

# The Development and Implementation of GIS at East Side Neighborhood Development Company

Conducted on behalf of the  
East Side Neighborhood Development Company  
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October 2000

## Table of Contents

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<b>COPC Acknowledgement and Disclaimer</b> .....	2
<b>Executive Summary</b> .....	2
<b>Recommendations for Future Development of GIS in Community Development Corporations:</b> .....	3
<b>Project Purpose:</b> .....	3
<b>Introduction and Background:</b> .....	4
<b>Models and Methods:</b> .....	4
<b>The Marble-Wilcox Conceptual Approach for GIS System Design:</b> .....	5
<b>The Waterfall Model</b> .....	5
<b>The Marble Spiral Model</b> .....	6
<b>ESRI White Paper: System Design Strategies</b> .....	6
<b>Approach for GIS at ESNDC:</b> .....	6
<b>GIS Software Acquisition</b> .....	7
<b>Needs Analysis</b> .....	7
<b>CGISC Development</b> .....	7
<b>Commercial Programs: Property Labeling</b> .....	8
<b>Community Organizing: African American Task Force</b> .....	8
<b>Housing Programs: Property Query</b> .....	9
<b>Project Conclusion and Recommendations:</b> .....	10
<b>Works Cited</b> .....	11
<b>Project Maps</b> .....	12

## **COPC Acknowledgement and Disclaimer**

August, 2000

The East Side Community Outreach Partnership Center (COPC) supported the work of the author of this report but has not reviewed it for publication. The content is solely the responsibility of the author and is not necessarily endorsed by the East Side COPC.

East Side COPC is coordinated by the Center for Urban and Regional Affairs at the University of Minnesota in partnership with Macalester College, Metropolitan State University, East Side Neighborhood Development Company, Dayton's Bluff Neighborhood Housing Services, Phalen Corridor Initiative, District 4 Community Council, East Side Work Resource HUB, American Indian Policy and Research Institute, American Indian Family Center, The Urban Coalition, Minnesota Campus Compact, Twin Cities Local Initiatives Support Corporation and Upper Swede Hollow Neighborhood Association.

The work that provided the basis for this publication was supported by funding under an award from the U.S. Department of Housing and Urban Development. The author and publisher are solely responsible for the accuracy of the statements and interpretations contained in this publication. Such interpretations do not necessarily reflect the views of the Government.

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### **Executive Summary**

Until recently, neighborhood studies at Community Development Corporations (CDCs) have been infrequent because of the cost and time associated with obtaining the necessary data. With the acquisition of new Geographic Information System (GIS) software, such studies could become a standard part of CDCs, conducted by staff or researchers. In November 1999, the East Side Neighborhood Development Company (ESNDC) received a GIS software grant

from Environmental Systems Research Institute (ESRI). This project was initiated to develop and integrate this software at ESND. The project began with a needs analysis, identifying GIS projects that would enhance the work and programs administered at ESND. Three projects were identified and completed for Commercial Programs, Community Organizing and Housing Programs. Along the way came a couple of supporting developments; the formation of the Community GIS Consortium, bringing together many of the CDCs in St. Paul for collaborative GIS development; an agreement with the Ramsey County Users' Group for the acquisition and regular updates of consolidated City and County data on a regular basis for a minimal fee to the participating groups. Various models for system development and implementation are drawn from for the effective development and implementation of GIS at ESND.

**Recommendations for Future Development of GIS in Community Development Corporations:**

1. Continued collaboration for the development and use of GIS software and technical assistance in community organizations, which can be facilitated through the Community GIS Consortium.
2. Utilization of data from the Ramsey County Users' Group and the development of supportive projects:
  - a. Reference maps.
  - b. Property query for targeting programs.
  - c. Property analyses (values, improvements, owner occupied vs. renter).
  - d. Establishment of a property database for program tracking and future analyses.
  - e. Glossary of field names (explanations of field names).
  - f. Feedback from the community organizations for the improvement of the data sets.

**Project Purpose:**

Today, technology is rapidly developing and changing the ways in which people work. It is no longer enough to simply work hard. It is increasingly necessary to work intelligently, utilizing new technology and making better use of available resources. Geographic Information Systems (GIS) is one such new technology that can be used to enhance the programs at Community Development Corporations (CDCs). These GIS projects have the potential to improve the use of resources, which has long been a priority of CDCs, which have limited funds and are pressed to prove that they are making the best use of those funds.

The purpose of this project was to assist in the development and use of Geographic Information Systems (GIS) through project development at the East Side Neighborhood Development Company (ESND). This development included participation in local meetings about the use and development of GIS in

community organizations and the data distributed from the City of St. Paul and Ramsey County.

**Introduction and Background:**

This project was initiated to develop and implement GIS at ESNDC to support and enhance the development efforts of the community revitalization programs there. The project was initiated in conjunction with the award of GIS software through the Livable Communities grant program – Community Development sector, from Environmental Systems Research Institute Incorporated (ESRI). The research grant was arranged through the East Side Community Outreach Partnership Center (COPC), a collaboration between ESNDC and the Neighborhood Program for Community Revitalization (NPCR) and East Side organizations (such as ESNDC). This grant utilizes student resources from local colleges and universities to assist with community directed revitalization efforts.

The East Side Neighborhood Development Company is a non-profit community organization dedicated to improving the East Side Neighborhood through four areas: Housing, Commercial Development, Community Organizing and Homeownership. These programs, especially in the areas of housing and commercial property, regularly use property data. Records are maintained for current and recent programs. However, for neighborhood analyses it was necessary to request data from Ramsey County and/or the City of St. Paul. These requests often took several weeks to complete and were costly. As a result, few neighborhood studies were performed, which would have been helpful in identifying and targeting programs. The acquisition of GIS software and the distribution of city and county data through the Ramsey County GIS Users' Group, offered the opportunity to perform such neighborhood studies. These developments address the issue of data acquisition pointed out in the recent draft report "St. Paul Community Geographic Information Systems" by Chris Matthews and Sandra Paddock. Also, they open up many opportunities for neighborhood studies by CDC staff and neighborhood researchers.

**Models and Methods:**

There are several different approaches for the development and implementation of a GIS; the Marble-Wilcox Conceptual Approach, Chrisman's approach of evaluation and implementation of GIS based on particulars, the Waterfall Model of traditional computer systems development, the Marble Spiral Model and the ESRI white paper focused on the technical details of system design strategy. Each approach was developed with different user contexts in mind, none specific to the non-profit environment but offering input towards the creation of a suitable model. The following is a brief description of each approach and the approach chosen to be most suitable for GIS development and implementation at ESNDC.

### **The Marble-Wilcox Conceptual Approach for GIS System Design:**

The Marble-Wilcox approach for GIS system design and implementation was developed out of the experience and research of early GIS developers, particularly that of Hugh W. Calkins and Roger Tomlinson. The model considers the many people and organizations that are involved in GIS development and implementation including system users, system sponsor, system operator, GIS supplier, GIS application developers, data suppliers and GIS system analyst. There are several key characteristics to this approach:

1. The various levels of detail that can be utilized to direct the design process.
2. User requirements and system specifications are intimately connected to system design and database content. (The users in the organization direct how the system is set up and what kind of database is developed).
3. It is assumed that specialized tools are available such as data flow diagrams.
4. The design process is on going; new and/or more complex questions are asked that will expand the further define and refine the local uses of GIS.
5. The processes present in the model are mirrored on a smaller scale within individual steps such as defining goals, developing applications and post-implementation evaluation and development.

The model is articulated in a linear manner but the process can become circular with the repetition of various steps as the situation demands, as on-going development and improvement is inherent in the process. (Marble and Wilcox, 1991)

### **Evaluating and Implementing a GIS: A Detailed Approach by Nicholas Chrisman**

Chrisman presents a practical approach to GIS design, based on the many detailed steps of the process. This is a more structured approach that has limited flexibility in the many specified steps in developing and implementing GIS. Chrisman emphasizes accuracy, efficiency and effectiveness as key elements in this process; the accuracy of the database, the efficient use of resources and the effectiveness of the system to produce valuable products that contribute to the organization's goals. The process begins with extensive evaluation and specification of needs and requirements, followed by system proposals, system construction, pilot projects, re-evaluation and system modification. Continual evaluation of the GIS system is suggested to improve the quality of user applications but is not included as a necessary part of the development and implementation process of a GIS. (Chrisman, 1997)

### **The Waterfall Model**

The waterfall model is a standard model used for computer system design. It is more structured and inflexible than Chrisman's approach; any delay will slow the entire process, as each step must be completed before proceeding. This model emphasizes thoroughness in initial system development and

implementation. This approach is partially based on the rationale that the cost of fixing an imperfect system will be exponentially more than getting it right the first time. It is useful to take note of the importance of being thorough in initial development. Though, because of the changing inputs and uses of GIS at an organization, such an approach has limited value to GIS development. (DeMers, 1997)

### **The Marble Spiral Model**

The Marble Spiral Model was developed in 1994, after the Marble-Wilcox approach and is a more detailed account of a GIS design and implementation process. It divides the process into three repeating tasks regarding information: acquiring, organizing and analyzing. It also specifies three levels of detail in the process: initial or general, conceptual and detailed. There is a progression through the levels of detail as the model at each level of detail goes through the tasks of information processing. Within this process, there are various points at which it can be determined that GIS is not appropriate for the organization and the project terminated. Through these processes the GIS is developed, implemented, reviewed and modified. (DeMers, 1997)

### **ESRI White Paper: System Design Strategies**

ESRI's white paper on system design strategies is focused primarily on system specifications than the people and organizations involved in utilizing the technology. Their model for system implementation is brief, focusing on system management in a corporate business environment. ESRI's design and support services are promoted, as is to be expected. ESRI's approach begins with system architecture and requirements, which assumes that the organization has prior knowledge of what GIS is and its capabilities. The white paper is a technical document about GIS, its history and how it functions. It is a good complimentary document to the other models presented here, particularly for software and hardware information about how GIS functions. (Mitchell, 2000)

### **Approach for GIS at ESNDC:**

For the implementation of GIS at ESNDC, a basic conceptual framework for designing and implementing a GIS was used. The more detailed models did not allow for the flexibility needed in light of the unique circumstances of implementing a GIS at ESNDC. These unique circumstances include the manner of acquiring GIS software, temporary technical staff (students), the manner of resource utilization and the development of a primary, consolidated data source. The resulting situation ruled out a strict adherence to a more detailed and formal approach. The concepts, list of participants in the process and key characteristics articulated in the Marble-Wilcox approach proved most useful. The process involved a needs assessment of users and potential projects, system construction, data acquisition, pilot projects, staff training and re-evaluation. Throughout this process, flexibility was key to progress.

### **GIS Software Acquisition**

At ESNDC, ArcView and ARC/INFO GIS software was acquired through the 'Livable Communities – Community Development- Grant Program' sponsored by ESRI. The grant was written by Jessica Deegan, the VISTA Housing Organizer at the time. This created a singular starting point for the development and implementation of GIS. Questions about the software and system design were defined by the terms of the grant and software license. Upon review of the size of data and the space needed in GIS processing, new system requirements were specified. Funding for the new workstation was provided by the Commercial Property Programs Department.

### **Needs Analysis**

Several staff members who could potentially benefit from the development of GIS projects were identified and interviewed. These interviews served as a dialogue to further explain the capabilities and benefits of GIS, learn more about the activities and programs of the staff members and identify potential projects. A report was compiled and distributed to participating staff members and the director of ESNDC.

#### *Needs Report*

Of the five staff interviewed, two were identified as immediate users of the system in commercial property and housing development. With the data received from the Ramsey County Users' Group, projects and analysis could be initiated immediately for their benefit. The other staff can utilize GIS in the future with some development. In the area of community organizing, demographic studies and analyses can be completed with census data and other local sources of data, such as data on crime. The HomeLINK program can benefit from the querying capabilities of GIS when the data for the entire city is available to members of the Community GIS Consortium (currently only district data is available to each organization). Other commercial development programs can be improved through the future analysis of the lasting impacts of the Main Street Program and other recent programs.

### **CGISC Development**

The Community GIS Consortium (CGISC) was initiated by a number of community organizations as GIS was being introduced at ESNDC. The CGISC was developed as a vehicle for the regular acquisition of consolidated data through the Ramsey County GIS Users' Group from the City of Saint Paul and Ramsey County. This group included 13 members listed below at its establishment in July 2000.

Community Neighborhood Housing Services  
Dayton's Bluff District 4 Community Council  
Dayton's Bluff Neighborhood Housing Services  
Eastside Neighborhood Development Company  
Greater Frogtown CDC  
Hamline-Midway Area Rehabilitation Corp.

Lexington-Hamline Community Council  
Neighborhood Development Alliance  
North End Revitalization  
Rondo Community Land Trust  
St. Anthony Park Community Council  
Thomas-Dale/District 7 Planning Council  
Twin Cities Habitat for Humanity

The data set is distributed on compact disks and includes the following layers: digital geographic data layers; digital aerial photographs; parcel maps; name-address, parcel description, value, current tax, delinquent tax and special assessment database extracts for property from Ramsey County the City of Saint Paul Department of Records and Revenue; and an application for updating – changing and adding information - to the current data.

Projects:

The following projects were identified in the Needs Report as pilot projects for GIS at ESNDC. These projects illustrate applications of GIS with the data from the Ramsey County Users' Group - property labeling and queries – and projects that can be done on an one-time basis – demographic maps - with the use and development of other data sources, such as census data and school population data.

#### **Commercial Programs: Property Labeling**

A map of the primary commercial properties that ESNDC works with had been produced in 1998. This map was constructed by hand, cutting and pasting labels on a street map. It was still in use because the production of such a map was so labor intensive. Using GIS the creation of such a map and updating it on a regular, even quarterly basis, is possible. The two data sources for the creation of the commercial property map included geography such as parcel outlines and nominal property information such as business name. The geography was obtained from COPC. Information about the commercial property in question was obtained from the Commercial Property Manager, Rich Malloy, as an Access file. This file was converted into database format and brought into ArcView (GIS software), where the map was created. The initial map focused on commercial property along Payne Ave and Arcade St. After editing, the area became more focused on an area along Payne Ave and Arcade St. This map included the parcel outlines, building footprints, business names and address numbers. The project was created and saved on the workstation with the data from the Ramsey County Users' Group and the Access database of business information.

#### **Community Organizing: African American Task Force**

The African American Task Force was a project initiated by the Community Organizer, Petey Mitchell, to create a comprehensive history and description of the African American population in District 5. As the first attempt at a comprehensive recording of the African American population in the District, it

was decided that maps illustrating some general characteristics would best enhance the research. It was also an opportunity to demonstrate an application of GIS for community development corporations and ESNDNC in particular.

The description of the African American situation was divided into several parts - housing, education, safety and crime, and community resources. In consultation with the researchers, it was decided that the complimentary GIS project would focus on illustrating the general demographic characteristics of the African American population. The maps produced included the number and location of African Americans in District 5 by census tract from 1960 to 1990, the concentration of African Americans by block group in 1990 (a more exact representation of where the African American population is in District 5), the number of African American who own homes or rent and the average value or monthly rent and the per capita income of African Americans by census tract in 1990. The data for these maps was drawn from Census Bureau records for the de-centennial censuses in 1960, 1970 and 1980, which are found in hard copy in the Government Publications department of the Wilson Library at the University of Minnesota. Records and geography (census tract and block group boundaries) for the 1990 Census can be found in electronic format in the Borchert Map Library, also located in the Wilson Library at the University of Minnesota.

These maps can be found at the end of this report. The first set of maps of African Americans in District 5 between 1960 and 1990 shows the increase from almost none (21) in 1960 to a significant and growing minority (1322 or roughly 5%) in 1990. The map showing the concentration of African Americans shows a distinct pattern of highest concentration in the Western third of the District, decreasing to the East. The second set of maps shows two characteristics of the economic situation of the African Americans in District 5 in 1990. The map of housing shows the small number of African American homeowners as compared to the large number of renters. The map of per capita income of African Americans in District 5 in 1990 graphically shows that despite individual differences in income, the income per person is below the poverty guideline of \$6000.00 for one person in 1990. Through such graphic display of information, the situation of African Americans in District 5 is better understood.

#### **Housing Programs: Property Query**

The Housing Programs manager, Kathryn Paulson, initiated a new program targeting non-owner occupied duplex housing. For greatest impact, a twelve-block area was identified for targeting. The objective was to identify the addresses of non-owner occupied duplexes and find out if there were a significant amount of properties in the selected target area. A query was performed using the consolidated data CD of District 5, which was obtained through the Community GIS Consortium. Two fields were used to identify the specified property in the targeted area: 'subcd', the sub-use code, of '91' identifies duplex housing and 'classcd', Ramsey County classification code of 'NHM' identifies non-homesteaded property. Combined, these two variables

locate the selected properties in the area. In addition to the map created from this query, a list of addresses was also produced for administrative use.

### **Project Conclusion and Recommendations:**

The development and integration of GIS at ESNDP has just begun with this project. There are numerous steps to complete for effective and lasting implementation. GIS a powerful new resource for CDCs. However, it will take continued efforts of all groups involved to fully integrate GIS. There is the challenge involved with being the leader of such development but the opportunity comes with the benefits of learning the system, customizing applications and access to data for studies that can help to improve the neighborhoods by improving programs and services. Listed below are recommendations for the continued development of GIS at local organizations.

#### Recommendations for the Future Development of GIS at CDCs:

1. Community organizations should continue to collaborate regarding the development of GIS for their agencies, which has been initiated through the Community GIS Consortium.
2. Utilization of data from the Ramsey County Users' Group and the development of supportive projects:
  - a. Reference maps
  - b. Glossary of field names (explanations of field names)
  - c. Property query
  - d. Property analyses
  - e. Establishment of a property database for program tracking and future analysis
3. Community organizations should make it a priority to send feedback to help improve the accuracy of the data that they are receiving through the Ramsey County GIS Users' Group from the City of St. Paul and Ramsey County.
4. Printing Layouts (maps): A large format printer should be obtained for the collective use of the organizations in the Community GIS Consortium. Until such a time, an agreement should be made with one of the participating organizations or local universities for the use of a large format printer.

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<<http://tcfreenet.org/org/reports.html>>.

Peters, Dave. "System Design Strategies; An ESRI White Paper", ESRI Library. June 2000 <[http://www.esri.com/library/whitepapers/addl\\_lit.html](http://www.esri.com/library/whitepapers/addl_lit.html)>.

### **Project Maps**

Commercial Programs: "Commercial Property in Payne-Arcade Area"

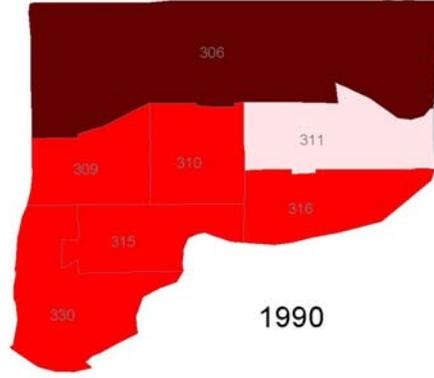
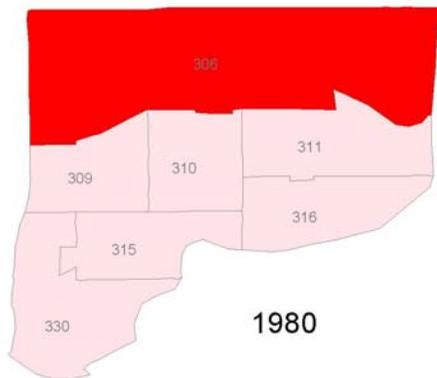
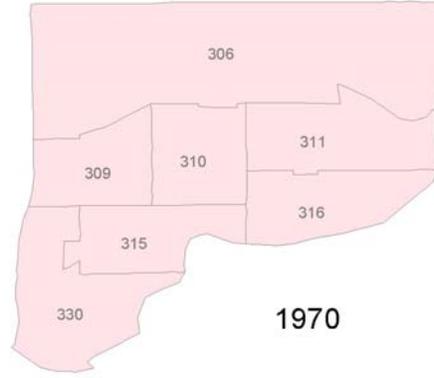
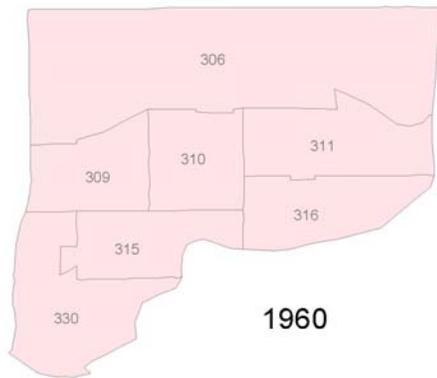
Community Organizing: "African Americans in District 5: 1960 – 1990"  
"African American Population District 5: 1990"

"District 5: Housing Ownership and Value for African Americans 1990"  
"District 5: African American Per Capita Income 1990"

Housing Programs: "Target Area: Non-Owner-Occupied Duplex Housing"



# African Americans in District 5: 1960 - 1990

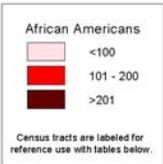


### Census Tract Boundary Changes

Between 1960 and 1990, some census tract boundaries changed. These changes were made in response to the natural alteration of physical boundaries in the landscape. In adjusting the census boundaries, the Census Bureau aimed to preserve comparability of the boundaries between Census. The most significant change in District 5, was the construction of Interstates 35 and 94 between 1960 and 1970. Though this affected the entire western boundary and the southwestern tip, the overall shape and composition of the District was not significantly altered. More recently, census tract 306 was split into two sections, 306.01 and 306.02, in response to a large growth in population. For purposes of comparability to previous census data, these two parts were combined.

### Patterns of Increase

Between 1960 and 1990, the number of African Americans in District 5 increased dramatically and created a distinct pattern. In 1960 and 1970, the number of African Americans was very small, 22 and 26 respectively. The majority lived in tract 330, located in the southwest corner of the district. This small majority shifted to tract 306, the northernmost tract, by 1970. Since 1970, the number of African Americans in tract 306 grew significantly to 225 (as shown by the map of the population in 1990) though still constituting less than 1% of the population in District 5. Since then, the African American population continued to grow, 1222 in 1990, almost 5% of the population in 1990. Since the shift between 1960 and 1970, there has been no other major shift in the location of the African American population. In 1990, the majority of African Americans continued to reside in the North and Southwestern parts of the district.

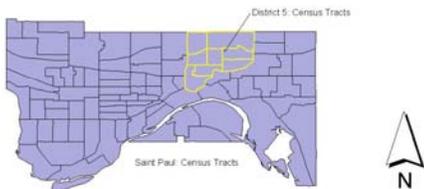


### African Americans as a Percent of Total Population in District 5

Year	Total Pop.	AF Am. Pop.	Percent AF Am.
1960	2867	22	0.8%
1970	2952	26	0.9%
1980	2579	122	4.8%
1990	2269	1222	5.4%

### Number of African Americans per Census Tract: 1960 - 1990

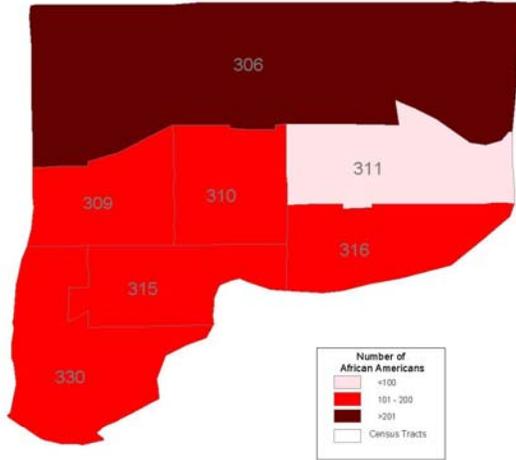
Tract	1960	1970	1980	1990
306	1	14	157	432
309	1	3	21	169
310	0	1	9	146
311	0	3	11	
315	3	0	9	196
316	0	1	17	158
330	17	4	1	164



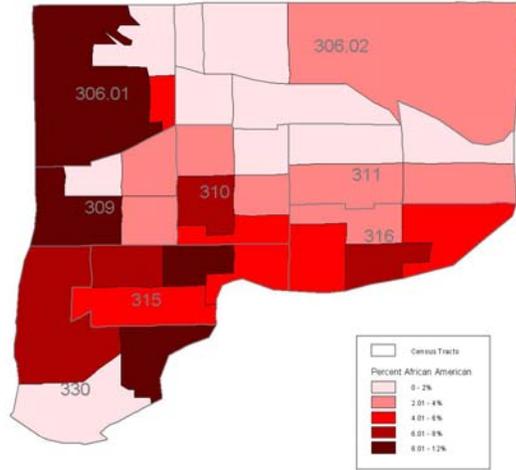
Project: African American Task Force: Demographics  
 Project Location: (z:\p\drive\ademo.apr  
 Layout: Demographics 1960 - 1990  
 Data Sources: US Census Bureau, 1990 Census and ESND  
 Date: July 2000

# African American Population in District 5:1990

Number of African Americans



Concentration of African Americans



## Patterns in the 1990 Census

With the distribution of the African American population further divided by block group, a more defined pattern of the population's distribution is evident. African Americans are most concentrated in the Northwest and South-central block groups 306 and 315, respectively. From these areas, the concentration of African Americans declines. This decline is particularly evident to the East and South.

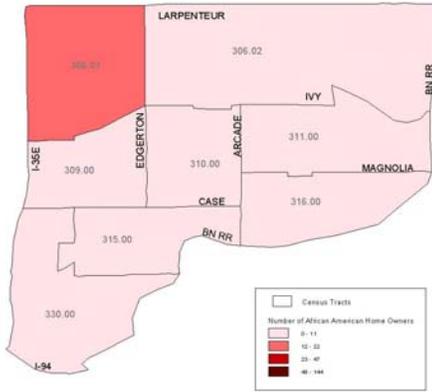
*A Note on 1990 Census Boundaries:* In 1980, tract 306 was divided into parts because of an increase in its population. For the comparability purposes of this project these divisions were combined into one census tract. However, the division is shown when the census tracts are broken into their respective block groups.

Project: African American Task Force, Demographics  
 Location: (z:\o drive)\aadam\apr  
 Layout: 1990 Demo  
 Data Sources: US Census Bureau, 1990 Census  
 Date: July 2000

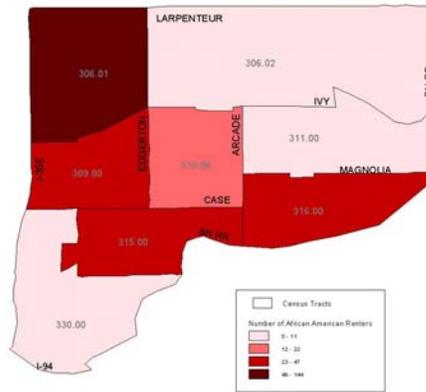


# District 5: Housing Ownership and Value for African Americans 1990

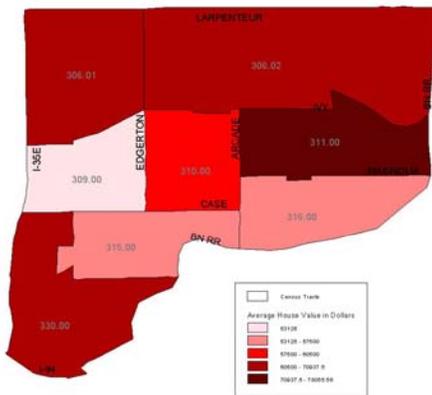
African American Homeowners



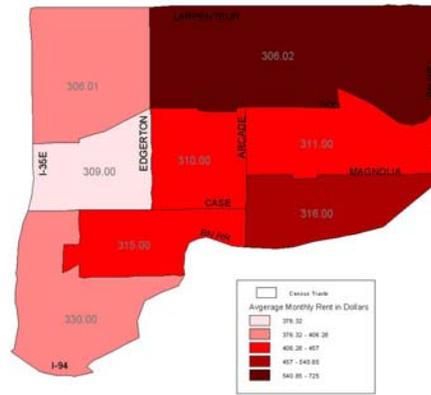
African American Renters



Average Value of Houses Owned by African Americans



Average Monthly Rent for African Americans



## Patterns of African American Homeownership and Average Home Value

In District 5, there are very few African American homeowners. The majority are in tract 306.01, located in the Northwest corner of the district. There are very few, less than 11, African American homeowners in each of the other census tracts in District 5.

The pattern of average home value for African Americans shows much more variation. Of the few homes owned by African Americans, the lowest average value is \$52,125.00, in tract 309.00 in the West-central portion of the district. Average values increase directly to the North and South to \$69,037.50 in tract 306.01 and \$67,500.00 in tract 330.00. The highest average home value for African Americans is \$70,955.00, in tract 311.00 in the East-central portion of the district.

Census Tract	Af Am Owner Occupied	Af Am Avg Housing Value
306.01	16	70927.50
306.02	7	69226.57
309.00	4	52125.00
310.00	5	62050.00
311.00	9	70955.00
315.00	3	57500.00
316.00	8	58675.00
330.00	2	67500.00

## Patterns of African American Renters and Average Monthly Rent

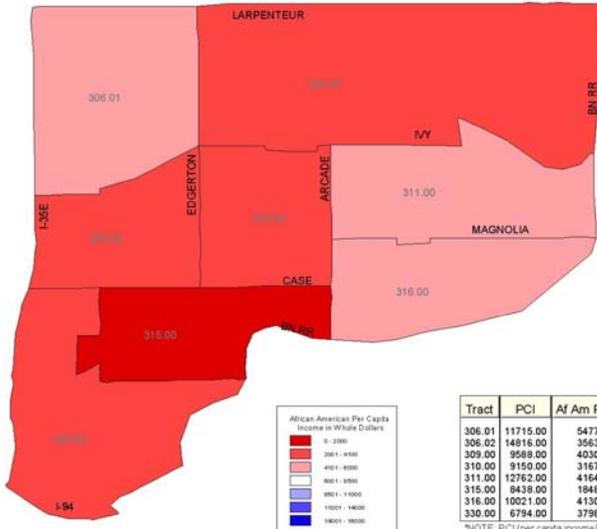
The majority African Americans who rent property in District 5 are located along a diagonal running between the Northwest and Southeast corners of the district. The largest number, 144, are located in tract 306.01, the Northwest corner of District 5. Outside of this tract, there is a sharp decrease in the number of African American renters. There are 47 in tract 309.00, 39 in tract 315.00 and 41 in tract 316.00, forming a diagonal directly to the South and West of tract 306.01. Moving away from these areas, the number of African American renters continues to decrease to the Northwest and Southwest corners of the district with 3 in tract 306.02 and none in tract 330.00.

The pattern of average monthly rent shows some contrast to where the majority of African American renters are located. The lowest average monthly rents are located in the western third of District 5. Gradually in tract 309.00, where the average monthly rent for African Americans is \$ 376.32. Average rent for African Americans increases towards the North and East. The highest average rent of \$725.00 is in tract 306.02, with one of the lowest number of African American renters.

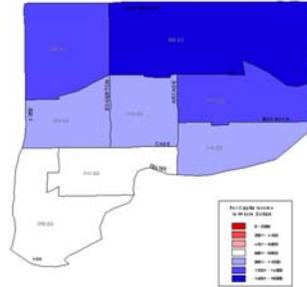
Census Tract	Af Am Renter	Af Am Avg Monthly Rent
306.01	144	406.26
306.02	3	725.00
309.00	47	376.32
310.00	22	451.00
311.00	11	457.00
315.00	39	429.98
316.00	41	540.85
330.00	0	395.37



# District 5: African American Per Capita Income 1990



Total Population Per Capita Income



## Poverty in District 5

The 'poverty line' is a commonly used term that refers to the poverty guidelines published by the Department of Health and Human Services each year. They are a simplified version of the poverty thresholds used for administration. In 1990, the poverty guideline for one person was \$6280.00. In District 5, in 1990, the per capita income for African Americans in every tract was below \$6000.00. This is not evident looking at the per capita income for the total population of census tracts in District 5 because African Americans represent only a fraction of the population. The income of the total population in each census tract in District 5 is significantly higher so that only two census tracts, 330.00 and 315.00, have a per capita income that is below the poverty guideline for one person in 1990.

Tract	PCI	Af Am PCI	Pct Af Am
306.01	11715.00	5477.00	9.63
306.02	14816.00	3563.00	1.28
309.00	9588.00	4030.00	5.43
310.00	9150.00	3167.00	3.80
311.00	12762.00	4164.00	1.50
315.00	8438.00	1848.00	6.41
316.00	10021.00	4130.00	4.72
330.00	6794.00	3798.00	8.74

\*NOTE: PCI (per capita income) is expressed in dollars.

## Patterns of African American Income

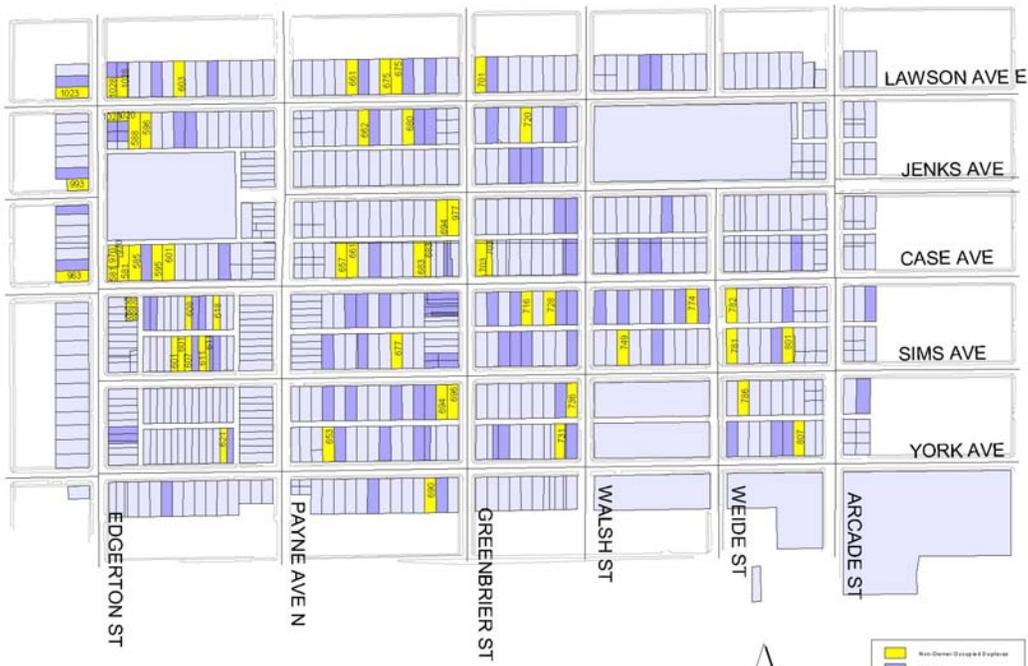
There is a striking contrast between the per capita income of African Americans in District 5 and the per capita income of the total population of District 5. For the total population in each census tract, the lowest per capita income is \$6794.00 in tract 330.00. Per capita income for African Americans does not exceed \$6000.00 and is significantly lower than the per capita income for the total population in every census tract. In tract 330.00 the per capita income for African Americans is \$3798.00, almost \$3000.00 less than the figure for the total population in the tract. The highest per capita income for African Americans is \$5477.00 in tract 306.01, more than \$6000.00 less than the per capita income for the total population of \$11715.00 in tract 306.01.

Census Tracts: District 5



Project: African American Task Force, Income  
 Project Location: (zip drive): \\stslab\ford\dem\dem\income.apr  
 Layout: Income  
 Data Source: US Census Bureau, 1990 Census,  
 the University of Minnesota, Barrbart Map Library and  
 the US Department of Health and Human Services  
 Date: August 2000  
 For more information contact: mcrenmam@stthomas.edu

# Target Area: Non-Owner-Occupied Duplex Housing



Project: Targeting Non-Duplex Occupied Housing  
 Project Location: 100 W. 10th St. 4th  
 Location: Target Location  
 Data Source: Kansas County Assessor's Office (Tax Assessment Database, 2008)  
 Date: August 2009  
 For more information contact: m.moran@kansas.edu or www.ksccds.org

