in 1840 it was the 13<sup>th</sup> largest city in the country at the tail end of a boom brought on by the Erie Canal's transportation revolution. Earlier, flour mills powered by the Genesee River's High Falls made it the world's largest flour producer and earned it the nickname 'The Flour City'. Rochester also has a rich history of civil rights activism from its time as an important stop on the Underground Railroad and a center for the abolition movement, to serving as a home to leaders of the women's suffrage movement like Susan B. Anthony.

In the wake of combustion and electrical powered factory technologies which freed companies from relying on the power of High Falls, Rochester transformed itself into a center for optics and high tech manufacturing with the rise of Kodak, Bausch and Lomb, and Xerox. Now known as the 'Flower City' for its annual Lilac Festival, Rochester struggles to retain a place in the national consciousness and even that of my fellow students at Trinity.

## **Ain't a Company Town Anymore- Kodak's Impact**

This January, in the wake of the bankruptcy filing, *The New York Times* ran a front-page story on Rochester and the role of Kodak. Perhaps the most significant national coverage we've had in years, it had a surprisingly optimistic tone for the Rochester area, highlighting how the slow decline of Kodak has provided opportunities for those laid off to form their own tech startups and hire others like themselves. An all out closure may have flooded the market and created a worse situation for the city. I share this optimistic sentiment, and can confirm these trends from my personal experience.

Several parents of some of my closest friends are Kodak layoffs and have started or joined new tech startups. One who worked for the Kodak Research and Development division was laid off several years ago and now heads a plastics manufacturing company that produces components for Kayaks and similar consumer products. Her husband, who also worked in research, now heads an OLED lighting research and manufacturing outfit scheduled to market high efficiency lighting solutions in the coming months. Another friend's mother took comfortable early retirement last year when released from her position as a lab technician with Kodak. I have more examples in this vein, and while these are just my highly personal depictions of Kodak's impact, they are in line with larger trends in the Rochester area.

My family ironically continues to enjoy the remnants of Kodak's idyllic past. My dad was one of those lucky enough to survive the gauntlet of layoffs since the late 1990's, and cites his irreplaceable skills with systems engineering and data analysis as his saving grace. He has worked primarily with the NexPress printer division, even when owned briefly by Heidelberg, a German printing company. As Kodak shifts its sights from tradition to profitability in Chapter 11, this is one of the sales divisions that has survived along with reel film production, and others that are less consumer oriented.

Beginning as a security guard for Kodak while finishing out his engineering degree at RIT, my father has worked his way through various data administration positions since 1981 to his current position as Systems Business Analyst, developing labor saving solutions for highly technical reporting demands, cost savings logistics management, and data integration. My grandfather also worked for Kodak, enjoying stable employment during Kodak's remarkable heyday from the early 1990's to the late 80's. During that time, Kodak had a stranglehold on the US personal photography market enjoying up to 90% share of film sales, and 85% of camera sales. During that time, Kodak also employed close to 70,000 people in the Rochester area, while in 2011 struggled to maintain 7,000. My grandfather, Richard Fitts, worked his way from a position as Time Study Engineer in 1944 to Manager of Computer Systems in the Marketing Division when he retired in 1986. In those days one 'joined' Kodak, and could expect to be

taken care of for life in exchange for hard work and unquestioning loyalty to the company. My grandfather famously retired having never taken a sick day, and after naming my uncle after his boss Andrew Satter. (To bring things full circle, Satter's daughter taught film history at my high school.)

### **Rochester Today, Selling Points**

Today, Rochester is home to some 210,565 people according to the 2010 census, while the metropolitan area has just over a million inhabitants (US Census, 2010). According to that same census, downtown Rochester witnessed surprising growth in population in the last decade and is nearing the theoretical tipping point for renewed retail and commercial feasibility. This entails a large enough population to enable businesses like supermarkets to make a profit. 2010 was also the year with the most new housing units coming online through city initiatives in a decade. The largest employer in the Area is the University of Rochester, with a majority of these positions within the university's prestigious School of Medicine and Dentistry at the Strong Memorial Hospital. University and medical employment are growing sectors in many US cities, while downtown growth and housing demand are also being seen elsewhere.

What Rochester should be known for today, and what The City of Rochester local government needs to do a better job advertising, is the low cost of living, short commutes, incredible access to natural and cultural amenities, and highly educated and down to earth population that all can be found within its borders. Each of these contribute to an incredibly high quality of life that is hard to quantify, but is easily recognizable in contrast to cities like Hartford which boasts long commutes, an extremely built up urban area, higher cost of living, and seemingly self absorbed population.

Putting quality of life in quantifiable terms is an increasing trend in the information age. Rochester has been ranked time and time again amongst the best cities in the US by reputable institutions, including 3<sup>rd</sup> Best City to Raise a Family 2010 (Forbes), 6<sup>th</sup> Best Place to Live 2007 (Places Rated Almanac), and 2<sup>nd</sup> Most Secure Metro Area 2011 (Farmers Insurance), 4<sup>th</sup> Most Affordable Places

to Buy a Home 2012 (US News and World Report), and 7<sup>th</sup> Most Affordable Cities to Buy a Home 2010 (Forbes).

Businesses looking to locate in Rochester need only to be sold on the highly educated workforce, high level of existing industrial space and related infrastructure from Kodak and other companies, and the diversifying economy. Rail access parcels, warehouse space, and clean room labs are all available. Rochester was the nation's 46<sup>th</sup> highest exporting city in 2010, and second highest in New York (US Department of Commerce). While the local economy remains somewhat stagnant, increased connection from transportation and information technologies is closing conceptual spatial gaps and bringing the Rochester economy closer to both economic centers and consumers.

High tax rates, high vacancy rates, and failing public education are the remaining major challenges to the health of the city. These all can be surmounted with sound planning, targeted investment, and continued growth from both an economic and population standpoint.



# **Personal Experience: BHD Internship**

## **Introduction**

As I've already mentioned, some of my background on this topic and familiarity with Rochester comes from my experience interning for the City of Rochester's Bureau of Neighborhood and Business Development with the Business and Housing Development department. There I worked directly under Director Bret Garwood for 4 temporary terms during the summers and winters when I was home from school. Besides important personal connections and access to data for this project, the internship helped to develop an already budding love for Rochester into an academic focus for my urban studies major and this thesis.

I began working at BHD in early July, 2010 after returning from Trinity's Megacities of the Yangtze River summer program. At this time Bob Duffy was Mayor, and the economy was still very rattled from the market crash of 2009. I had secured the internship in the winter of 2009 following an interview I had requested with Bret, and at the suggestion of my grandfather who had some contacts in City Hall.

As is the case for many interns, my major projects during that first summer were ones that nobody else had time to conduct, yet I found they all still had the potential to benefit the department in tangible ways. Bret also told me that he designed these tasks to have a finished product that I could present as examples of my hard work.

## **Strategos Project Management Software Implementation**

The first major project that I tackled was helping transition the department from an Excel based system for tracking and managing projects to a project management software system called Strategeos. This was part of a generally unpopular citywide technological initiative pushed by Mayor Duffy, and while I dealt with much grumbling in my work nudging coworkers to use the software, I do believe that It was a step in the right direction in making things more efficient. Strategos is a Microsoft access powered reporting tool that allows employees to track and update progress on projects, set goals and timelines, and even upload documents and files. The major benefit is that it can be accessed and updated simultaneously from anywhere in the department. Before, spreadsheets had to be compiled by division heads with information from project leaders, then all compiled by Bret for presentation to the commissioner and the Mayor.

For this project I helped compile the last spreadsheet report before switching to Strategos and worked with all the project leaders in the department to collect information. I then helped design the new reporting system within Strategos, choosing where details would be included in the Strategos project management windows. Unfortunately, the built in textboxes within the 'project charter' window forced us to create a text based and inherently flawed workaround. This entailed a given prompt that I had to copy and paste into each text box.

The two boxes prompts read as such:

Box 1- "Scope and Assumptions"

Description:

TDC (Total Development Cost)  
City Investment/Involvement:  
Date Updated:

Box 2- "Information"

Accomplishments:  
Plans:  
Issues Concerns and Corrective Actions:  
Date Updated:

In my instructions to coworkers I asked them to duplicate these subheadings when they entered new updates quarterly, but this rarely happened. I also asked them to keep older text for general records, but also rarely happened. Lastly I asked them to update a drop down that had an aggravatingly wide variety of choices for 'Project Status'. The amount of choice did not contribute to a better understanding of the project.

It amazed me how difficult it was to get adults to read and follow simple directions. By the end of my fourth term working with BHD I think people were finally accepting that this was how things were going to be and using Strategos in more of the way Bret and I would have liked.

### **Mapping Website**

Collecting the information on the final iteration of the excel reporting system also contributed to another project that I worked on: developing a mapping website for the city's real estate development projects. Again, this project had the potential for great publicity for the department, but due to budgetary and time restrictions on everyone else in the department, the project was left to me. The project really complemented my diverse skills in GIS, data management, and photography, and helped develop my knowledge of Rochester's economic geography through first hand exploration.

Working with Bret we again decided what key information would be included on the website concerning each project. Development projects can take many forms, some involving physical construction and a short-term life span within our departments, while others are long term and involve active management of many businesses and tenants. Thus, we decided to include the following information elements on the website for each project, and I believe adequately covers most types:

Description:

Address:

Project Type (Office, Residential, Industrial, and/or Commercial):

Project Status (Proposed, Pending Approval, Under Construction, Complete):

Developers:

Developer Contact Information:

Developer Website, Project Website:

Development Cost:

City Investment:

City Contact Name:

City Contact Email:

City Contact Phone Number:

I also worked with project leaders to collect and upload all available photos, renderings, or other media on each project. This was a struggle for some leaders, who seemed almost at odds with their developers, or wary of confidentiality agreements and past run ins with news media. I also went out and explored the city to find each project, and took a status photo of each during my summer terms with the department.

My only concern after implementation was with the project status line. The 'Pending Approval' status ended up filling a wide variety of situations due its vagueness, and didn't always follow in chronological order. For instance approval could refer to project approval from

the city, funding approval from various organizations, and even construction approval in some cases. For projects that involve demolition of a structure followed by construction of a new structure, 'under construction' might be used twice unless a separate project was created for the demolition phase. The latter of course brings forth further issues with overlaps for markers on the map section of the site, which can fog quantitative assessments of project activity. Lastly, there was inconsistency in developer contact information I received from project leaders. Some gave full details and websites while others were very hesitant to give anything. This had much to do with the type of project and worries of controversy surrounding public funding of certain private developments. I later learned that BHD leaders periodically deal with pressure from the local media surrounding projects that receive large public subsidies and as perceived as having little public benefit.

Overall, the website turned out pretty well, but the department still suffers from lack of staffing and funding and the site becomes largely out of date when I am away. My biggest qualm is that when the website information is downloaded as a comma separated values spreadsheet, the data is garbled. I addressed this issue with the IT department during my most recent term, but they lived up to their notoriously unhelpful reputation and the issue has not been fixed.

Nonetheless, I am proud to say that the site is being used and making an impact for the City. It has been used and referenced by the Communication Bureau and Mayor Richards staff to construct presentations he has given at events such as the Rochester Downtown Development Corporation's (RDDC) annual luncheon. My original pictures were shown at this event. The site is also listed on the RDDC's website in their collection of maps of Rochester. I

have also heard that students visiting the University of Rochester have explored the site, excited to learn about the College Town project planned in the area.

### **Home Rochester**

Another project I worked on was conducting an analysis of the HOME Rochester Program, a program that uses city funding to rehab and sell vacant homes to first time homebuyers. It also involves long term financial counseling for the buyers. With vacancy and associated issues some of the most prevalent elements affecting Rochester's poorer northern neighborhoods, this program has been a strategic initiative by the city. The cost to demolish and clear a parcel is around \$20,000, while to rehab may only cost \$30,000.

My task was to analyze the average timeline for a HOME Rochester property, and find out if the program had been effective at combating vacancy and foreclosure. I did this using data from the HOME Rochester program, foreclosure starts posted in *The Daily Record*, and property ownership information from the Monroe County website.

I summarized my findings in a long report as well as a short memo that was circulated to the Mayor and other important offices. My major findings were that only 5% of homes in the first 3 years of the programs suffered additional foreclosure, and that the latter years fared even better. These findings held up when I did an update of the analysis this past winter, adding new years of data, and still finding a continuing decreasing trend in subsequent foreclosures. Thus, I would say that the program has been improving in its effectiveness. The program has also been selling homes for record prices, some actually making profits for the City in terms of total development cost to sale price.

### **Grants and Annual Documents**

I also assisted with editing and compiling a few grants and annual reports when I had time. I helped compile a grant application to the Department of Housing and Urban Development (HUD) for the University of Rochester Collegetown project. This involved printing, punching, and ordering documents. I reviewed all the documents as I came across them in genuine interest. The project is still currently stalled due to funding issues. I also helped update an annual report for the Rochester Economic Development Corporation (REDCO) on the economic health of the Rochester region. This included brief research on statistics for unemployment, the local job market, top employers, and other factors.

### **Tax Lien Mapping**

Due to my proficiency with GIS, I was also brought on to map tax delinquent parcels for strategic acquisition by the Real Estate Department in the summer of 2011. Delinquent parcels are often aquired for development projects and other city initiatives. This entailed geocoding an address list of delinquent parcels, and creating a new shapefile of parcels in which these addresses fell. I mapped these alongside city owned parcels, symbolizing them differently depending on department designations obtained from a join.

Previously, Real Estate had only circulated an address list of delinquent parcels and people in BHD and other departments were forced to look up properties individually on the web based GIS system, or make educated guesses of proximity to development sites. Being able to see geographic clusters and patterns in the parcels is invaluable. The impact of this labor saving solution was immediate and very gratifying.

### **PILOT Program Analysis**

My final project, and the one which has spawned this thesis, was focused on the controversial Payment in Lieu of Taxes (PILOT) Program. The PILOT program is an alternative funding method for closing financing gaps for development project by offering developers tax incentives. Developers pay a portion of rents “in lieu of taxes”, usually on the order of 10%. It had been used exclusively with low-income housing development projects until the mid 2000’s when it came into use for mixed-use development. Now projects like Collegetown are on the table offering developers PILOTs, and while they may include some low to moderate-income housing. This stretches the use of the PILOT and is in opposition to precedent.

My task was to analyze the history of the PILOT Program with the major goal of determining what proportion of taxes PILOT assisted units pay compared to similar market rate units in the surrounding area. I used property assessment data obtained from the assessment department paired with current GIS shape files and designated economic catchment areas with the help of Bret and head of Housing Development, Carol Wheeler. We also determined which projects I would survey, making special efforts to include projects that spanned the history of use of the PILOT program in Rochester back into the 1970’s.

I made progress on this project, but eventually ran out of time during the summer internship session. I began work again in the winter but due to other responsibilities, having to rework some of the data, and having a shorter internship, I again ran out of time. I am finishing this project as part of this thesis while including other new elements in a broader piece that comments on the policy choices of the City.

### **Special Event Attendance**



During my time interning I was also lucky to be invited to the following events:

- Photec Site Groundbreaking
  - North Plymouth Terrace Groundbreaking
  - Capron Street Lofts Ribbon Cutting
  - Midtown Rising Press Conference with Chuck Schumer (On Site)
  - Rochester Downtown Development Corporation Annual Luncheon
- I was also present at a handful of City Council meetings, BHD department 'sales team'

meetings, and accompanied project managers on many site visits for development projects. I took pictures at development project sites whenever I could, and many were used on the website. These experiences were invaluable for not only my own personal development, but also for informing this thesis.

### **Take Away**

I was lucky to enjoy such an in-depth and fulfilling internship with the City of Rochester. I learned an incredible amount about the process and nature of economic development, as well as the workings of local government and the professional world. I gained invaluable experience working with developers, project leaders, planners, tech support, and upper level management on my various projects. My curiosity for all things Rochester was ignited by the projects I was assigned, and I thrived given the space and free reign to make them my own. Thanks to my efforts, I have a full time job with BHD beginning this July pending only the necessary funding. My boss believes he will have the funding in the next few weeks, and will have me intern for pay until he finds funding regardless. Informed and inspired by my experience with BHD, I hope to put my thesis findings to good use in my future position.

## **Literature Review**

With a majority of the world's population living in cities as of 2007, and urbanization levels projected to reach 75% by 2050, urban issues are of utmost and growing importance as cities regain relevance in glocalized urban networks (Burdett and Sudjic, 2010). These transportation, governmental, and communication networks have worked to make capital and people increasingly mobile and pits cities in fierce competition with both cities around the world, and with those in their local region. To get a leg up, city governments use a variety of strategies including economic development investment to attract further investment, residents, and businesses. Most basically, economic development investment is the practice of using public funds in an effort to stimulate natural economic growth. These local investments, and the policies that drive them, must be analyzed through a critical lens for the influences of power and the social hierarchy inherent in all levels of governance. Existing research relating to local economic development spending comes primarily from the disciplines of economics, sociology, public policy, and urban studies. Salient in this breakdown is the defining the role of power and ideologies in the decision-making process of choosing development projects, the sources of funding, the actual application of development spending, and who ends up benefitting from development projects. Also imperative to this study is the focused literature on geographic effects of such development and the nature of spillover effects and public goods related to such projects. These come primarily from the economic side of Urban Studies, professional economic development literature, and GIS based research.

### ***Social Concepts of Local Urban Power***

Social power theory has been specifically applied to the local urban context in an effort to explain patterns of inequality and systemic concentrations of power and wealth. The applicable schools of thought and theories include structuralism (including neo-marxism), and neoliberalism.

There are several fairly comprehensive reviews of the discourse on urban politics and power, some even detailing the role of power in economic development investment. Some like John Mollenkopf (1994) suggest a synthesis of thought. He brings together relevant elements of pluralist, neo-marxist, and public choice theory, concluding that there are a complex set of interests within the city, and that it is possible for a dominant coalition made up of these interests to maintain power. Other review chapters simply outline and provide the pluses and minuses of various schools of thought and theories (Orum and Chen, 2003).

One of the more referenced theories in these reviews is the portrayal of the city as a growth machine (Logan and Molotch, 1987), (Orum and Chen, 2003). This pluralist approach stresses tight elite coalition backed control of the government and use of the ideological apparatus to ensure a singular goal of growth at all costs. Signature policies incentivize business investment, remove regulations to reduce business overhead, fund self-marketing programs, and align civic pride with growth and development successes through various initiatives. A “growth coalition” made up of major stakeholders in continued growth supports these policies and elected leaders who put them forth. Collectively, the coalition depicts development projects are benefitting everyone, as they add to the public’s tax base and potentially boost neighbor’s real estate values. This theory however fails to account for varying influence of individual groups throughout time and changing strategies for growth.

### ***A Brief History of Urban Planning and Development in the US***

At first glance, there seems to be little research specifically dedicated to urban economic development strategies in the United States. The process of public development involves government

bureaucrats, and planners with Masters Degrees in Urban and Regional Planning. Their education and perceived professional status would seemingly require a body of scholarly work on the subject. Digging deeper, it seems there is a gap in the discourse between the academic study, and professional strategy. The academic side trains graduates in large scale and optimistic 'urban planning', while they may go into the workforce and end up facilitating very opportunistic and targeted 'urban development' projects. This in itself may say something about how strategies of economic development and the role of the city government have changed and how academics are often slow to adapt. (Personal experience/knowledge)

While some form of city planning has existed as long as there have been cities, true 'urban planning' in the professional and academic sense arose in the United States in the early 1900's out of the progressive era, sanitary reform, and the City Beautiful movement. While the term 'city planning' was already in use, John Peterson (2003) marks the birth of the urban planning discipline at the first National Conference on City Planning in 1909. Fredrick Law Olmstead was in attendance and played a major role in shaping the future of the field. The field took up tactics like single use zoning, born out of Corbusian thought, and went through several defining eras of aesthetic design. While professional planners continue to create urban master plans for their cities, their role has been marginalized and funding for their projects has been substantially cut in favor of the more opportunistic and enterpreneurialistic processes of urban development.

'Urban Development' was born with the creation of the Department of Housing and Urban Development (HUD) in 1965 and came into major use as a task of local governments with institution of the Community Development Block Grant Program (CDBG) (Cunningworth and Caves, 2009). Through this program cities received federal funding earmarked for redevelopment spending. Until the 1990's much of this money was also earmarked for specified urban renewal zones defined by the planning departments, and the era displayed a good deal of integration of urban planning and urban

development initiatives. Much of this development also came in the form of large projects with a large proportion of public investment making up the total development cost.

During the 1990's the funding process for urban development was overhauled and transitioned away from targeted urban renewal zones which were viewed as restrictive and the process of defining them as useless. Similarly, planners were stripped of much of their influence in the process except for updating and changing zoning designations and offering assistance with demographics and other quantitative data. Cities still receive small annual CDBG disbursements from the federal government, but much more money is now allocated on an individual project basis through application and review processes. Overall these types of processes were implemented in an attempt to curtail the perception of overall poor and politically motivated investment decisions made by cities in the previous era. States have also increasingly taken on roles similar to HUD and created their own economic development departments dispersing funding in a similar application based fashion.

The current grant application process forces economic development departments to put together or commission reports showcasing the worth of the public investment. This usually includes estimations of a few key metrics including: potential job creation, tax base increases, home ownership increases, and total development cost. With decreasing operating budgets and increasing demands to create such reports development professionals are often swamped with work (Personal Experience).

In discussing motives for urban development strategies, scholars often focus on the issues of local government finance. Simply put, governments must take in money to finance their normal operations and the services they provide. A small amount of aid comes from State and Federal Governments, but the majority of a city's income comes from property taxes. The city extracts taxes from property owners annually based on a set percentage of the assessed value of property. Property values are reassessed in a regular interval, usually every four to five years, or whenever major changes or sale of a property are made. Local governments are thus uniquely dependant on the value of

property in their city, also referred to as 'tax base'. Scholars like Lyons (1991) have recognized the 'capitalization of property tax', a process by which future property taxes are accounted for in present terms during sale, development, and individual cost benefit analyses. This stands in contrast to older urban planning which envisioned overall and long term improvements to a city, but would have more subjective or small impacts on values and statistics.

### ***Contemporary Strategies, Policy Shifts***

More recent local economic development in the United States can be reduced most simply to the practice of using public taxes to spur economic growth of a city and attract further investment. The success of economic development is typically measured in terms of jobs, residents, and tax base gained as a result of the initial investment. These are easily measured outcomes that also have bearing on the health and continued funding of local government projects.

Economic development funding can come from varying levels of governance, but its use is most commonly targeted at the local urban level. Most State, and County governments have economic development agencies that offer funding to cities within their jurisdictions. Similarly, the national government's Department of Housing and Urban Development (HUD) disburses funding to the local level. This type of funding is awarded through an arduous approval process in most cases, and submissions require a good deal of preparation.

As outlined by Hackworth (2007), Grimsey and Lewis (2004), and others, the public private partnership (PPP) is a development strategy that has come into major use since the 1970's. This type of development incentivizes private urban development of through grants, loans, tax abatements, and various combinations of the three that all, some way shape or form, come out of public funds. Typically, grants and loans coming from the State, Federal, and County level, are earmarked for specific types of projects as they come from separate departments dedicated to different types of development. For instance, New York's Empire State Development Corporation has historic Restore NY historic

development grants, a jobs focused subsidiary tax abatement program called Excelsior, as well as other general funding available through project proposal application. From Washington, HUD offers specific grants for low-income housing development, large payouts to project grant applications, as well as other funding that is dependant legislation from Washington. On the county level, much development funding is redirected to their central cities and funding is bundled into development projects supported by the city. The local urban government has a reserve of investment capital allocated each year to the economic development department, and usually has a subsidiary development corporation to manage long-term holdings. It is the role of the economic development department to navigate these various funding sources and allocate them to projects, be they in partnership with a private firm, or entirely public.

A major area of note in the literature, is how little the rise of Public Private Partnership policy has been challenged in the political sphere (Altschuler et al, 2003). There is plenty of opposition to general economic policies that support private firms, but little opposition to these forms of fairly direct investment in private projects. Cities shifted from investment in large-scale public projects, which had grown to be unpopular to mixed success and high cost, to incentivizing private investment in the 1970's. This shift blurred the nature of public development and creates very low visibility systems of investment, such as tax abatements (Lyons, 1991). The close relationship between public and private development has been the cause for growing concern, especially as scandals have rocked city governments over bureaucrats pocketing private money in return for public investment support. My experience at City Hall in Rochester came just after a major reorganization of the economic development department following corruption in a subsidiary development corporation.

As the globe continues to be shrunk by information and transportation technologies, people and capital are also increasingly mobile. Both carefully weigh the costs and benefits of their locations, taking into account elements like taxes, amenities, services, and infrastructure among others. National

governments lose their significance, as cities across the world and within regions compete for the most desired businesses and residents. To succeed in this competition, cities must market themselves on both a global and local scale, showcasing their unique attributes in addition to the fundamentals of urban life. Economic development departments play an important role.

### ***GIS Studies of Property Value***

Despite the widespread practice of urban development and public economic investment, I was unable to find studies that completed a similar analysis to the one I was planning. I did come across a few studies that used a similar methodology to the one I hoped to employ however, and while looking at different variables, address the impact of proximity through GIS. De Sousa and coauthors published an article in 2009 that was closest to the scope of my project. It focused on the effect of the redevelopment of former industrial sites, or brownfields, on surrounding property values in the cities of Minneapolis and Milwaukee. They utilized GIS software and completed a hedonic regression analysis of the effect of development on surrounding parcels within a sequence of 500 foot buffer zones. They used housing transaction data for a given year before development and captured any change based on difference to a later year's data. They however developed a very complex model that included assessments of area demographics, geography, housing stock, and other factors that would influence the relationship. They also surveyed and interviewed stakeholders to better understand the perception, impact, and politics of such development. They found brownfield projects to have a significant effect on surrounding property values. They also found that public involvement and investment had no effect on the economic impact of the project. This would support public private partnerships, and the authors suggest that the public needs only provide only enough funding to make such projects feasible. Another interesting result showed that proposed and final land use had a major effect on the surrounding properties. The method, hypotheses, and results of this study are very much in line with my thesis. I however did not have access to the same data resources, have as much time, or have experience in the more advanced analysis



techniques. I do take some inspiration from this work, including the theoretical foundations for the effect of development projects, public development funding ideology, and other elements.

# Methods

## **Introduction, Hypothesis**

In addressing my research question and formulating my hypothesis, I worked with several different sources, a harrowing amount of data, finicky software, and many different strategies of analysis. The final analysis procedure is the result of more trial and error than a distinct methodology. This is in large part because I was teaching myself the software and data analysis techniques along the way. Regardless of the meandering process, I took great strides to preserve the scientific and academic quality of this project, with the eventual application of my findings in mind.

In consulting previous literature, my previous experience, and initial evaluations of my data I made the following hypothesis regarding my research question:

1. Economic development projects should have a positive effect on neighboring property values due to spillover effects and viewing aspects of neighborhood redevelopment as public goods. Regression and correlation should show a negative relationship between distance from project site and increase in value for a parcel.

I believe this hypothesis is theoretically grounded and testable through a methodologically sound statistical analysis of property assessment values, and assessment of my personal experience and other primary sources.

## **Data Sources**

As I mentioned in my personal experience chapter, I worked on several data analysis projects during the course of my internship with the City of Rochester's Department of Business and Housing Development. This thesis project is inspired in part by the analysis I conducted of

the PILOT program, and draws on the methodology I developed when working with related data. The major goal of the project was to access what projects assisted by this alternative funding method pay per unit in taxes when compared to similar units in a market area.

I worked with Head Assessor Tom Hounker and Nala Sangaramoorthy in the Department of Assessment to obtain historical tax assessment data. While I was looking at projects that dated back to the 1970's, data stored electronically only went as far back as 1990. I also learned that the City reassesses property values every 4 years, and that assessment values remain constant between reassessment years unless there is a major alteration to the property. The reassessment years in the data I looked at were 1990, 1996, 2000, 2004, 2008, and 2012. Initial reassessments were being completed in January of 2012 when I extracted my most recent data, while property owners had an opportunity to dispute their assessments up until the end of March. According to Tom Hounker, little over 6% of parcels schedule such a review. Thus, 2012 figures can be used to address some aspects of the discussion, but not taken to be a final truth.

I received comma-delimited files for each reassessment year. Each contained a row for each of the roughly 66,000 parcels in the city. I used excel's vlookup function to combine the data into one spreadsheet using the SBL identifier as a common field, or key. SBL stands for section, block, lot, and is a remnant of a paper-based system of organizing and locating highly detailed maps of the city. Huge books still exist that document these maps and aspects such as property lines, but much of this has been digitized to PDF formats. In the future these should all be integrated into a GIS system.

I also received my GIS spatial data from my time working with BHD, and had access to their full library of GIS data. I acquired a current shapefile of all the parcels in the city and

included the necessary SBL attributes to work with my other data sources. This shapefile is updated annually by the Monroe County GIS department.

### **Data Evaluation, Management**

One major issue I encountered was the fact that when parcels were combined or split, they were assigned a new SBL. Unfortunately, this was done without a uniform system, and made piecing together assessment histories for select parcels impossible. Other parcels also had mysteriously missing data. Fortunately, of the 66449 parcels, 62083 had complete assessment records. Representing 93.4% of the population fully, I still feel that the data is more than adequate to make claims and generalize to those with missing data. When possible, I included all available statistics in my calculations. This made sense for historical mapping of assessment statistics. For more sophisticated and geographically oriented assessments such as cluster analysis and near regression I used only parcels with full histories.

Working with historical consumer price index data (CPI) and historical tax rates I computed new variables for taxes owed, and real dollar values for each reassessment year in Excel. I also computed the change and percentage change between reassessment years for all of these variables. I also cleaned the data, clearing error cells resulting from my calculations and formatting variable names to work within both SPSS and GIS.

Once this was complete I worked with the file in SPSS as it allows for much easier initial analysis of data for quality and quick descriptive statistics outputs. Initial evaluations showed relatively healthy data, with a few large outliers. This is however to be expected, especially when I found many outliers to be industrial parcels and others that would be expected to have extremely high assessment values. A comparison of variable means by zipcode also seemed to

show some promising initial results. This SPSS file also allowed for other intensive statistical analysis procedures such as my proximity analysis regression, zip code analyses, and others which couldn't be completed in GIS.

GIS was however useful in to conducting spatial analysis and mapping, and I brought imported this SPSS data to conduct these procedures. Due to aggravating data processing and computing demands, the data had to be saved in a .dbf database format from SPSS, then 'exported' using ArcCatalog into the .gdb geodatabase file collection as a duplicate .dbf file. Without doing this further functions would fail. I then conducted a data join based on SBL ID between the parcels shapefile and the property info file. Like a vlookup, the join uses the unique SBL ID field as a key to match cases and add variables to the shapefile data table. Immediately I found that conducting any function on a joined data set of this size crashed GIS. I was forced to export the joined files, creating a new shapefile with all of the info.

One issue with shapefile as a filetype however, is that it cannot store null values, or empty cells, and converts them to zeros when created from a joined file like the one I was working with. Due to the large amount of missing data and the type of analysis I was planning, I was forced to create a secondary shape file that contained only parcels with full assessment records. This required a bit of back tracking, going back to the earlier excel file and using some functions to identify all records missing any data, and deleting them. Again I took the propinfo file through SPSS and into GIS via a series of exports and imports, joined with the parcels file, and exported as a full shapefile.

This file finally worked for everything I needed in GIS, including spatial statistics functions such as Hotspot Analysis and Cluster and Outlier analysis. These were valuable for the study while took a long time to produce and simmlar to the regression analysis.

### **Citywide Property Value Maps**

With the original joined file that included missing data, I created a series of maps showing changes in historical and adjusted real assessment values (2011 Dollars). I chose a color scheme and ranges that made sense for this project and the monetary variables. Viewing these allows one to see trends and clusters from a subjective standpoint. Full city views of these maps are included in this document, but full interactive layered maps are available electronically via link in the appendix and viewable with Adobe Reader. These are valuable to explore and view data with more detail.

### **Cluster Map**

Using the shapefile that included only parcels with full assessment records, I was able to utilize the cluster and outlier analysis tool in GIS. This tool accesses the value increase of each parcel and compares it to the values of parcels surrounding it. The tool created a new shapefile of all the parcels with a variety of variables relating to the effects of clustering, and highlighting parcels that showed increase and were surrounded by others that showed the same. This map was useful for identifying both citywide trends from a more qualitative perspective and also comparing to economic development sites.

### **Proximity Analysis Regression**

Using the original joined shapefile that included parcels with missing data I computed a new field for each parcel using the 'near' tool in GIS for the distance to the nearest project site

for all projects completed in given years. Exporting the data back to SPSS I was able to run a regression between distance to project site and increases in property value for the 2000 to 2012 timespan. This analysis addresses my second hypothesis, and I was expecting to see negative correlations and regression coefficients. Initial linear regressions proved statistically insignificant, had low positive correlations, or very low negative correlations in some cases. Controlling for some variables helped improve these results, showing more significant and negative correlations, but not to a degree where I was confident in the results. The same was true for eliminating extreme outliers from the analyses. I then revised the analysis to look at 2004-2012 and it showed better results. See the findings section for example outputs and further discussion.





# **Citywide Assessment Value, Historical Analysis**

## **Choropleth Maps**

The maps on pages 40- 46 reveal that property values have largely been stagnant or lost value throughout the last twenty-two years. The South Wedge and the areas surrounding East and Park Aves in the east were the only collective areas showing growth from 1990 to 2012. This geography is true of both the Historical Dollars and Real Dollars analysis, while more pronounced in the Real Dollars map.

Comparing the two decades, values in the 2000-2012 time span fared slightly better than the 1990-2000 span, but still did not paint a hopeful picture for much of the city. Again the South Wedge and East/Park areas were the only collective value gainers in the 2000's. Select industrial parcels along the river to the North of downtown also gained major value but didn't seem to have spillover effects. Again, this is true of both the Historical Dollars and Real Dollars maps, with more pronunciation in the Real Dollars map.

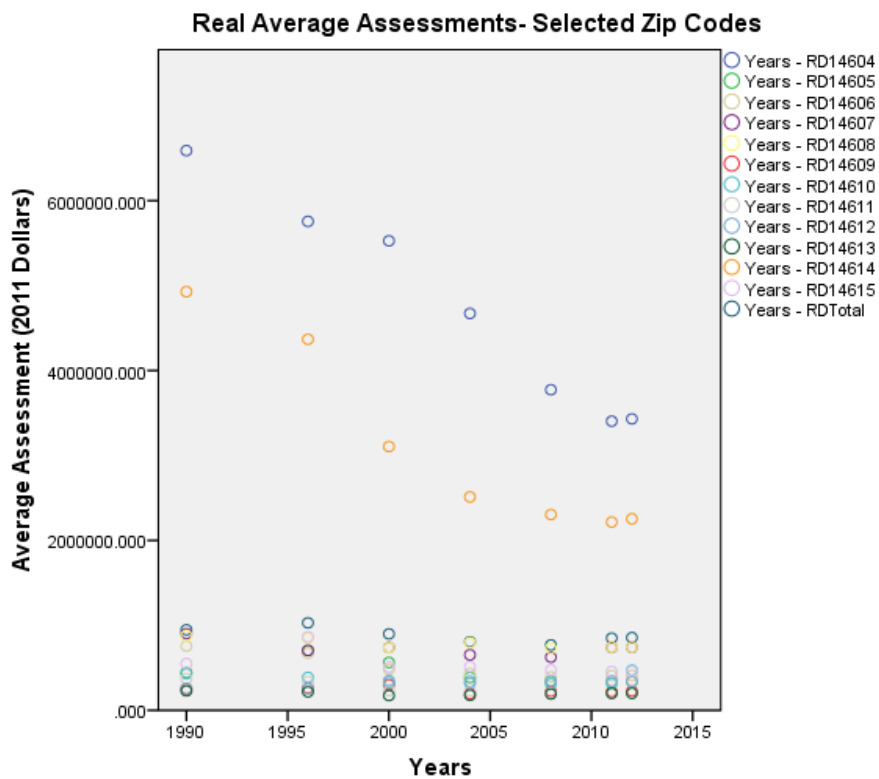
This mapping also reflects values consistent with general assessments of the economic climate of Rochester and Upstate New York in these periods. The late 1990's were a time of generally stagnant values for Rochester while Kodak began to slip in market share to Fujifilm, outsource labor, and other companies continued to shift jobs and investment out of the city.

This trend continued into the 2000's with a similarly stagnant local economy, even in the face of overall national growth with the housing bubble. This meant however that Rochester also came down easier in crises than other areas of the country that felt the economic trough of the decade much harder. The September 11<sup>th</sup> attacks had a slight effect on property values nationally, while the market crash of 2007-2008 affected national values considerably.

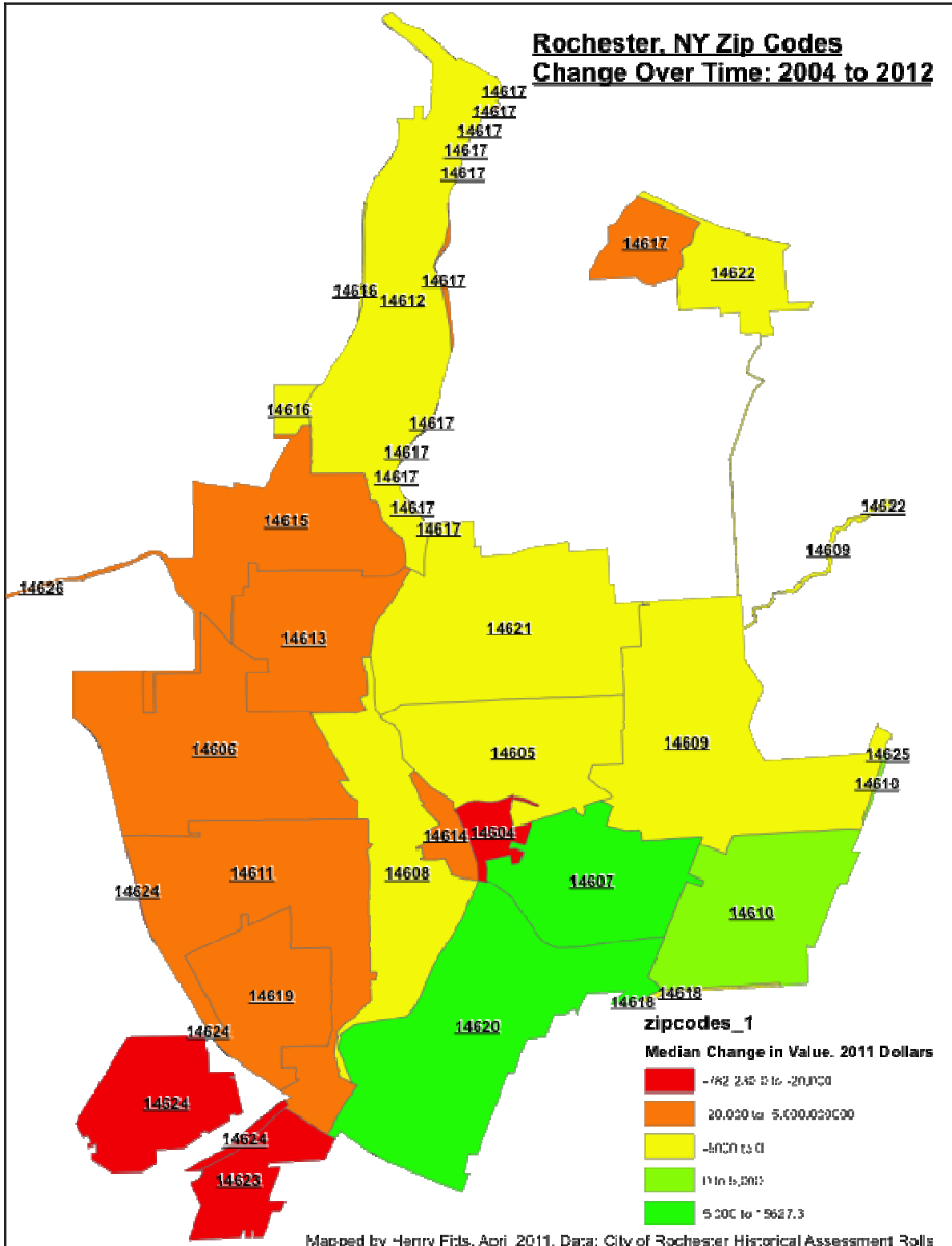
## Effects of National Economy, Housing Bubble

Unfortunately the reassessment year of 2008 doesn't allow for this analysis to showcase the projected highest property values that would have occurred in 2007 due to the housing bubble. The 2004 reassessment should however, should reflect a period of the most drastic increases in value of property in during housing bubble period. Assessors using modern techniques and noting national trends would have assessed properties with this trend in mind.

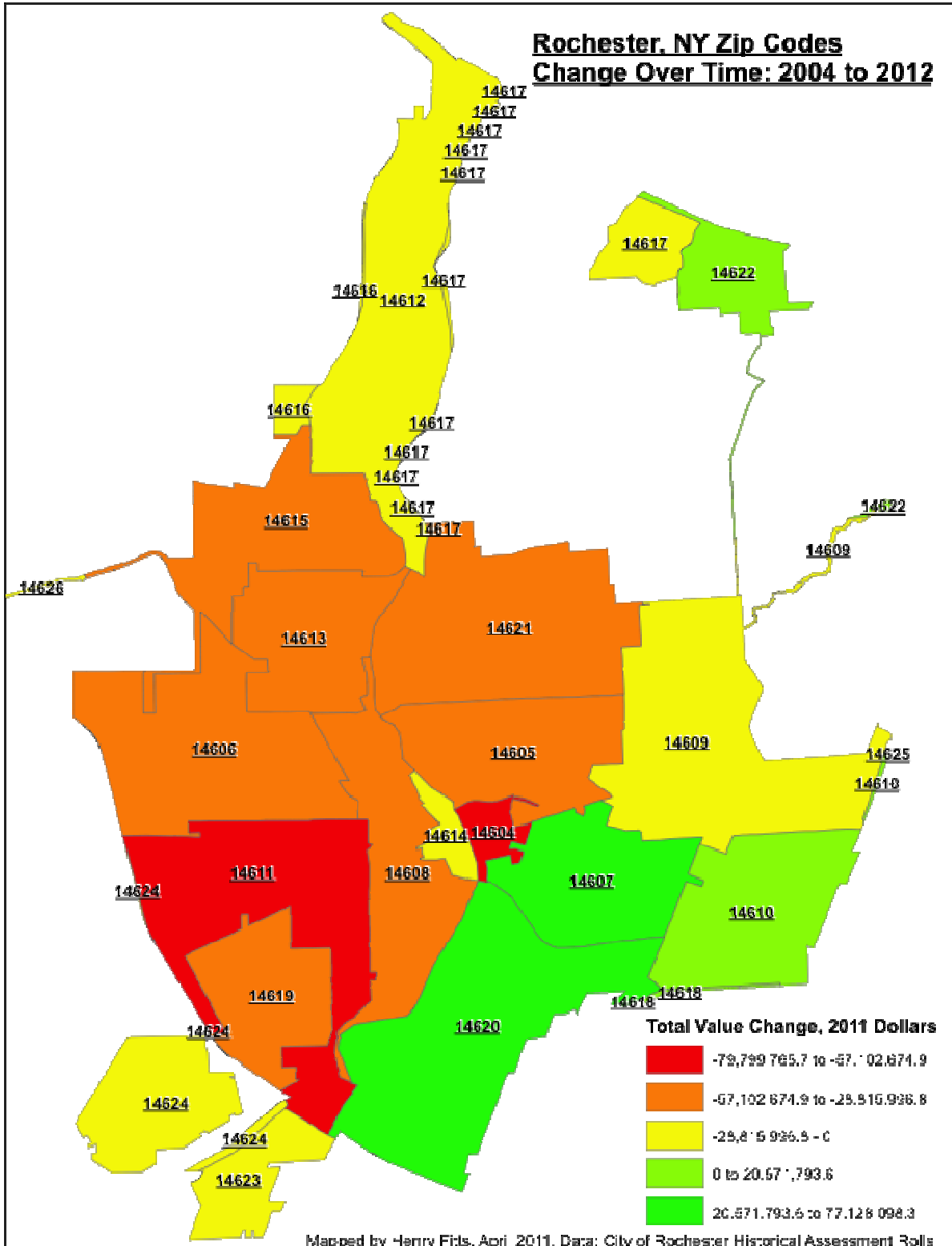
The graph below shows historical values for selected zip codes. We don't however see the drastic increases in assessments between 2000 and 2004 that would be expected if the Rochester real estate market reflected national trends. Values are similarly stagnant to other periods and reflect the sluggish economy Rochester experienced throughout the period I surveyed.



**Rochester, NY Zip Codes  
Change Over Time: 2004 to 2012**



**Rochester, NY Zip Codes  
Change Over Time: 2004 to 2012**



**By Zip Codes**

As is seen on the previous maps and in the table below, zip codes including the South Wedge and the areas adjacent to Park and East avenues were the areas that had major positive values for median real dollar increase for the given time spans and showed an increase in total value.

These areas have been early leaders in the gentrification of Rochester’s aging neighborhoods and continue to be major success stories for redevelopment. The South Wedge has served as one of Rochester’s most gay friendly neighborhoods, and Park Ave has long been a popular neighborhood for recent college grads. Combined, these two groups have been often been referred to in Urban Studies and Economic Development discourse as the ‘creative class’. They are highly mobile educated professionals that can have a drastic impact on urban dynamics, and are seen as the key to economic revitalization strategies.

**Report**

ZIPCODE		HDPC0412	RDPC0412	HDPC0012	RDPC0012	HDPC9012	RDPC9012
14604	Mean	.1957	.0100	.2838	-.0114	.1683	-.3173
	Grouped Median	.0051	-.1553	.0018	-.2299	.0328	-.3965
	Std. Deviation	1.51605	1.28065	1.76176	1.35669	1.71312	1.00106
14605	Mean	.1485	-.0298	.0917	-.1593	-.1030	-.4759
	Grouped Median	.0014	-.1553	.0002	-.2299	-.2760	-.5769
	Std. Deviation	1.59848	1.35028	1.42536	1.09764	1.31272	.76709
14606	Mean	.0436	-.1185	.0378	-.2008	-.1618	-.5102

	Grouped Median	.0009	-.1553	.0298	-.2070	-.2081	-.5373
	Std. Deviation	.77567	.65523	.48038	.36993	.75243	.43969
14607	Mean	.3230	.1175	.5443	.1892	.5053	-.1204
	Grouped Median	.2531	.0586	.5217	.1719	.4781	-.1362
	Std. Deviation	.87871	.74227	.79188	.60981	.46605	.27234
14608	Mean	.3764	.1627	.3346	.0278	.0609	-.3801
	Grouped Median	.0206	-.1380	.0023	-.2297	-.2088	-.5376
	Std. Deviation	2.85003	2.40750	2.13350	1.64296	1.38604	.80993
14609	Mean	.1658	-.0152	.1563	-.1096	.0236	-.4018
	Grouped Median	.1137	-.0592	.1364	-.1249	.0013	-.4149
	Std. Deviation	.88070	.74395	.41317	.31817	.68760	.40180
14610	Mean	.2561	.0611	.4786	.1387	.4711	-.1404
	Grouped Median	.2334	.0418	.4533	.1192	.4163	-.1724
	Std. Deviation	.37929	.32040	.39592	.30489	.53458	.31238
14611	Mean	.1369	-.0396	.0752	-.1720	-.1499	-.5033
	Grouped Median	.0003	-.1553	.0015	-.2299	-.1915	-.5276
	Std. Deviation	2.09881	1.77292	1.61973	1.24732	.71135	.41568
14612	Mean	.1524	-.0266	.2845	-.0108	.3464	-.2132
	Grouped Median	.1231	-.0513	.2343	-.0495	.1598	-.3223
	Std. Deviation	.45277	.38247	.76849	.59180	1.59430	.93163
14613	Mean	.1035	-.0678	.1396	-.1224	-.1930	-.5284
	Grouped Median	.0365	-.1245	.0963	-.1557	-.1910	-.5273
	Std. Deviation	1.32476	1.11906	1.25035	.96287	.45565	.26626

14614	Mean	.2395	.0470	.8794	.4473	.4149	-.1732
	Grouped Median	.0137	-.1553	.0153	-.2299	.0347	-.3962
	Std. Deviation	.78784	.66551	9.42669	7.25929	2.04379	1.19429
14615	Mean	.1467	-.0314	.2440	-.0420	.0078	-.4111
	Grouped Median	.0801	-.0877	.1632	-.1042	-.0608	-.4512
	Std. Deviation	1.47848	1.24891	2.00117	1.54106	1.63186	.95358
14616	Mean	.1272	-.0478	.2002	-.0757	.1539	-.3257
	Grouped Median	.1329	-.0430	.2015	-.0748	.1189	-.3462
	Std. Deviation	.08264	.06981	.10917	.08407	.54650	.31935
14617	Mean	.1207	-.0533	.4214	.0946	.4409	-.1580
	Grouped Median	.0103	-.1553	.0192	-.2299	.0347	-.3954
	Std. Deviation	.43775	.36978	1.61251	1.24176	2.02403	1.18275
14618	Mean	.1971	.0112	.4555	.1208	.5303	-.1058
	Grouped Median	.1799	-.0033	.4024	.0800	.4695	-.1413
	Std. Deviation	.23492	.19845	.40047	.30840	.51840	.30293
14619	Mean	.0549	-.1089	.1370	-.1244	-.0056	-.4189
	Grouped Median	.0438	-.1183	.1336	-.1271	-.0110	-.4221
	Std. Deviation	.19179	.16201	.25664	.19763	.25138	.14690
14620	Mean	.4229	.2020	.5807	.2173	.6248	-.0505
	Grouped Median	.3820	.1674	.5795	.2164	.4940	-.1270
	Std. Deviation	.86305	.72904	.91034	.70103	7.18249	4.19710
14621	Mean	.1766	-.0061	.1110	-.1444	-.1360	-.4951
	Grouped Median	.0347	-.1259	.0176	-.2164	-.2102	-.5385

	Std. Deviation	2.93461	2.47894	5.24086	4.03588	5.45927	3.19014
14622	Mean	.1308	-.0448	.3332	.0267	1.1689	.2674
	Grouped Median	.1293	-.0825	.3559	.0442	1.1945	.2823
	Std. Deviation	.16067	.13572	.31335	.24130	.93510	.54643
14623	Mean	.0000	-.1553	.0000	-.2299	.0347	-.3954
	Grouped Median	.0000	-.1553	.0000	-.2299	.0347	-.3954
	Std. Deviation	.00000	.00000	.00000	.00000	.	.
14624	Mean	-.0347	-.1846	.0441	-.1959	.1365	-.3359
	Grouped Median	.0100	-.1553	.0243	-.2299	.0347	-.3954
	Std. Deviation	.26813	.22650	.38718	.29816	.59555	.34801
14626	Mean	.0000	-.1553	.0000	-.2299	-.0187	-.4266
	Grouped Median	.0000	-.1553	.0000	-.2299	.0347	-.3954
	Std. Deviation	.00000	.00000	.00000	.00000	.14119	.08250
Total	Mean	.1887	.0041	.2241	-.0573	.0676	-.3762
	Grouped Median	.0796	-.0880	.1250	-.1337	-.0393	-.4386
	Std. Deviation	1.66977	1.41050	2.33182	1.79568	3.08783	1.80438

**Report**

ZIPCODE	HDC0412	RDC0412	HDC0012M	RDC0012
14604 Sum	-2583025.00	-79799765.76	- 47504735.0000 0	-1.78E8



	Mean	-8906.9828	-275171.6061	-	-619478.6066
	Grouped Median	298.1132	-21721.6144	164946.9965278	-40176.9868
14605	Sum	14694590.00	-28815996.81	1250415.00000	-69809192.02
	Mean	3923.7891	-7694.5252	342.8612558	-19141.5388
	Grouped Median	56.4589	-3430.3560	7.7661431	-7698.3796
14606	Sum	14047891.00	-44594501.36	13097275.00000	-80146681.39
	Mean	3370.4153	-10699.2566	3162.8290268	-19354.4268
	Grouped Median	37.0184	-7199.7011	1066.6666667	-10421.3067
14607	Sum	1.67E8	39349552.25	2.35716E8	51701277.01
	Mean	46016.0984	10813.2872	65367.7016084	14337.5699
	Grouped Median	31118.7500	7303.0505	54360.0000000	21044.4492
14608	Sum	31740912.00	-31294346.91	20520370.00000	-70949323.91
	Mean	8569.3607	-8448.7978	5667.0450152	-19593.8481
	Grouped Median	503.3333	-3520.3195	90.3296703	-7075.6766
14609	Sum	96061174.00	-21163062.18	97732891.00000	-87659108.55
	Mean	9665.0744	-2129.2949	9919.0998681	-8896.6922
	Grouped Median	5928.3654	-2658.5557	6981.9548872	-7017.0143
14610	Sum	1.02E8	20571793.62	1.59138E8	51943903.86
	Mean	35094.3725	7108.4290	56113.4040903	18315.9040
	Grouped Median	24450.0000	4616.5907	40031.5789474	12953.0942

14611	Sum	7781407.00	-57102674.95	9997680.00000	-91961043.60
	Mean	1288.9526	-9458.7833	1693.3739837	-15573.4197
	Grouped Median	19.5210	-6655.4748	88.6454183	-10367.3160
14612	Sum	46770894.00	-7022538.74	62897575.0000 0	-15834335.23
	Mean	15072.7986	-2263.1449	20514.5384866	-5164.4929
	Grouped Median	9005.7143	-3186.1838	15841.6666667	-2983.9970
14613	Sum	17569747.00	-33939714.51	30286040.0000 0	-48507479.98
	Mean	4325.3932	-8355.4196	7505.8339529	-12021.6803
	Grouped Median	1971.4286	-7109.7738	4937.8205128	-9137.0454
14614	Sum	18301060.00	-17825643.07	-115060.00000	-57518185.87
	Mean	81338.0444	-79225.0803	-532.6851852	-266287.8975
	Grouped Median	81.0526	-9705.1255	65.1515152	-24050.1466
14615	Sum	5070926.00	-43967961.02	13151302.0000 0	-54349464.50
	Mean	1706.8078	-14799.0444	4583.9323806	-18943.6962
	Grouped Median	4941.4634	-5639.2612	8929.0322581	-7083.3305
14616	Sum	3258800.00	-1717414.46	4751600.00000	-2885561.61
	Mean	10152.0249	-5350.2008	14802.4922118	-8989.2885
	Grouped Median	9700.0000	-3275.0778	14018.1818182	-6079.8139
14617	Sum	315700.00	-2824616.31	348000.00000	-912529.36
	Mean	8307.8947	-74332.0082	10545.4545455	-27652.4048
	Grouped Median	1490.3226	-10648.9617	2772.0000000	-12558.3291
14618	Sum	4142400.00	698698.57	7611700.00000	3195741.91

	Mean	46026.6667	7763.3174	85524.7191011	35907.2125
	Grouped Median	40250.0000	-18.3814	87333.3333333	18731.9426
14619	Sum	16166049.00	-41487167.07	38710609.0000 0	-47789543.08
	Mean	3329.0875	-8543.4858	7979.9235209	-9851.4828
	Grouped Median	2785.4167	-8447.9145	7472.0000000	-8904.9532
14620	Sum	2.40E8	77128098.27	2.91376E8	47840864.71
	Mean	43841.3557	14110.5193	53660.3243094	8810.4723
	Grouped Median	31075.9259	15627.3684	40941.4634146	19190.6682
14621	Sum	62561347.00	-47922984.80	61502639.0000 0	-1.16E8
	Mean	6593.0390	-5050.3725	6542.8339362	-12348.2090
	Grouped Median	1088.9447	-4752.0820	630.3370787	-9955.8500
14622	Sum	321100.00	15325.30	668300.00000	275293.35
	Mean	40137.5000	1915.6621	83537.5000000	34411.6681
	Grouped Median	18750.0000	-945.9991	69150.0000000	11526.1419
14623	Sum	.00	-1564459.92	.00000	-2541152.43
	Mean	.0000	-782229.9595	.0000000	-1270576.2138
	Grouped Median	.0000	-782229.9595	.0000000	-1270576.2138
14624	Sum	-446700.00	-14900533.27	643000.00000	-22509012.19
	Mean	-14409.6774	-480662.3636	20741.9354839	-726097.1673
	Grouped Median	78.2609	-31744.6896	426.3157895	-50398.4831
14626	Sum	.00	-86852.15	.00000	-141073.95
	Mean	.0000	-12407.4496	.0000000	-20153.4219

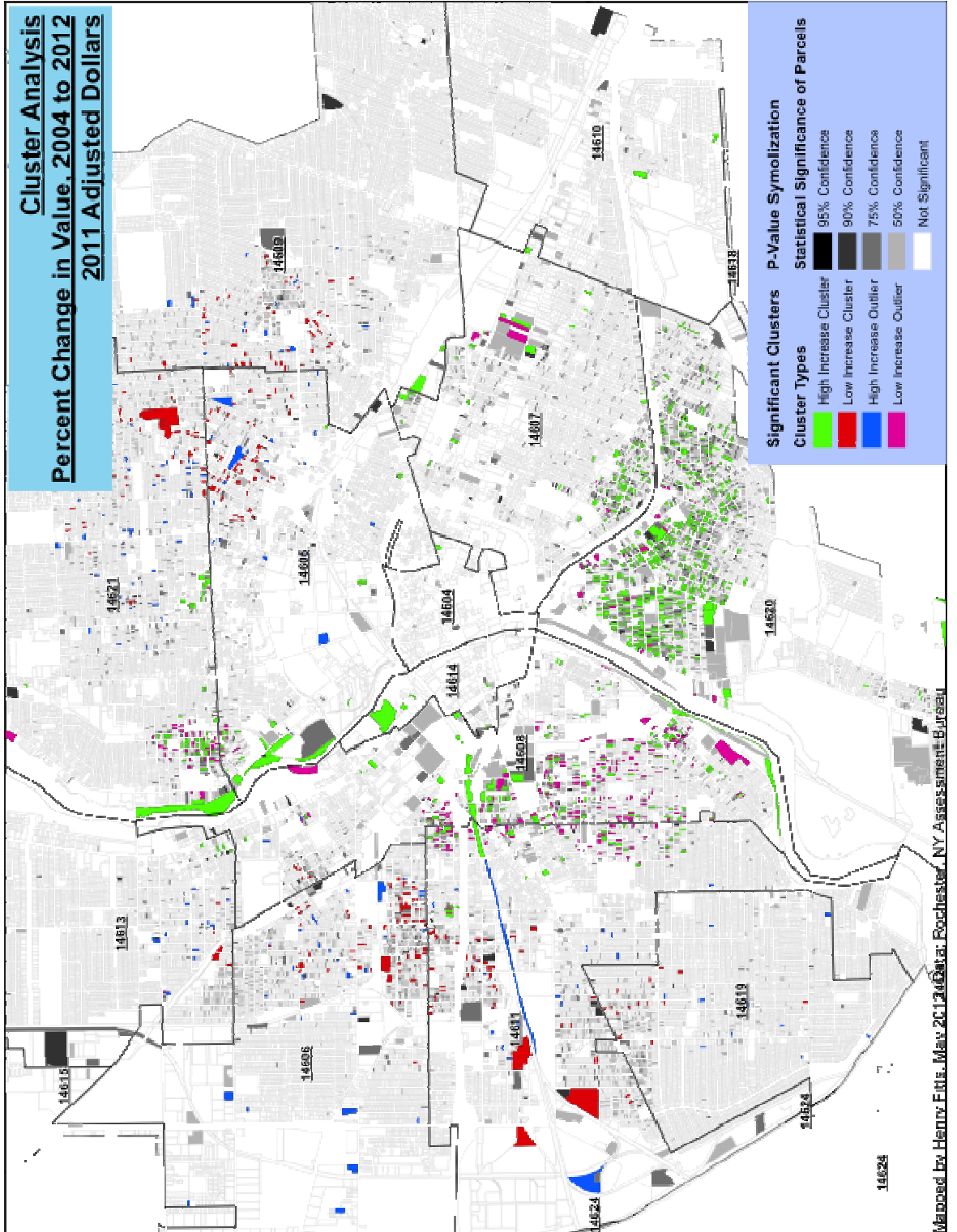
	Grouped Median	.0000	-11378.0908	.0000000	-18481.4343
Total	Sum	8.44E8	-3.38E8	1.00178E9	-7.93E8
	Mean	12974.2155	-5197.3076	15590.9158652	-12342.0685
	Grouped Median	3939.3600	-3860.2732	5940.7325194	-6615.3293

## **Cluster Map**

The map below displays visualization based on the cluster-outlier analysis tool output in GIS. Again this used percent change in value as the base variable and compared values for parcels to proximity. This map shows two layers: one that highlights the major clusters and outliers, and one that shows the overall statistical significance of each parcel to an inverse distance relationship to gains in value.

As would be expected from the previous analyses, the South Wedge neighborhood to the south of the Central Business District is a site of major clustering. Other more isolated clusters exist around the city, as well as pockets of cluster parcels interspersed with outlier parcels. The latter may be areas receiving investment while still on a general decline.

Very interestingly, there is very limited clustering in the East Ave and Park Ave neighborhoods in the 14607 zip code. This was very unexpected especially as those areas showed strong positive mean and median parcel increase values. This may be because this area is a more established strong neighborhood hasn't seen as drastic increases in value as South Wedge which started improving more recently.

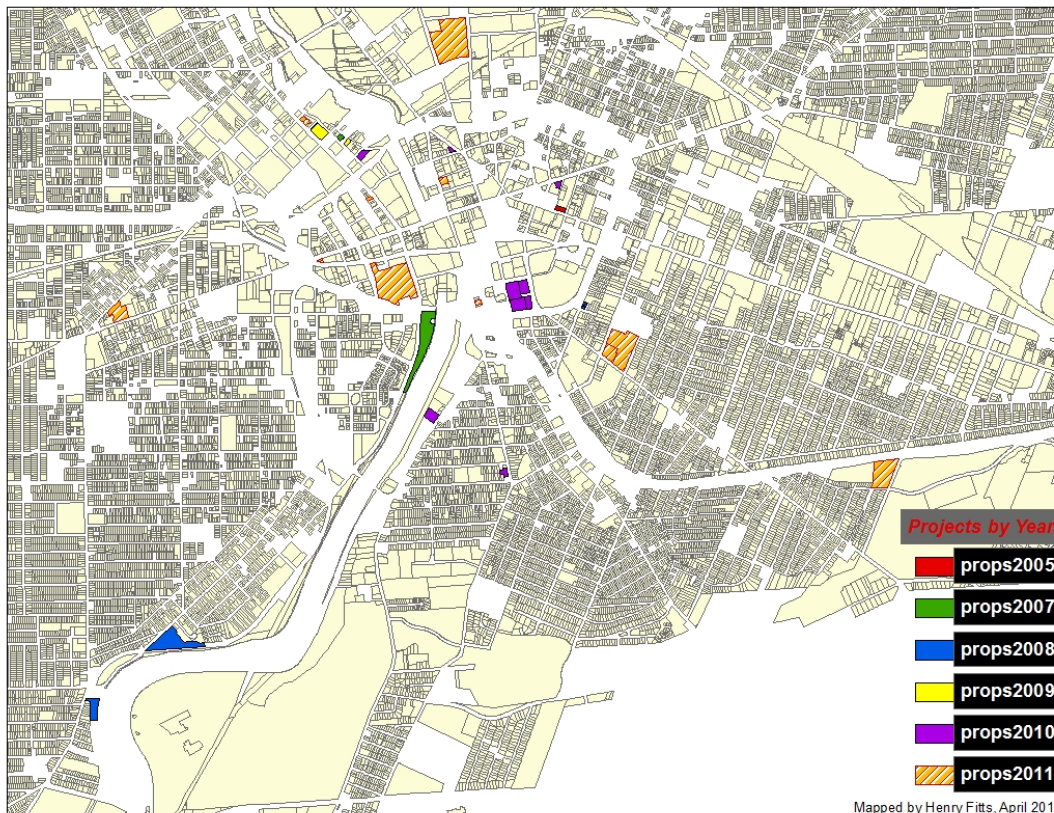


# Project Proximity Analysis

## Selected Projects

Below is a map of selected projects from the last decade, also listed below. These projects were selected to capture a variety of project types and sizes, and chosen from a pool of projects of which I had the most information and experience.

When compared to the initial orienting map of the city, it should be immediately obvious that these projects are primarily near or within downtown. Recalling the earlier general assessment value historical map, this is a potential red flag for my hypothesis as downtown properties were primarily stagnant or lost value through the 2000's.



Title	Year Completed
The Sagamore	2005
Parry Building	2007
Corn Hill Landing	2007
Union/Lafayette Townhomes	2008
Riverview Student Housing	2008
Brooks Landing Hotel	2008
Mills at High Falls I	2009
Parizan Building	2009
Eastman Theatre	2010
ESL Headquarters	2010
The Hamilton	2010
South & Hickory Place	2010
Trolley Barn	2010
Kirstein Building	2010
DePaul West Main	2011
VOA State Street	2011
Monroe County Crime Lab	2011
Fight Village	2011
Mills at High Falls II	2011
H.H. Warner Building	2011
Nothnagle Headquarters	2011
Capron Street Lofts	2011
Culver Road Armory	2011
Alexander Park	2011



### **Correlation- Distance compared to Value Change**

Creating a value in GIS for distance to nearest project site allowed me to run statistical analyses between this distance to project and change in property value over various time spans. Below is a table of the correlations for Percent Change in Historical Value from 2004 to 2012 (HDPC0412), the same variable with outliers removed (MOHDPC0412), Percent Change in Real Dollar Value from 2004 to 2012 (RDPC0412), and it's corresponding variable with outliers removed (MORDPC0412). These are all correlated with the variables for distance to closest development project for each year of development projects. The variables are named NEAR followed by the year. I also included NEARALL for an overall correlation.

These values show a low correlation between distance to project site and percentage change in property value. The strongest correlation was -.247 for distance to closest development project completed in 2010 and Percent Change in Assessment Value, Historical Dollars for 2004 to 2012. This was statistically significant to the 99% confidence level. I was also pleased to see that for distance to all projects for the same time span this was also significant and has a correlation value of -.125.

A few correlations were not found to be statistically significant including years 2005, 2007, and 2009. Others including 2008 and 2005 displayed a positive correlation as opposed to my predicted negative correlation. Removing outliers above 200% gain in value for the MO variables improved the statistical significance, as well as the correlation. These large outliers were most often industrial properties and increase in their value, while large, showed limited positive effect on other parcels in other analysis techniques such as the cluster outlier analysis.

Overall, the regressions have mixed implications for my hypothesis. The regressions for 2010, 2011 and all projects showed expected and significant regressions, while 2005, 2007, 2008, 2009

showed the opposite or no relationship. Based on these results I expect that there are other factors involved that I was unable to account for, and further study is required to make significant claims.

		NEAR2005	NEAR2007	NEAR2008	NEAR2009	NEAR2010	NEAR2011	NEARALL
HDPC0412	Pearson Correlation	.015	-.013	.038	.005	-.023	-.020	-.027
	Sig. (2-tailed)	.632	.207	.000	.685	.008	.002	.000
	N	1017	9992	15391	5736	13623	24094	29377
MOHDPC0412	Pearson Correlation	.243	-.140	.131	-.024	-.247	-.070	-.125
	Sig. (2-tailed)	.000	.000	.000	.068	.000	.000	.000
	N	1009	9809	15260	5584	13428	23767	29038
RDPC0412Another	Pearson Correlation	.015	-.013	.038	.005	-.023	-.020	-.027
	Sig. (2-tailed)	.632	.207	.000	.685	.008	.002	.000
	N	1017	9992	15391	5736	13623	24094	29377
MORDPC0412	Pearson Correlation	.201	-.138	.127	-.018	-.244	-.066	-.122
	Sig. (2-tailed)	.000	.000	.000	.181	.000	.000	.000
	N	1014	9838	15298	5603	13468	23825	29100

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### **Regression- Proximity to Value Increase**

Presented below is a curve estimation regression for the most promising correlation between MOHDPC0412 and NEAR 2010. MOHDPC is 'Minus Outliers Historical Dollars Percentage Change' and is for values in in 2004 compared to those to 2012. Linear, quadratic, and cubic models were all found to be statistically significant. Coefficient values for each model were fairly low, indicating little influence of development projects on property values, especially at further distances.

According to the linear best fit regression for these two variables, at 3180.35 feet from project site there should be no observed effect on values, while parcels at 0 feet should see a 17% increase in value due to the project development. Each additional foot decreases percent gains by .005%. Fairly similar values were observed for the quadratic and cubic models. These models were statistically significant to the 99% confidence level and had an R square value of a little over .6, meaning that variation in the independent variable can explain about 6% of variation in the dependent variable.

Other regressions are available in the Appendix 3. These detracted from the results of this regression, as some had very weak coefficients, or were not statistically significant. This however may be due to a variety of factors that I could not account for in my simple model. A more sophisticated model like the one used by De Sousa might show that variation in distance from city center, unique geographic characteristics, and demographics might have a large effect on these results (De Sousa et al, 2009). Creating such a model would be the next step for this project.

Despite its flaws, I believe this analysis shows support for my hypothesis, and at the very least would suggest that the projects completed in 2010 were extremely successful at contributing to nearby property values.

## Curve Fit

### Notes

Output Created		10-May-2012 19:42:24
Comments		
Input	Data	\\tcddata\sandbox\SOCL201SP12\StudentWork\FittsFiles\finalfiles\finalanalysis.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	67007
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Cases with a missing value in any variable are not used in the analysis.
Syntax		CURVEFIT /VARIABLES=MORDPC0412 WITH NEAR2010 /CONSTANT /MODEL=LINEAR QUADRATIC CUBIC /PRINT ANOVA /PLOT FIT.
Resources	Processor Time	00 00:00:03.152
	Elapsed Time	00 00:00:02.383
Use	From	First observation
	To	Last observation
Predict	From	First Observation following the use period
	To	Last observation
Time Series Settings (TSET)	Amount of Output	PRINT = DEFAULT
	Saving New Variables	NEWVAR = NONE
	Maximum Number of Lags in Autocorrelation or Partial Autocorrelation Plots	MXAUTO = 16
	Maximum Number of Lags Per Cross-Correlation Plots	MXCROSS = 7
	Maximum Number of New Variables Generated Per Procedure	MXNEWVAR = 60
	Maximum Number of New Cases Per Procedure	MXPREDICT = 1000
	Treatment of User-Missing Values	MISSING = EXCLUDE
	Confidence Interval Percentage Value	CIN = 95
	Tolerance for Entering Variables in Regression Equations	TOLER = .0001
	Maximum Iterative Parameter Change	CNVERGE = .001
	Method of Calculating Std. Errors for Autocorrelations	ACFSE = IND
	Length of Seasonal Period	Unspecified
	Variable Whose Values	Unspecified
	Label Observations in Plots	

Equations Include

CONSTANT

[DataSet3] \\tcd\ sandbox\SOCL201SP12\StudentWork\FittsFiles\finalfiles\finalanalysis.sav

**Model Description**

Model Name		MOD_3
Dependent Variable	1	MORDPC0412
Equation	1	Linear
	2	Quadratic
	3	Cubic
Independent Variable		NEAR2010
Constant		Included
Variable Whose Values Label Observations in Plots		Unspecified
Tolerance for Entering Terms in Equations		.0001

**Case Processing Summary**

	N
Total Cases	67007
Excluded Cases <sup>a</sup>	53539
Forecasted Cases	0
Newly Created Cases	0

a. Cases with a missing value in any variable are excluded from the analysis.

**Variable Processing Summary**

	Variables	
	Dependent	Independent
	MORDPC0412	NEAR2010
Number of Positive Values	19020	14247
Number of Zeros	0	24
Number of Negative Values	45692	0
Number of Missing Values	0	52209
	User-Missing	
	System-Missing	
	2295	527

**MORDPC0412****Linear****Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.244	.060	.060	.307

The independent variable is NEAR2010.

**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	80.371	1	80.371	853.322	.000
Residual	1268.302	13466	.094		
Total	1348.673	13467			

The independent variable is NEAR2010.

#### Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEAR2010	-5.347E-5	.000	-.244	-29.212	.000
(Constant)	.170	.006		26.854	.000

### Quadratic

#### Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.247	.061	.061	.307

The independent variable is NEAR2010.

#### ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	82.322	2	41.161	437.661	.000
Residual	1266.351	13465	.094		
Total	1348.673	13467			

The independent variable is NEAR2010.

#### Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEAR2010	-1.666E-5	.000	-.076	-2.010	.044
NEAR2010 ** 2	-6.369E-9	.000	-.172	.	.
(Constant)	.130	.011		12.122	.000

### Cubic

#### Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.248	.061	.061	.307

The independent variable is NEAR2010.

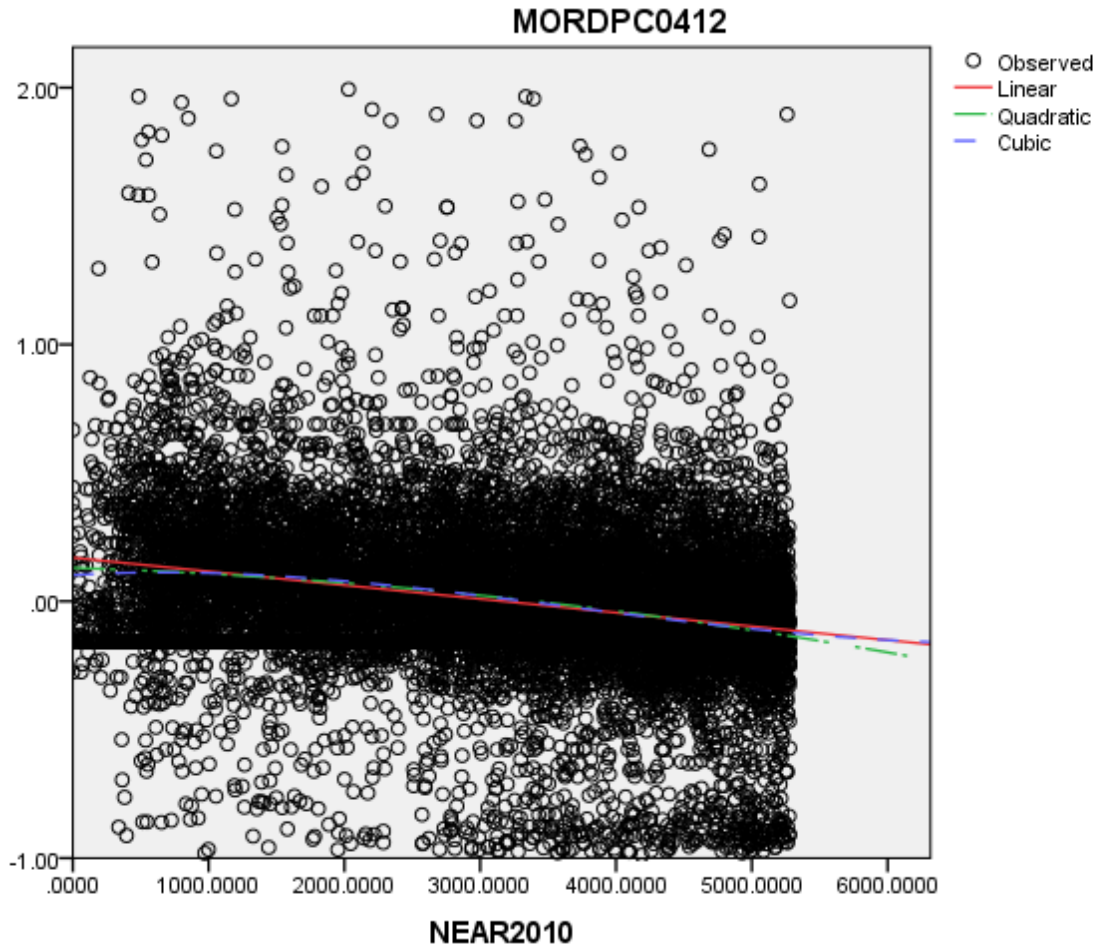
**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	82.811	3	27.604	293.597	.000
Residual	1265.862	13464	.094		
Total	1348.673	13467			

The independent variable is NEAR2010.

**Coefficients**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEAR2010	3.270E-5	.000	.149	1.411	.158
NEAR2010 ** 2	-2.710E-8	.000	-.733	.	.
NEAR2010 ** 3	2.437E-12	.000	.345	.	.
(Constant)	.102	.016		6.227	.000



## **Cluster Map Applications to Proximity Analysis**

While I was not able to fully integrate the analyses, the cluster map is useful when dissecting the regression analysis results to comparing project sites to parcels that showed clustering. Looking at the map below, the yellow striped parcels were those that showed high values for percent increase and were surrounded by parcels that has a similar increase. According to my hypothesis, project sites should thus be yellow striped as well as parcels surrounding them. Project sites are here outlined in red.

This analysis however required parcels with no missing data, and many project parcels had been combined or split and thus removed from this analysis. We can however infer the effect of the missing parcels based on surrounding parcels. The map also shows P-Value of parcels for the cluster analysis is also useful and shows darker parcels as ones that were more statistically significant and conformed more fully to the inverse distance model. From this we can see that project parcels are primarily in areas with were significant in the relationship.

Taking this all together the map shows doesn't confirm or deny my hypothesis. Some project parcels are dark, and yellow striped. Others had missing data, but were surrounded by yellow striped parcels. Still other project sites seem to be in a sea of white, and would seem to suggest they had little effect on surrounding values. Again this may be due to the varying nature of the projects, their environments, etc. Further research is needed to confirm my hypothesis.



## **Conclusion- Applications**

As I write this, my job after college with BHD is being finalized. My position as a one-year temp, long-term researcher, or paid intern all depends on the City's budget. As has been true for many years, Mayor Richards has been working hard to finalize an extremely tight budget, and to find creative ways to close fiscal gaps. The amount allocated to BHD is variable, and often politically motivated. The city's investment in economic development can be viewed as a long-term investment, and future solution to the current budget shortfalls. Whether the city shells out grants and loans directly to projects, or pays the salaries of development staff like myself, the benefit of these dollars may not be seen for a decade. Empirical evidence from projects like mine may be the only thing that can encourage oft-shortsighted politicians to continue to invest in the future. While Mayor Richard is a big picture type, and has backed major projects like Midtown Rising and Collegetown, I know that this type of data may someday prove useful in addressing which investments have been most successful. This project is also useful in highlighting the areas in which the city should focus its efforts. The worst areas need investment and help from a humanitarian and neighborhood building standpoint. Growth of those areas on the rise needs also to be fostered and channeled, and are areas where public money will go further.

It seems that the South Wedge is on a decidedly positive path to revitalization. While the city will always have an obligation to improve all areas of the city, focused investment in the South Wedge offers the best return on the investment for both public dollars and those of private partners. Moving forward I would advise a strategy of investment that plays to the strengths of the South Wedge, continuing investment in that area and fostering the growth trend. This includes linking the growth nodes at South and Hickory and at the Hamilton and Erie Harbor projects along the river. This area of the city is poised to become a driver for the city's overall revitalization.

Additional efforts should be focused in downtown and on continuing to develop amenities to meet the increased demand. With the population jump shown in the last ten years, commercial and

retail interests need to be reminded of the growing market. This is a major need as people moving downtown will need supermarkets, electronics outlets, drug stores, and other staples of a functioning neighborhood. A lack of such resources will detract from potential growth. This 'neighborhoodization' of downtown needs to be a major focus.

Lastly, the city needs to continue to address the high rate of vacant units and vacant lots primarily to the North and West of downtown. Infill rental development like the El Camino, and Olean Kennedy projects have been successful at contributing to neighborhood property values while their own increased tax revenue is deferred through the PILOT program. The HOME Rochester program has also been successful in infill owner occupied housing development, boasting less than 4% of homes reverting to foreclosure (Fitts, 2012). City initiatives like Project Green and others that plan to combine vacant parcels into higher impact green spaces also have great potential a highly positive effect of green space on property values, as documented well in the literature.

With all of these strategies moving forward, Rochester stands to grow over the next ten years. It may not make headlines or come up in daily conversation, but Rochester will improve its standing as one of America's best midsize cities. I hope to do my part in making Rochester better known, and more vibrant with every passing year.

# APPENDIX 1- Variable Definitions

## Term Definitions

**Parcel:** One of more than 66,000 properties in the city.

**SBL:** Section Block Lot unique identifier. Comes in 20 character, 10 character, and Dot/Slash varieties.

**Historical Dollar Assessment:** Assessed value of a parcel in historical dollar figures

**Equalization Rate:** The percentage of market value the assessment represents.

**Tax Rate:** The dollar amount owed per 1000 dollars of assessment value.

**Market Assessment:** For years without 100% equalization rate, the estimated market rate based on computation of the equalization rate.

**Real Dollar Assessment:** Historical assessment values adjusted for inflation based on national CPI statistics with 2011 as base year. Statistics specific for Rochester, or Upstate NY were not available for all years studied.

## Important Variable Codes:

**SBL20-** 20 Character SBL parcel identifier

**SBLID-** 10 Character SBL parcel identifier

**NEAR####-** Distance from parcel to nearest development project completed in year ####

**NEARID####-** ID of nearest development project in year ####, randomly assigned

**USECODE-** Zoning designated use of parcel. Full New York State use-code definitions available online.

**ASSESSVAL-** 2012 assessed value. A holdover variable from original property information spreadsheet.

**HD####(M/A)-** Parcel assessed value in year ####. 1990 and 1996 did not have 100% equalization rates, and thus have listed assessment value (A), and market value (M)

**RD####(M/A)-** Assessed value in year #### adjusted for inflation, or Real Dollars, with 2011 as base year. See HD#### for 'M/A'

**HDTO####-** Estimated taxes owed in historical figures.

**TPU-** Estimated taxes owed per unit, historical figures

**HDC#####-** Change in assessed value between years #### and #### in historical figures.

**RDC#####-** Change in assessed value between years #### and #### in adjusted figures.

**RDPC#####-** Percent change in assessed value between years #### and #### in adjusted figures.

**RDTO####-** Real Dollar Taxes Owed in year ####

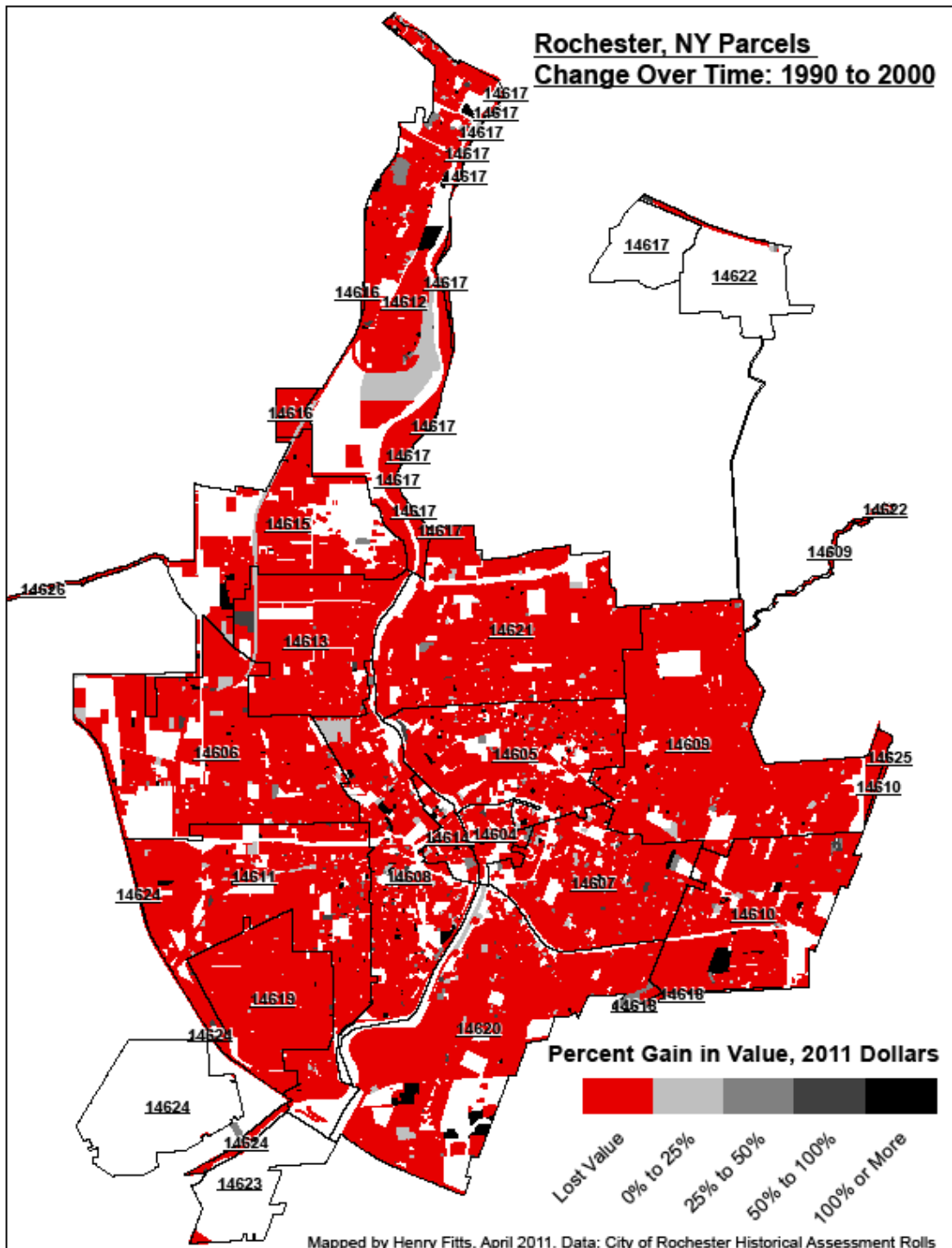
**RDTOC#####-** Change in Real Dollar Taxes Owed from year #### to year ####

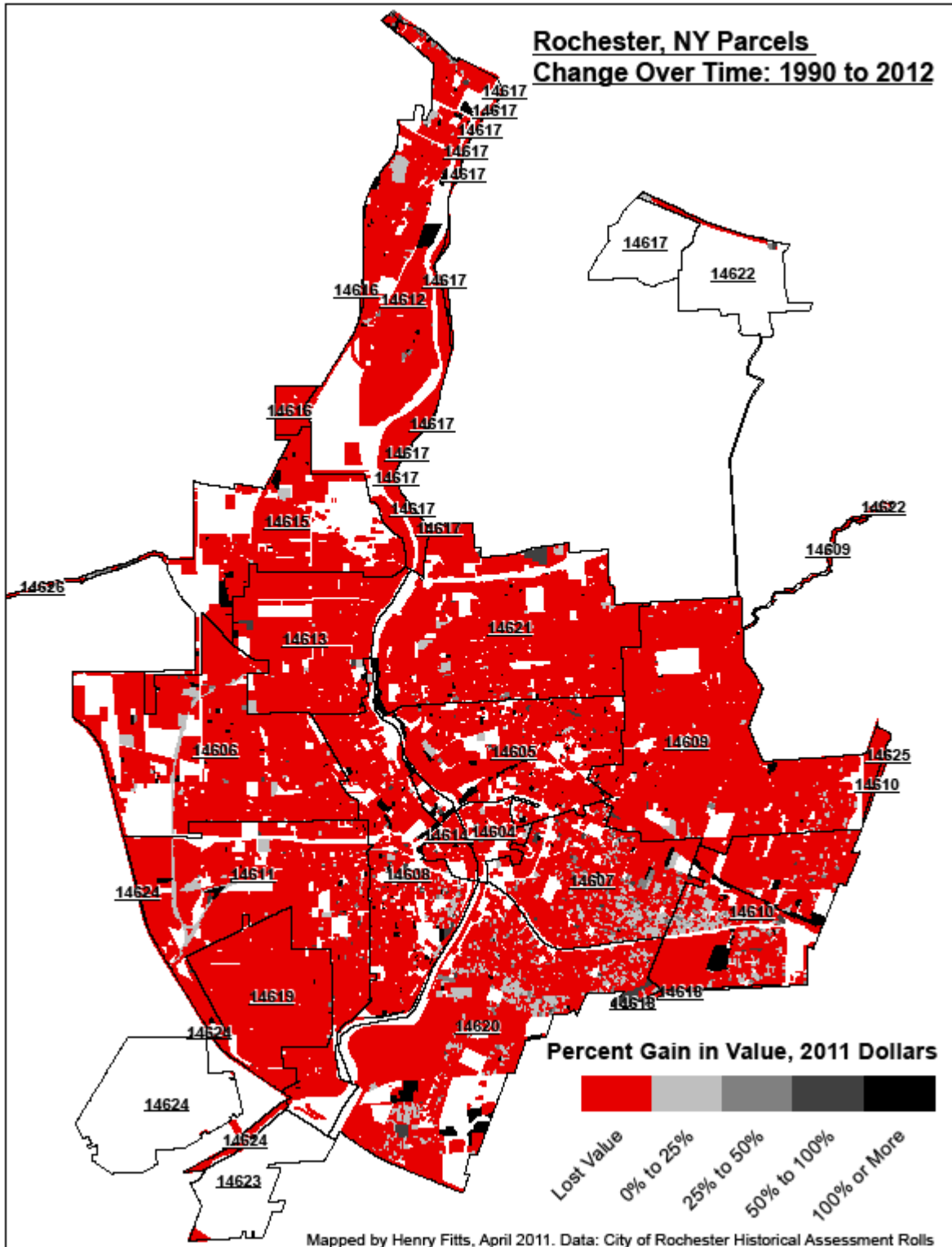
**RDTOPC#####-** Percent Change in Real Dollar Taxes Owed from year #### to year ####

**MORDPC####-** Minus Outliers, RDPC###. Outliers > 200%

**Other Variables-** The remaining variables were not used in analyses and/or had obvious codes.

## APPENDIX 2- Additional Maps





## APPENDIX 3- Additional Regressions

### Curve Fit

RDC0412

### Linear

**Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.024	.001	.001	285043.868

The independent variable is NEAR2010.

**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.635E11	1	6.635E11	8.166	.004
Residual	1.107E15	13621	8.125E10		
Total	1.107E15	13622			

The independent variable is NEAR2010.

**Coefficients**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEAR2010	4.835	1.692	.024	2.858	.004
(Constant)	-20951.020	5839.414		-3.588	.000

### Quadratic

**Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.025	.001	.000	285048.071

The independent variable is NEAR2010.

**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.121E11	2	3.560E11	4.382	.013
Residual	1.107E15	13620	8.125E10		
Total	1.107E15	13622			

The independent variable is NEAR2010.

**Coefficients**

	Unstandardized Coefficients	Standardized Coefficients	t	Sig.

	B	Std. Error	Beta		
NEAR2010	10.605	7.650	.054	1.386	.166
NEAR2010 ** 2	-.001	.001	-.030	-.774	.439
(Constant)	-27148.375	9914.051		-2.738	.006

## Cubic

### Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.037	.001	.001	284959.887

The independent variable is NEAR2010.

### ANOVA

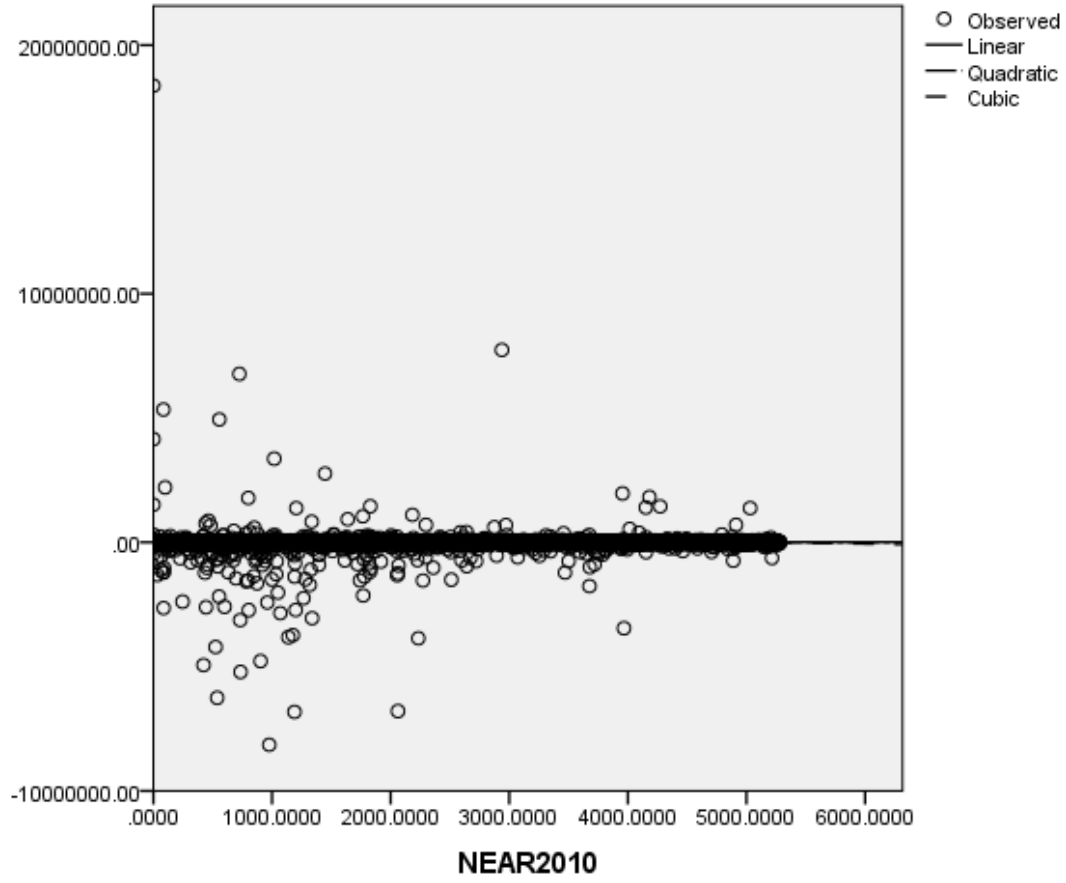
	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.478E12	3	4.926E11	6.067	.000
Residual	1.106E15	13619	8.120E10		
Total	1.107E15	13622			

The independent variable is NEAR2010.

### Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEAR2010	-50.648	21.362	-.256	-2.371	.018
NEAR2010 ** 2	.025	.008	.742	2.918	.004
NEAR2010 ** 3	-3.028E-6	.000	-.476	-3.071	.002
(Constant)	7732.402	15074.309		.513	.608

# RDC0412





## Curve Fit

### MORDPC0412

#### Linear

**Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.122	.015	.015	.288

The independent variable is NEARALL.

**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	36.510	1	36.510	440.161	.000
Residual	2413.617	29098	.083		
Total	2450.128	29099			

The independent variable is NEARALL.

**Coefficients**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEARALL	-2.527E-5	.000	-.122	-20.980	.000
(Constant)	.021	.004		5.719	.000

#### Quadratic

**Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.132	.017	.017	.288

The independent variable is NEARALL.

**ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	42.664	2	21.332	257.823	.000
Residual	2407.464	29097	.083		
Total	2450.128	29099			

The independent variable is NEARALL.

**Coefficients**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEARALL	-6.583E-5	.000	-.318	-13.561	.000
NEARALL ** 2	7.501E-9	.000	.202	.	.
(Constant)	.061	.006		10.322	.000

## Cubic

### Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.134	.018	.018	.288

The independent variable is NEARALL.

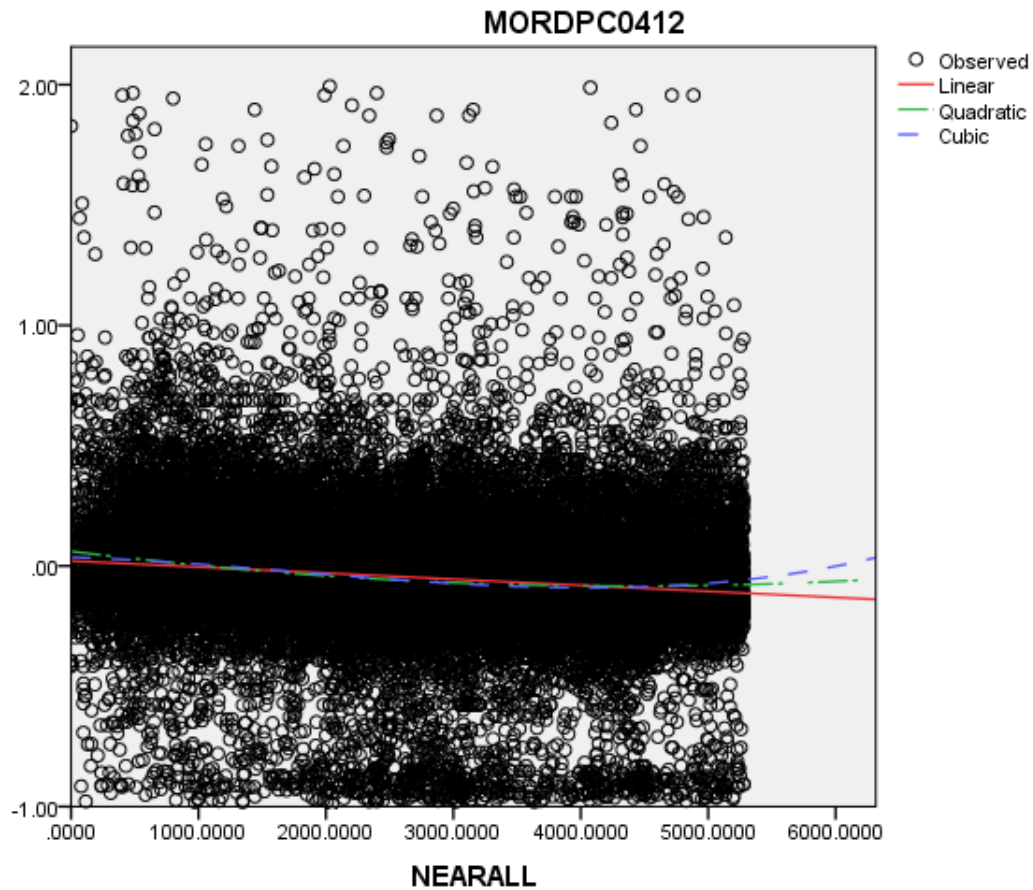
### ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	44.039	3	14.680	177.517	.000
Residual	2406.088	29096	.083		
Total	2450.128	29099			

The independent variable is NEARALL.

### Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
NEARALL	-1.796E-5	.000	-.087	-1.414	.157
NEARALL ** 2	-1.421E-8	.000	-.383	.	.
NEARALL ** 3	2.695E-12	.000	.367	.	.
(Constant)	.036	.008		4.328	.000



## **APPENDIX 4- File Download Link**

**<http://dl.dropbox.com/u/75849809/Fitts%20Thesis%20Files>**

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