

Steans Center Project Site Maps

Your GIS is as Good as Mine

Mari'a Anderson

Andrea Craft

DJ Forbes

Alex Frazier

Matt Gridley

Joe Menard

Table of Contents

Project Summary

Introduction

1. Introduction.....	3
2. Needs Assessment	
2.1 Background.....	4
2.2 Project Goals.....	4
2.3 Objectives.....	5
2.4 Information Structure/Products.....	5
2.5 Information Category.....	5
3. System Requirements	
3.1 Introduction.....	6
3.2 Data Requirements as a Conceptual Database Design	
3.2.1 Matrix of Need to Know Questions Cross-Referenced with entity classes.....	6
3.2.2 Entity Relationship Modeling.....	6
3.2.3 Entity Relationship Diagram.....	8
3.3 Software Requirements	
3.3.1 Matrix of Need to Know Questions Cross Referenced with Software Functions.....	8
3.4 Personnel Requirements	
3.5 Timing.....	10
3.6 Institutional Requirements.....	10
4. Data Acquisition	
4.1 Introduction.....	10
4.2 Data Dictionary	
4.3 Data Source Steps.....	13
4.4 Fitness for Use.....	13
4.5 Data Acquisition Constraints.....	13
5. Results.....	14
5. Summary, Conclusions, and Recommendations.....	23
6. References.....	24
Appendix A: Data Dictionary.....	26
Appendix B: Entity Relationship Diagram.....	27

Project Summary

As a liaison between DePaul University faculty/students and the community organizations, the Steans Center assists students/faculty in finding an organization suitable to their needs. It also assists affiliated organizations in locating students/faculty interested in the work of the site. The assistance in both respects is along the lines of work study, coursework, community service and project work. One of the Steans' main objectives was to make it easier for students and faculty to locate an affiliated organization that was suitable to the needs of their interests, as well as provided added comfort in their selection.

The Steans Center wanted all their affiliated organizations mapped using ArcGIS. The organizations would then be separated by neighborhood, services offered and according to demographic information (race, income, etc). In order to illustrate the ease of commuting to all of the organizations, spatial overlays of transportation routes (i.e., CTA rail maps, Chicago bike routes, and major Chicagoland streets were created. Although we were able to provide illustrations of these objectives, there were issues surrounding the progression and completion of the project.

The first and largest issue was normalization. Some of the data available on the Steans website for all the affiliated organizations was incomplete. The same information (address, phone#, etc) was not available for every site. We had to do a little extra research on the separate sites in order to obtain all the information needed. Another problem was that the information available about the organizations in the attribute file sent to us from the Steans Center was inconsistent. For example, phone numbers were given as (773)374-3744, and 773.374.3744. The addresses had to be exactly the same for geocoding purposes in ArcMap.

Another situation was getting the entire group to meet at the same place and time. We all have conflicting schedules with classes and jobs. As a result, we had to rely heavily on email and phone communication.

We did however have great outcomes. We found out the nearly 75% of all the sites were within 0.4miles of a CTA rail station. Also, they are all easily accessible from the bike routes and major streets. Overall, Chicago has a great transportation system compared to other places. Our demographic maps provide information that will be great for future trend mapping.

1. Introduction

The Steans Center is a community-based learning organization that works with DePaul University students and community organizations throughout Chicago. Its mission statement is as follows; "The Steans Center for Community-based Service Learning provides educational opportunities grounded in Vincentian community values to DePaul students. The Center seeks to develop mutually beneficial, reciprocal relationships with community organizations in order to develop a sense of social agency in our students through enrollment in CbSL courses, community internships and placements, and community-based student employment." The stakeholders or the users of the work produced would be the Steans Center itself and also DePaul students working

with community organizations. The work could also be utilized by the community organizations themselves.

2. Needs Assessment

2.1 Background

During the meeting with our clients, Howard Rosing and Marisol Morales, we discussed the capabilities of what our GIS project could be for the Steans Center and how they could utilize the technology to display information about the facility more efficiently. The goal of the Steans Center is to have an interactive map displaying the location and information about their sites up and running on their website. After discussing goals and capabilities with Howard and Marisol we agreed that the community organization sites should be plotted on a map, separated by neighborhood and type of service the site offered. In accordance to that, they were also interested in different layers on the map that could display transportation routes. Most importantly they wanted CTA train line locations, bike routes and major streets.

A long-term goal of the Steans Center is to have a GIS displaying demographic changes occurring around their sites. This would need to be done using a type of dynamic map. That was not possible due to time constraints, however, it would be a great idea for a future extension of the Steans Center's vision. In order to produce the desired project, we explained that we needed all of the addresses of their affiliated sites along with the certain category (explained by the Steans Center) in which the site resides. After compiling the dataset with all the necessary information we plotted the sites on a spatial overlay of the city of Chicago.

From what we understand about what the Steans Center wanted is similar to a real estate problem in Brunswick, NY. Staffers would spend hours or days searching sets of files for information. After accessing the problem they determined that, "we needed a computerized data-base that wouldn't just hold all the towns' data, but would depict the information in a way that is easy to understand." In talking with the Steans Center, they were interested in having an interactive map similar to one they had seen on a RE/MAX real estate website. The Steans Center directors decided that they wanted us to create a basic model of the final project in which we could further discuss the GIS capabilities in efficiently displaying the information they deem necessary.

Other articles and relevant literature that we found helpful throughout our project were "GIS Applications in Real Estate and Related Industries" and "A GIS Decision support system for Brownfield Redevelopment." Utilizing previous studies and projects concerning similar problems will be helpful in understanding on how to solve a specific problem.

2.2 Project Goal

Our group intends to help the Steans Center understand and improve the spatial distribution of the services they provide throughout the city of Chicago. In this project, we will ask ourselves "How can we best represent the multitude of community

organizations as spatial entities, and how does this representation facilitate efficient access and communication for members of the community?”

2.3 Objectives

The first objective is to identify the locations of the community organizations the Steans Center partners with. Then we would like to differentiate these organizations based on the types of services they provide, boundaries of neighborhoods in which organizations are concentrated, and demographics of community served. We will also include an overlay of the CTA rail and bus route map to show users efficient ways to access the organizations. These attributes will be represented with multiple layers overlaid in ArcGIS.

2.4 Information Structure/Products

We transformed the nominal addresses for all the Steans affiliates into tabular data. This data was then geocoded into a point shapefile. ArcMap was used to create various maps showing spatial distribution of transportation modes (bike routes, CTA lines, and major streets), neighborhoods and income. We downloaded the CTA lines, bike route lines and Stations point files from <http://egov.cityofchicago.org>. To represent income per community, we used the poverty rate by Chicago Tract represented as a ratio level of measurement. This value represents the percentage of the population that is below the poverty line. All of these shapefiles were saved as layer files and overlaid onto the ChiComm layer. We used Choropleth maps to represent different neighborhoods. We joined the CTA lines, bike routes, stations and neighborhoods to the Steans Affiliates sites so that the attribute table for each site will have all of this information appended to it.

2.5 Information Category

There were many information products needed in order to arrive at the objective solutions. In order to map Steans community partners we compiled a list of addresses for every organization to produce a geocoded shapefile displaying the locations of all places. Because there are many locations, they were divided into townships to make it easier to navigate through the eventual interactive map. The township/block information was obtained from the U.S. Census Bureau. There are also separate overlays which include information such as demographics, and other services provided/facilitated (i.e., affordable housing, various extracurricular activities, homeless services, etc). This information was obtained from the Steans Center, the organization websites and also the U.S. Census Bureau. Lastly, we obtained line data for the CTA and transportation routes and stations, Chicago bike route paths and the Major Chicago streets as well. Luckily for our group, we were able to easily find this data online and did not have to create .dbf files to geocode for each line and route.

3. System Requirements

3.1 Introduction

The Steans Center is requiring a GIS interactive map about their different sites located around the Chicago area. They want their community organization sites plotted on a map, separated by neighborhood and type of service the site offered. In accordance to that, they also were interested in different layers on the map that could display transportation routes. In the following section, we will discuss the system requirements that will fulfill these needs.

3.2 Data Requirements as a Conceptual Database Design

3.2.1 Matrix of need-to-know questions cross-referenced with entity classes

Object Classes	Need to Know Questions			
	What is the proximity of the Steans Center to its affiliated organizations?	How does representation facilitate efficient access and communication for members of the community?	What types of services are offered by the Steans Center and its affiliated organizations?	How are the affiliated organizations grouped by neighborhood ?
SteansAffiliates.dbf			X	
SteansAffiliates.shp	X	X		X
County.shp	X	X		X
ChiComm.shp (blocks)	X	X		X
CTAstations.shp	X	X		
CTAlines.shp	X	X		
Bikeroutes.shp		X		
Majorstreets.shp	X	X		X

3.2.2 Entity Relationship Modeling

Entity

Name: SteansAffiliates

Definition: Steans Center affiliates and corresponding addresses

Type: Shapefile (point)

Temporal: 2007

Name: SteansAffiliates

Definition: Steans Center affiliates and corresponding addresses

Type: .dbf tabular data
Temporal: 2007

Name: ChiComm.shp
Definition: Chicago Districts, familyincome, per capita income
Type: Shapefile (polygon)
Temporal: 2000

Name: ChiTract.shp
Definition: U.S. Census Tracts represents the U.S. Census tracts of the United States in the 50 states and the District of Columbia
Type: Shapefile (polygon)
Temporal: 2000

Name: CTAlines.shp
Definition: location of CTA "L" lines
Type: Shapefile (line)
Temporal: April 2004

Name: CTAstations.shp
Definition: addresses of all CTA "L" stations
Type: Shapefile (point)
Temporal: June 2006

Name: Bikeroutes.shp
Definition: the Chicago bike routes
Type: Shapefile (line)
Temporal: Spring 2005

Name: Majorstreets.shp
Definition: major streets in Chicago
Type: Shapefile (line)
Temporal: April 2004

Name: tgr17000sf1trt.dbf
Definition: demographic data by census tract
Type: .dbf tabular data
Temporal: 2000

Attributes

Name: Address
Description: The street address of each Steans Center affiliate; used in geocoding

Name: Zip
Description: The zip code of each Steans Center affiliate; used in geocoding

Name: Fl/ste/rm

Description: an extension of the address column; the floor, suite, or room; not used for geocoding

Name: Type of Service

Description: The type of service that is provided by each organization

Name: Phone Number

Description: The phone number of each Steans Center affiliate

Name: Family Income

Description: Average family income by neighborhood

Name: District Name

Description: The name of each neighborhood

Name: Median Rent

Description: The median rent of each household by neighborhood

Name: Poverty Rate

Description: Percentage of people living under the poverty line measured by tract

Name: Stations

Description: The name of each "L" station

Name: Type of Line

Description: Which particular route the line services

Relationship

Both the Address and Zip columns were used to geocode the locations of the Steans Center affiliates

3.2.3 Entity Relationship Diagram

See Appendix B

3.3 Software Requirements

3.3.1 Matrix of need to know questions cross-referenced with software functions

Function Capabilities	Need to Know Questions
-----------------------	------------------------

	What is the proximity of the Steans Center to its affiliated organizations?	How does representation facilitate efficient access and communication for members of the community?	What types of services are offered by the Steans Center and its affiliated organizations?	How are the affiliated organizations grouped by neighborhood?
Table and Shapefile Joins	X		X	X
Geocoding	X	X		X
Overlay		X		X
Georeferencing	X	X		X
Symbology		X	X	X

3.4 Personnel Requirements

Matt Gridley:

Performed the task of coordinating with Steans Center and other group members while acquiring Chicago overlay map separated by neighborhood. When all information was gathered, he organized the final presentation tasks. Tasks required 10 hours of work.

DJ Forbes:

Performed the task of coordinating with Steans Center and other group members while acquiring attribute categories on service learning sites from Steans Center. When all information was gathered, he assisted Matt Gridley in organizing the final presentation tasks. Tasks required 10 hours of work.

Maria Anderson:

Performed the task of all the data collection on Steans Center community learning sites along with brief description of each site. She was also an important player in the final combination of tasks. Tasked requiring 10 hours of work.

Alex Frazier:

Performed the task of collecting and plotting different demographic information on selected neighborhoods where Steans Center sites exist. Tasks required 12 hours of work.

Andrea Craft:

Performed the task of plotting Steans Center sites in ArcGis on top of existing overlay maps. Also assisted in the PowerPoint procedure. Tasks required 10 hours of work.

Joe Menard:

Performed the task of assisting with the plotting of data points and designer of final PowerPoint presentation. Tasks required 10 hours of work.

3.5 Timing

In order to complete our GIS project as smoothly as possible, some tasks needed to be completed before others in order to have a successful project. First Matt and DJ coordinated another meeting with the Steans center to make sure we were headed in the right direction. DJ simultaneously acquired the necessary data sets and attributes from them. Matt acquired the Chicago overlay map that the data sites were plotted on. These tasks were completed on the 23rd of February. Meanwhile Maria collected the data for each individual Steans center site from their website, which was also completed by the 23rd of February. After all the data was collected, Andrea with the assistance of Joe plotted the exact location of each individual site in Arc Map. This was completed by March 6th. While this was being completed Alex acquired demographic information based around the service center sites before the 23rd and plotted the information on the overlay map by March 6th. After all the information was acquired, Joe put together a PowerPoint by March 13th and all group members worked together in completing the final product.

3.6 Institutional Requirements

Due to such a specific task, the institutional requirements were limited to the Steans center providing us with attribute categories of the description of each individual service-learning site. All other information and data products were downloaded online.

4. Data Acquisition

4.1 Introduction

For this project, there were four major “need-to-know” questions. The first issue was to find out the proximity of the Steans Center to its affiliated organizations. The second issue was to determine how representation of this proximity facilitates access and communication for members of the community. Demographic information for each neighborhood was also added to the presentation. We also wanted to know what types of services are offered by the Steans Center and its affiliated organizations, as well as how the sites are grouped according to neighborhood. The topic hadn’t changed much since we had started the project. We had, however expounded upon the information that was represented.

What is the proximity of the Steans Center to its affiliated organizations?

Using absolute georeferencing we geocoded the table, SteansAffiliates.dbf. From the point shapefile created, the sites’ and their corresponding addresses were overlaid on the polygon shapefile ChiComm.shp. ChiComm is a shapefile of the different Chicago

communities. Based on the map scale, and also using the measuring tool in ArcMap, we could then see the proximity of the Steans Center to its affiliates.

How does representation facilitate efficient access and communication for members of the community?

We wanted to represent the sites relative to the many modes of transportation used by Chicago inhabitants. This was done by mapping the sites with CTA rail lines, major city streets and bike routes. Once we had the Steans Center and its affiliates mapped on ChiComm, we overlaid a shapefile of the CTA lines downloaded from www.cityofchicago.com. We delineated between the different rail lines and used symbology to color them accordingly (i.e., red, brown, blue, green, yellow, pink, orange). We also overlaid a shapefile of the Chicago bike routes for bikers, as well as a shapefile of the Chicago major streets for those who commute by car. In order to concretely represent how many sites were accessible by public transportation, in this case CTA rail stations, we used Select by Location operation to isolate which sites were within 0.5 miles of a CTA rail station. The result was that 123 sites are within walking distance, 0.5 mile, from a CTA station.

What types of services are offered by the Steans Center and its affiliated organizations?

The Steans Center for Community-based Service Learning provides educational opportunities and values to DePaul University students. The Center seeks to develop beneficial relationships with community organizations in order to develop a sense of social agency in our students, providing community internships, placements, and community-based student employment. Specific programs can be organized under the subsets of; Affordable Housing, Citizenship services, Domestic Violence, Financial Literacy, Human Rights Advocacy, and Youth development just to name a few.

How are the affiliated organizations grouped by neighborhood?

We spatially joined ChiComm to the steansaffiliates.shp file. In the attribute table of the steansaffiliates.shp file each site has the corresponding neighborhoods attached.

What are some of the demographics associated with the neighborhoods?

Since the ChiComm layer is a representation of all the Chicago neighborhoods, we attached each site with its corresponding community. We spatially joined the ChiComm layer to the points, giving each site the attributes of the polygon that its center lies within. As a result, the identity option in ArcMap not only reveals the address information from the original steansaffiliates.dbf file, but also the neighborhood and

demographic information of the Chicomm layer area that it corresponds to. We then used the quantities symbology, and added all values from the ChiComm layer in order to delineate the different neighborhoods with different colors.

4.2 Data Dictionary

Name: SteansAffiliates – a list of all Steans Center affiliated organizations and the corresponding address

Filename: SteansAffiliates.dbf

Source of the data: <https://140.192.23.188/staff/cbo/cbslsites.asp>

Spatial Object Type: attributes

Name: SteansAffiliates – a geocoded shapefile of all Steans Center affiliated organizations

Filename: SteansAffiliates.shp

Source of the Data: SteansAffiliates.dbf

Spatial Object Type: point

Name: ChiComm - Chicago Districts, family income, per capita income

Filename: ChiComm.shp

Source of the Data: ESRI.com

Spatial Object Type: Polygon

Name: ChiTract - U.S. Census Tracts represents the U.S. Census tracts of the United States in the 50 states and the District of Columbia

Filename: ChiTract.shp

Source of the Data: ESRI.com

Spatial Object Type: Polygon

Name: CTALines - location of CTA “L” lines

Filename: CTALines.shp

Source of the Data: cityofchicago.org

Spatial Object Type: Line

Name: CTAstations - addresses of all CTA “L” stations

Filename: CTAstations.shp

Source of the Data: cityofchicago.org

Spatial Object Type: point

Name: Bikeroutes - the Chicago bike routes

Filename: Bikeroutes.shp

Source of the Data: cityofchicago.org

Spatial Object Type: line

Name: Majorstreets

Filename: Majorstreets.shp

Source of the Data: cityofchicago.org
Spatial Object Type: line

Name: tgr17000sf1trt - demographic data by census tract
Filename: tgr17000sf1trt.dbf
Source of the Data: ESRI.com
Spatial Object Type: tabular data

4.3 Data Source Steps

The names and addresses of Steans Center affiliates were acquired from a list on the Steans Center website and entered into a spreadsheet. These addresses were geocoded, and phone numbers were added to the spreadsheet. We also acquired demographic data for the neighborhoods where the sites are located.

4.4 Fitness for Use

The scale and resolution of our maps are appropriate for our projects needs as the Chicago shape file utilized encompasses the geographical differences of our sites. The accuracy is what our client expected for their first GIS map; however they were also hoping for a higher resolution map that would include in-depth look at certain neighborhoods on the map. The Steans Center also wanted information for change in demographic information over time in the specific neighborhoods. This was not attainable due to out dated US census data. The maps are all up to date and the spatial accuracy is also on date due to Geocoding.

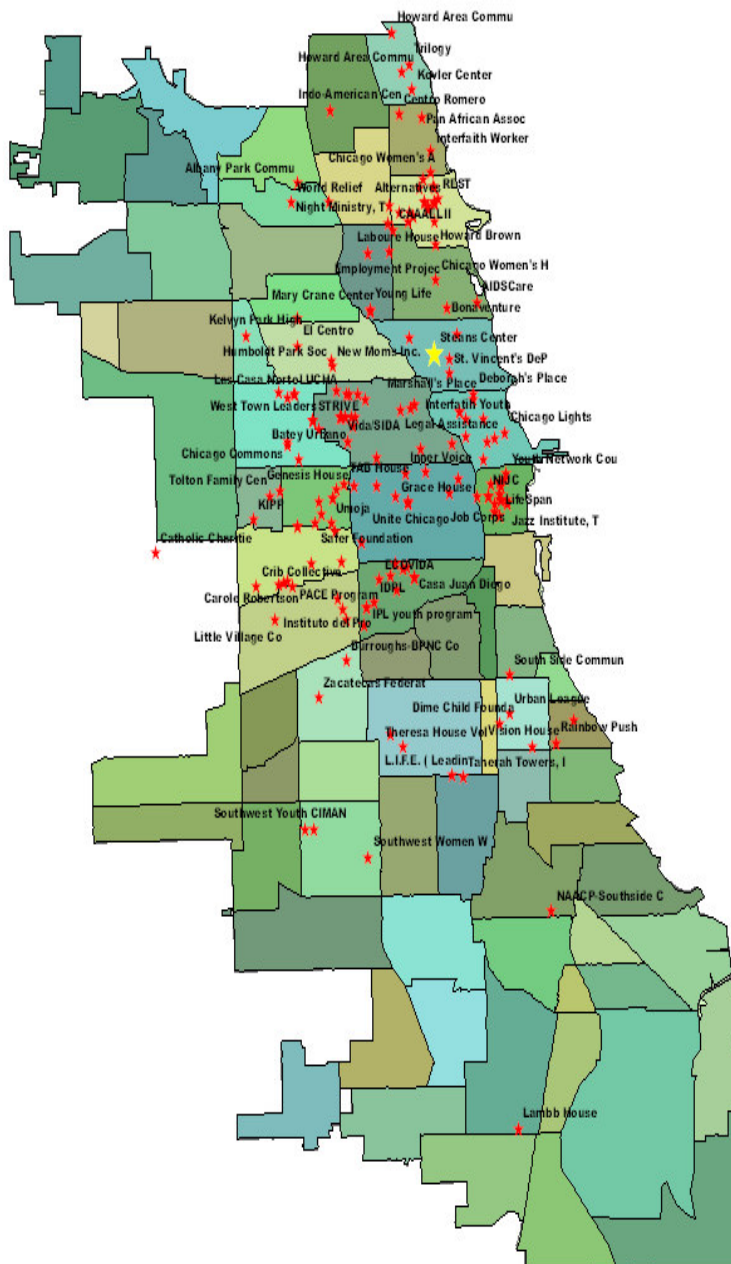
4.5 Data Acquisition Constraints

One piece of information that we were unable to acquire for usage was the widespread knowledge of demographic information for all of our neighborhoods.

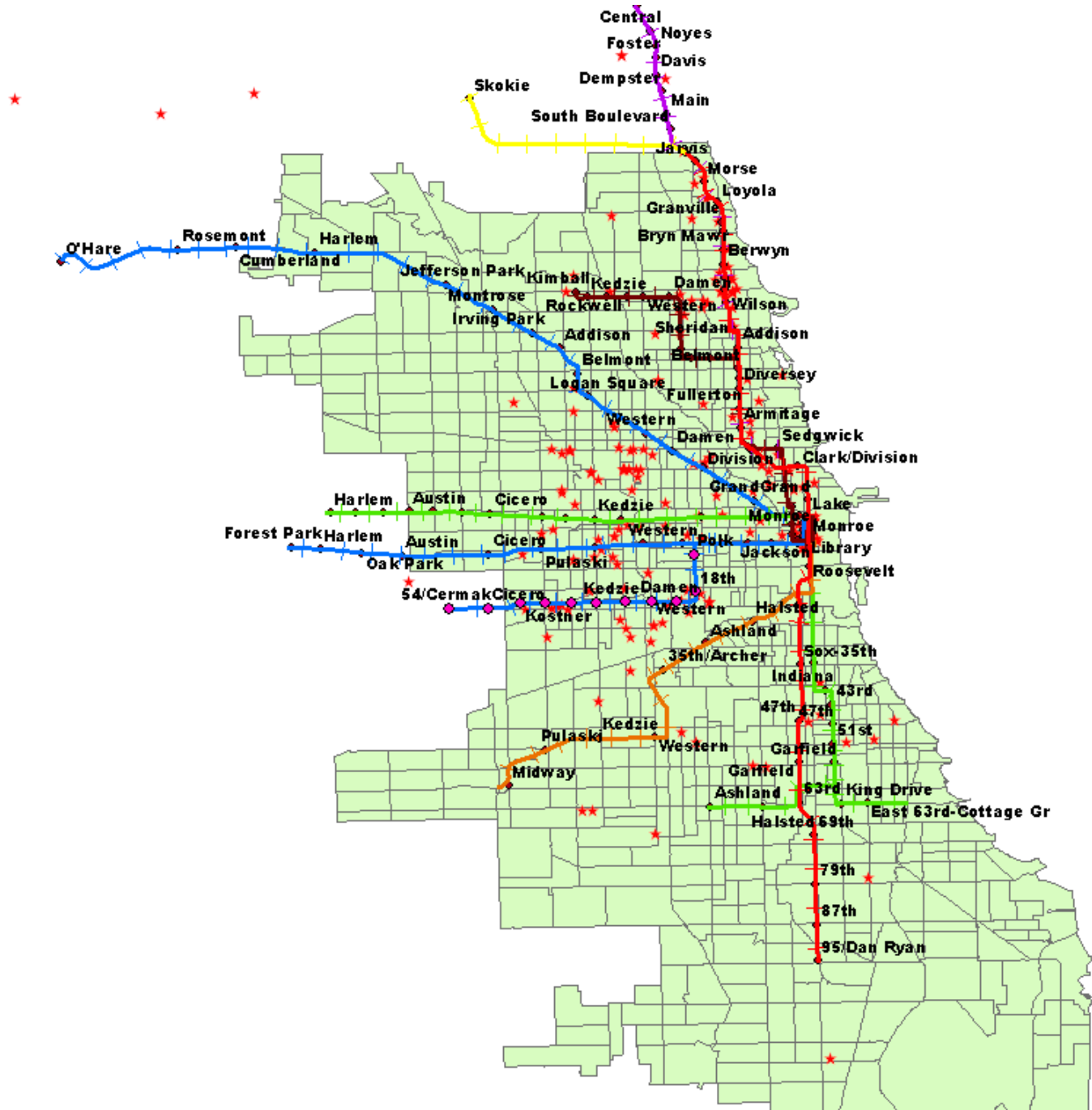
5 Results

Listed below are maps with short explanations of what we are displaying;

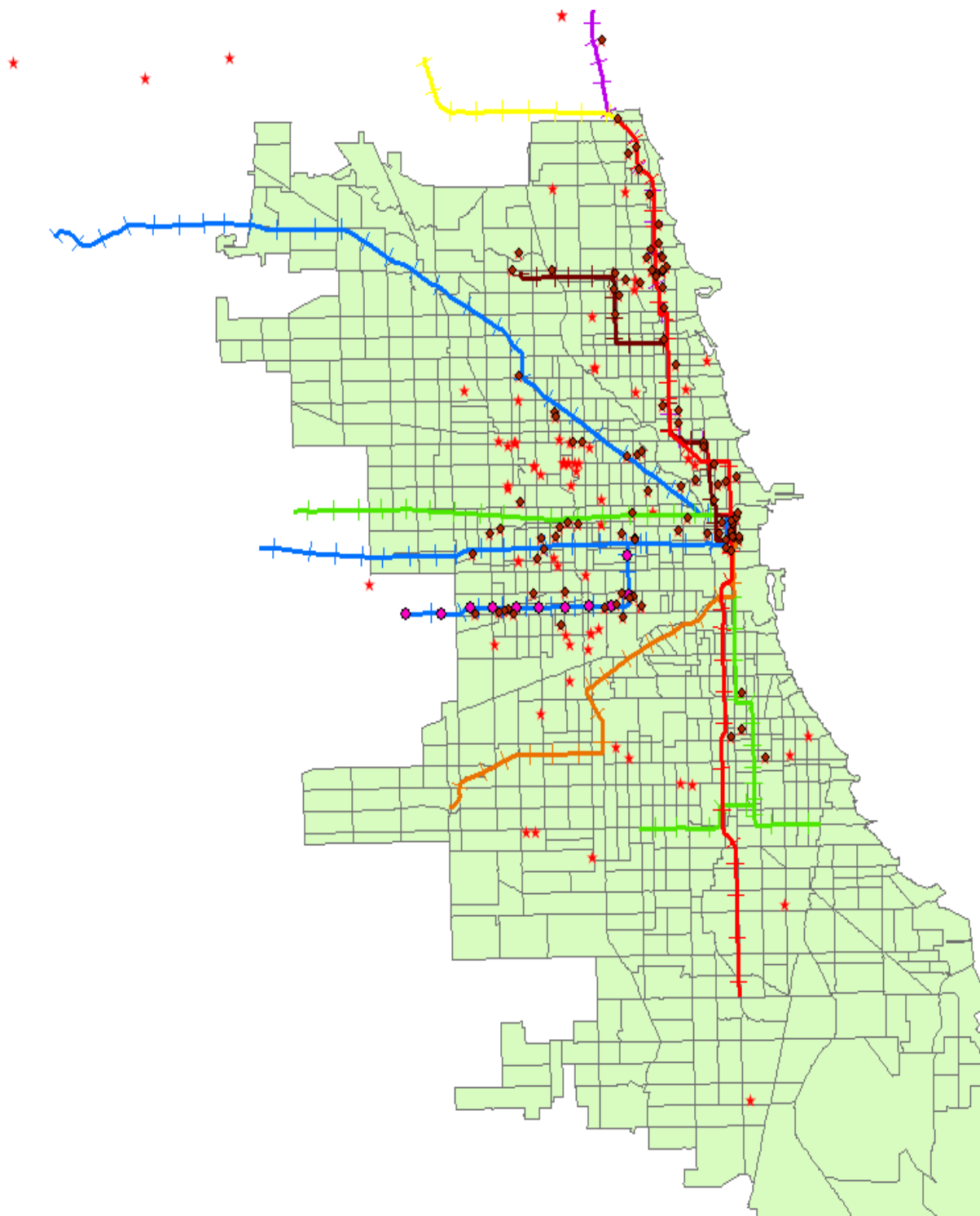
Chicago Neighborhoods with Steans Center Project Sites



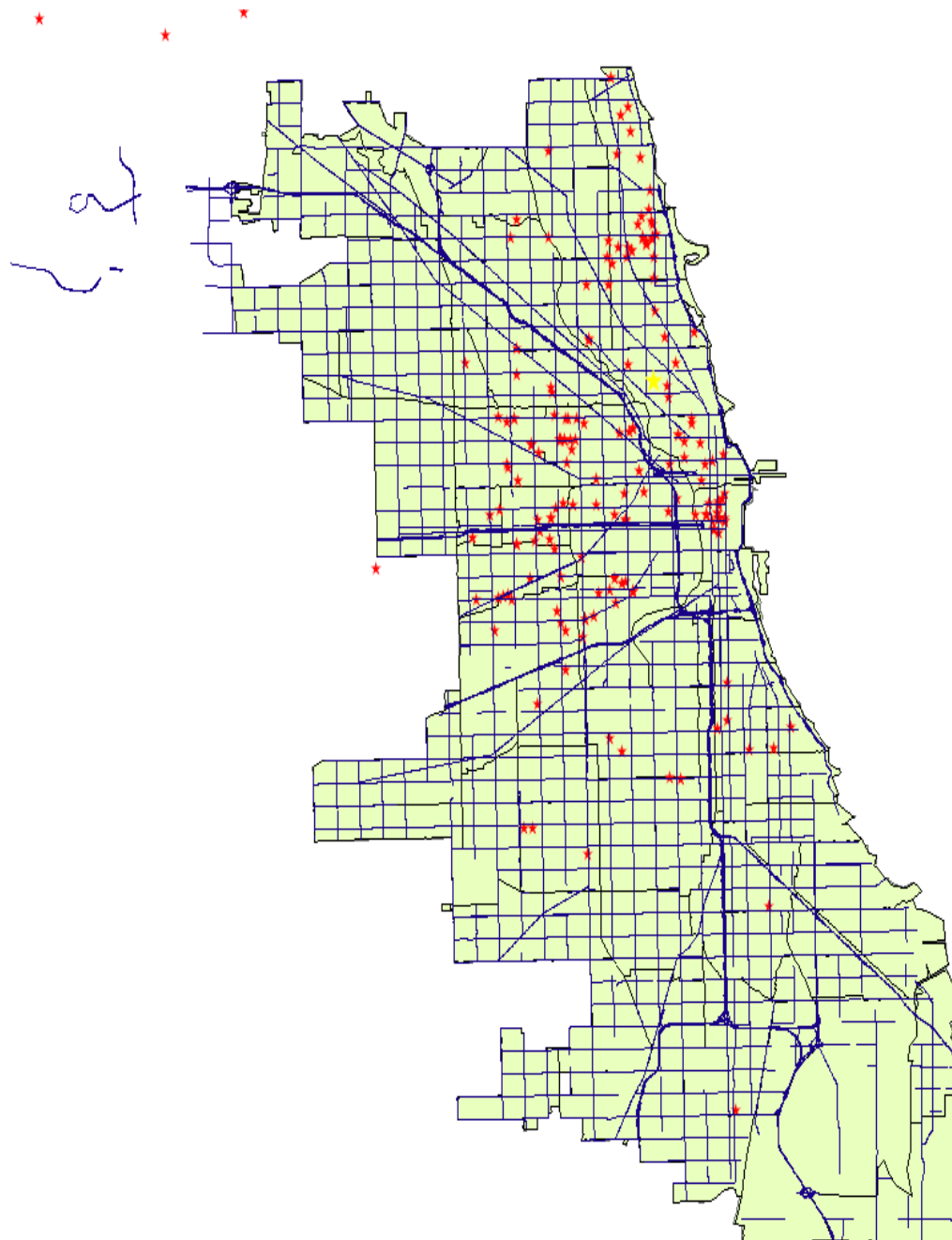
CTA Lines with stations and Steans Center Project Sites



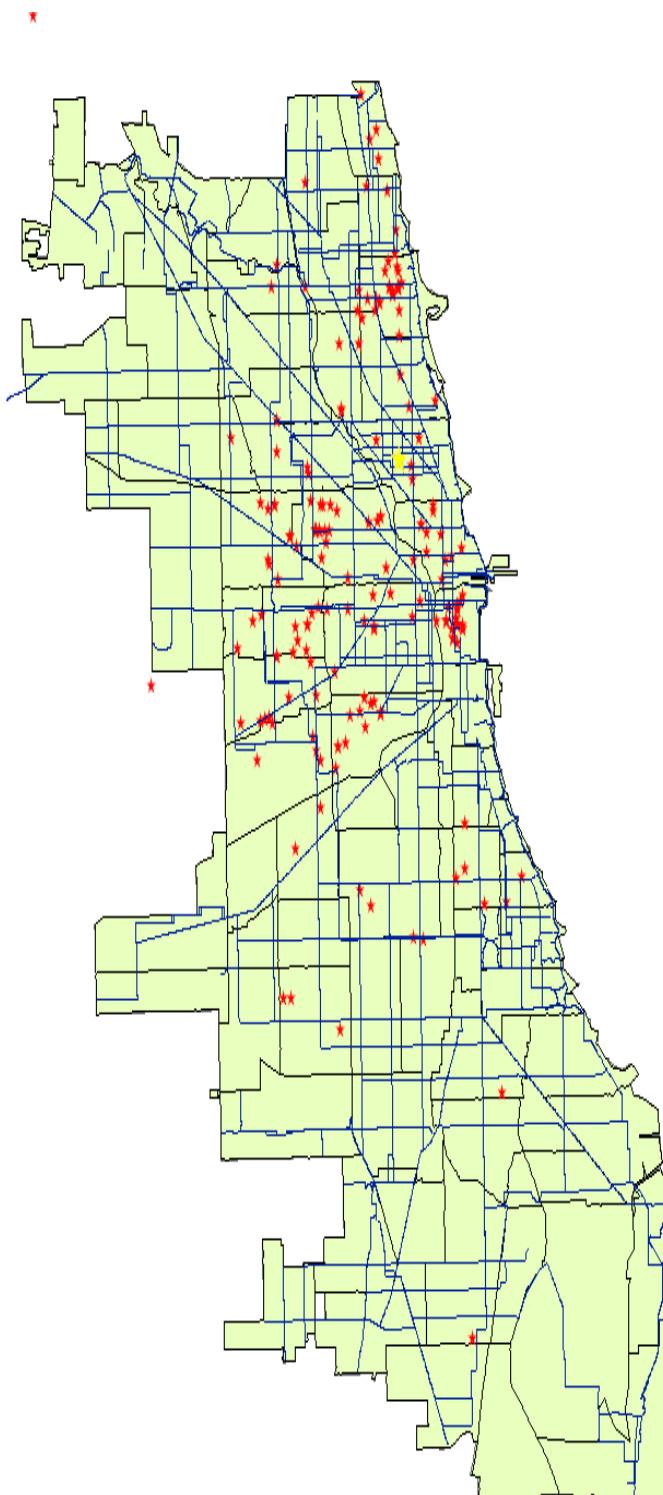
Steans Center Project Sites within walking distance (0.5 miles) of CTA stations



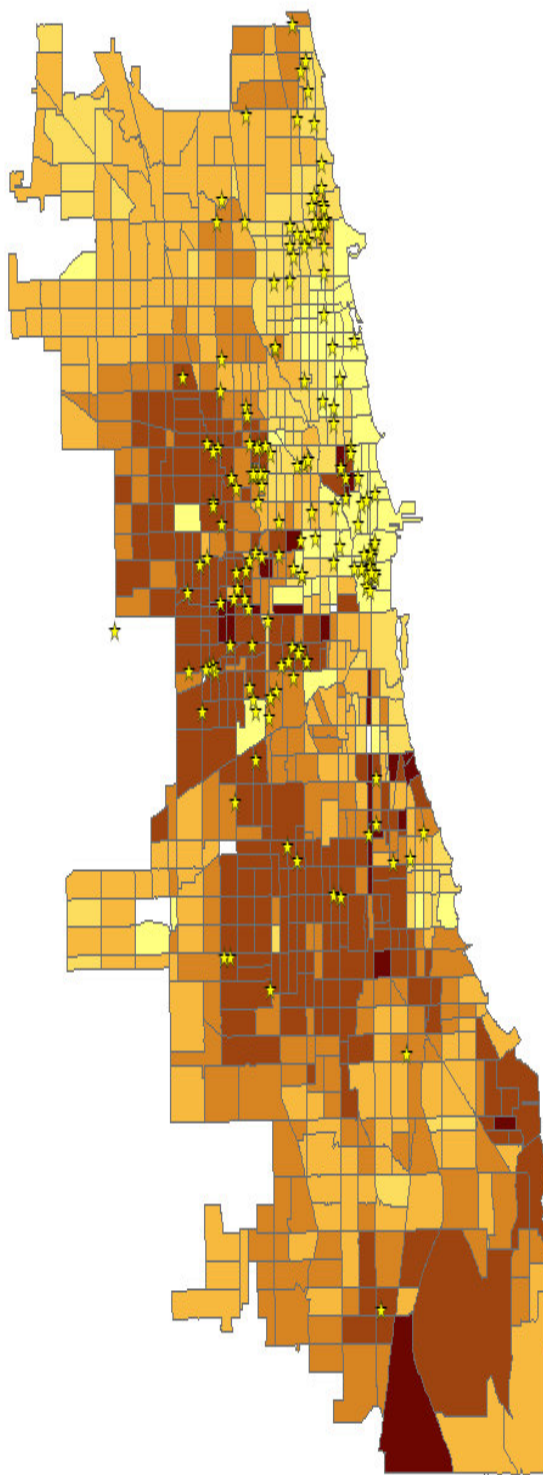
Major Roads and Steans Center Project Sites



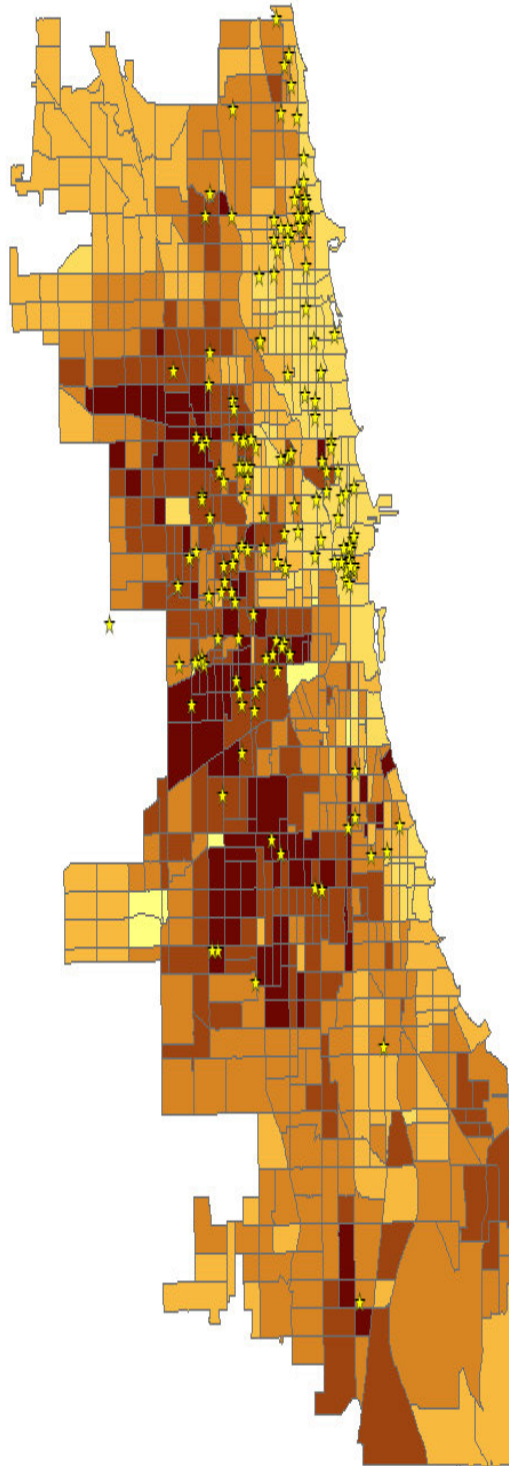
Major Bikepaths and Steans Center Project Sites



Percent Under Age 17 and Steans Center Project Sites

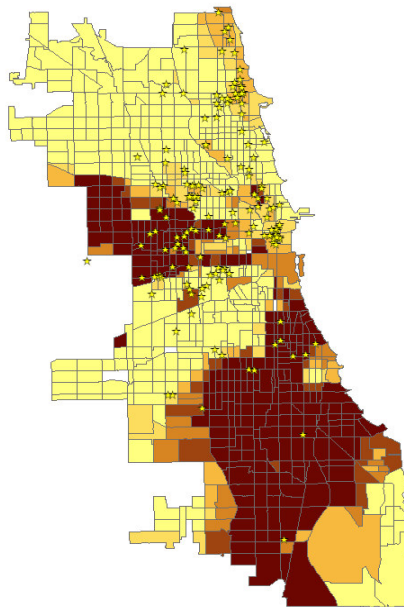
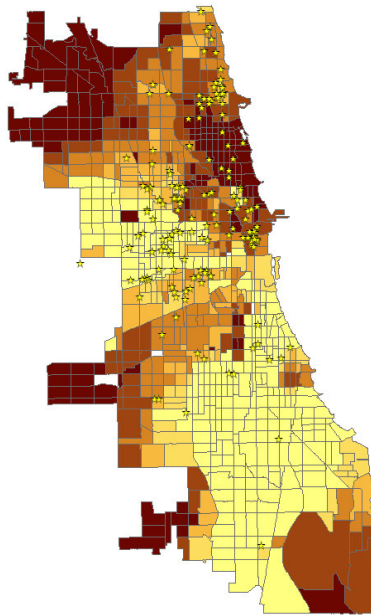
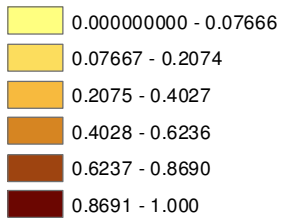


Average Household Size and Steans Center Project Sites

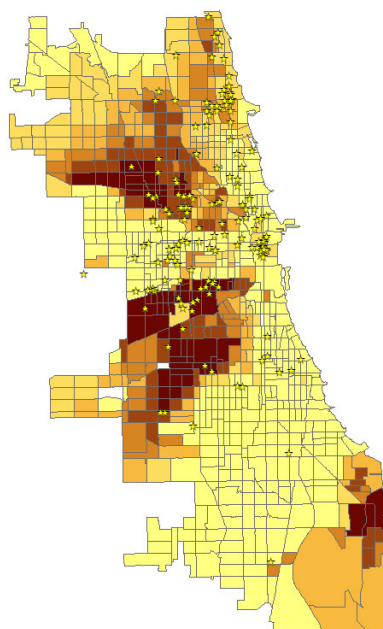
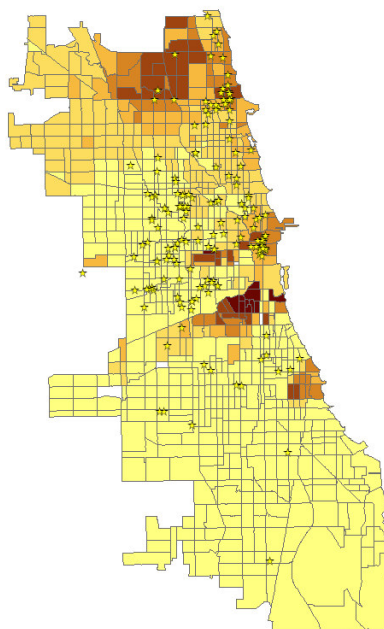


White and Black Populations and Steans Center Project Sites







Legend



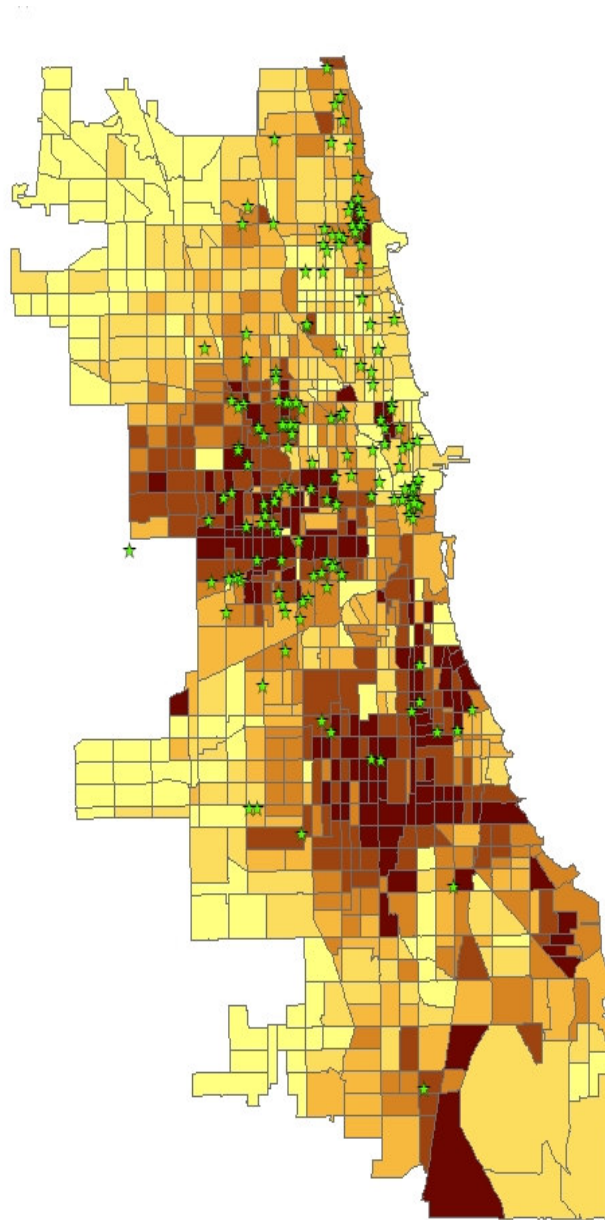
Asian and Hispanic Populations and Steans Center Project Sites



Legend

-  0.000000000 - 0.07666
-  0.07667 - 0.2074
-  0.2075 - 0.4027
-  0.4028 - 0.6236
-  0.6237 - 0.8690
-  0.8691 - 1.000

Percentage Under the Poverty Line and Steans Center Project Sites



6 Summary, Conclusions, and Recommendations

After obtaining the necessary information about the Steans Center site locations, we plotted the sites on the shape file ChiComm. After geocoding the sites to ChiComm, we did a spatial overlay with the following shape files; a CTA layer, major roads, bike

routes, neighborhoods and census tract when necessary for demographic knowledge. We made multiple maps depicting various information about the neighborhoods in which the Steans Center sites are located. Our research goal was met as we designed multiple maps based around the Steans Center locations. The method in which we took was effective as we did not encounter any major problems that forced us to reevaluate our methods. One recommendation that we have towards future research was to obtain more updated demographic information on Chicago neighborhoods. Another thing that we recommend is that future research teams use our gathered information to create an interactive map that could be utilized by the average user.

7. References

Appendix A: Data Dictionary

Name: SteansAffiliates – a list of all Steans Center affiliated organizations and the corresponding address

Filename: SteansAffiliates.dbf

Source of the data: <https://140.192.23.188/staff/cbo/cbslsites.asp>

Spatial Object Type: attributes

Name: SteansAffiliates – a geocoded shapefile of all Steans Center affiliated organizations

Filename: SteansAffiliates.shp

Source of the Data: SteansAffiliates.dbf

Spatial Object Type: point

Name: ChiComm - Chicago Districts, family income, per capita income

Filename: ChiComm.shp

Source of the Data: ESRI.com

Spatial Object Type: Polygon

Name: ChiTract - U.S. Census Tracts represents the U.S. Census tracts of the United States in the 50 states and the District of Columbia

Filename: ChiTract.shp

Source of the Data: ESRI.com

Spatial Object Type: Polygon

Name: CTALines - location of CTA “L” lines

Filename: CTALines.shp

Source of the Data: cityofchicago.org

Spatial Object Type: Line

Name: CTAstations - addresses of all CTA “L” stations

Filename: CTAstations.shp

Source of the Data: cityofchicago.org

Spatial Object Type: point

Name: Bikeroutes - the Chicago bike routes

Filename: Bikeroutes.shp

Source of the Data: cityofchicago.org

Spatial Object Type: line

Name: Majorstreets

Filename: Majorstreets.shp

Source of the Data: cityofchicago.org

Spatial Object Type: line

Name: tgr17000sf1trt - demographic data by census tract

Filename: tgr17000sf1trt.dbf

Source of the Data: ESRI.com

Spatial Object Type: tabular data