

# GIS-Supported Demonstration Modules in an Undergraduate Urban Geography Course

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Nashville, Tennessee



# Tennessee State University

## Fall 1999...

- Historically Black College – 8,000 students
- Offers only Geography minor –  
No students minor in Geography
- Geography courses primarily taught to fulfill pre-service teacher requirements
- No visible use of Geographic Information Systems in teaching or research

# GIS Capacity Development at TSU

## Fall 1999-Summer 2000

- **USDA 1890 HBCU Capacity Building Grant** funds used to launch Geographic Information Sciences (GISc) Laboratory
- **NASA Center for Automated Space Sciences (CASS)** program funds become available to support several undergraduate student researchers and expand the GISc Lab.
- **GISc Lab** formally established during summer 2000 with seven undergraduate student researchers on staff.

# GISc Lab Urban/Environmental Studies Research and Curriculum Development Fall 2001 - Present

- **Massie Chair of Excellence in Environmental Science and NASA Center for Automated Space Sciences (CASS)** programs provide funding for GIS hardware and software and support for several undergraduate research assistants.
- **GLOBE program:** TSU becomes a partner institution with the support of the Center of Excellence in Information Systems. Several local k-12 teachers are certified in GLOBE environmental sampling protocols.
- **The GISc Lab** establishes informal working partnerships with Fisk University, Vanderbilt University, Meharry Medical College, the Mayor's Office of Neighborhoods, the Neighborhoods Resource Center, EarthMatters Tennessee, and the Community at Bordeaux.
- **GISc Lab** research assistants and students enrolled in Cartography (GEOG 310) and Urban Geography (GEOG 485) engage in GIS-based environmental/urban studies-based service learning projects...

# TSU Upper Division Geography Courses with GIS and Spatial Analysis Content

- **Urban Geography (GEOG 4850) – Course content includes urban GIS applications. An “Urban GIS Term Paper” is required.**
- Cartography (GEOG 3100) – Course content updated with GIS-based material. Students are required to complete a “hands-on” GIS project.
- Physical Geography (GEOG 3010) – Course content includes GIS, GPS, and remote sensing applications.

# Challenge: Many social sciences majors have no background in Geography or GIS.

## Classifications and Majors of Students Enrolled in Urban Geography (GEOG 4850) for Spring 2005

Senior	Arts and Sciences
Senior	History
	Business Administration
Sophomore	Administration
Senior	Arts and Sciences
Senior	Political Science
Senior	History
Senior	English
	Undecided Undergrad
Senior	Undergrad
	Business Administration
Junior	Administration
Sophomore	Biology

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Spatial Analysis Tools in the  
Urban Geography (GEOG 4850) Course**

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- To attract students from across the social sciences disciplines due to the growing utility of GIS and related technology.

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- **To attract students from across the social sciences disciplines due to the growing utility of GIS and related technology.**
- **To lead students in applying spatial analysis tools to support the objectives and activities of local non-profit organizations, public schools, and government agencies.**

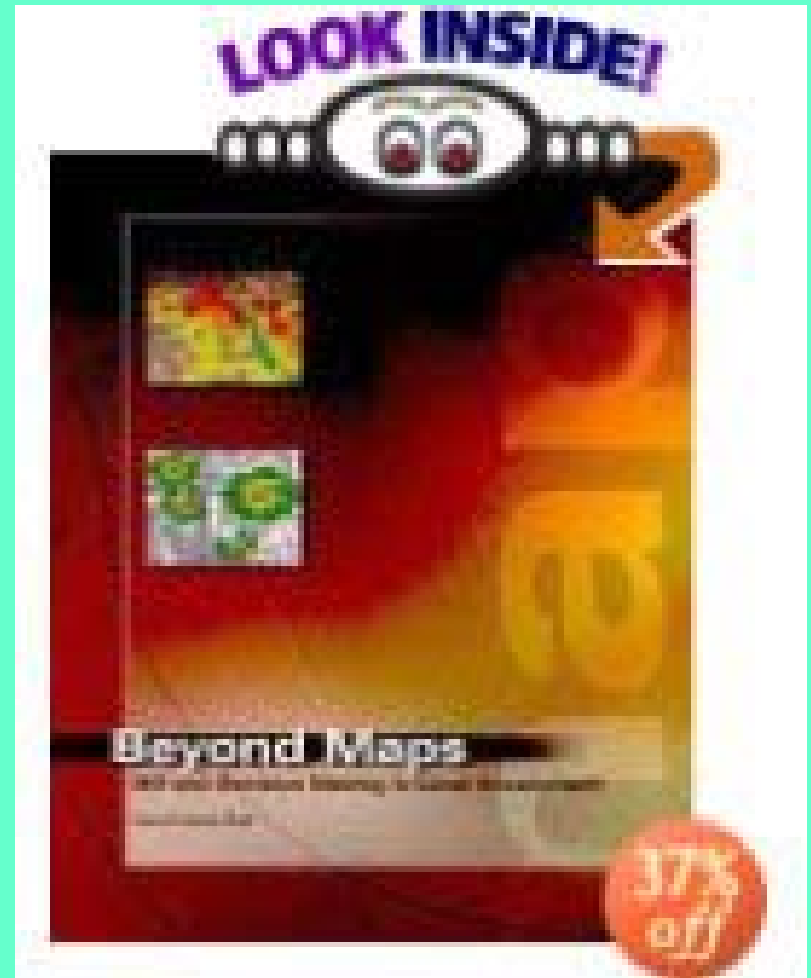
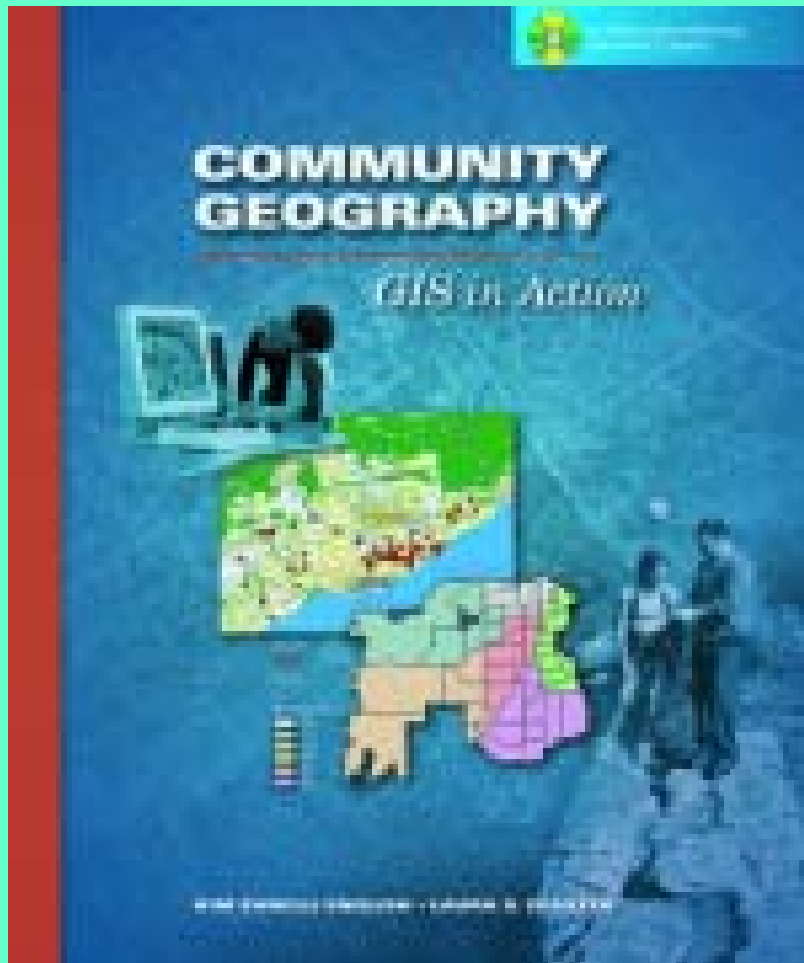
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- To attract students from across the social sciences disciplines due to the growing utility of GIS and related technology.
- To lead students in applying spatial analysis tools to support the objectives and activities of local non-profit organizations, public schools, and government agencies.
- To instruct students in the writing of term papers which will illustrate their ability to think critically and spatially about issues inherent to urban environments.

# Need for Development of Demonstration Modules for Urban Geography (GEOG 4850)

- Most students enrolled are social sciences majors who have no background in Geography or Geographic Information Systems.
- The History, Geography and Political Science Department has no computer labs for instruction.
- Due to students' lack of background, no current GIS-based supplementary textbook has been effective (or affordable) to date.

# Urban Geography (GEOG 4850) Former Supplementary GIS-based Texts



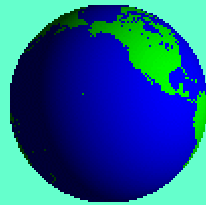
## Spatial Analysis/GIS- Supported Student Term Paper Topics in Urban Geography – Spring 2005.

- GIS Mapping of Grocery Store Audits vs Local Demographic and Socioeconomic Data
- Distribution of AIDS Cases in Washington, DC
- Impact of a Wal-Mart upon a Smyrna, Tennessee Community
- Spatial Analysis of Three Communities' Efforts to Keep Wal-Mart out of their Neighborhoods
- Spatial Comparison of the Location of Check-Cashing Businesses vs. Full-Service Banks

## Spatial Analysis/GIS- Supported Student Term Paper Topics in Urban Geography Spring 2005

- Spatial Location of Abortion Clinics vs Organizations Providing Alternatives to Abortion
- Should Nashville Invest in Expanding its Convention Center?
- Analysis of Land Uses Along a Planned Rev. Dr. Martin Luther King Boulevard Route.
- GPS and GIS Applications in the Development of a Black History/Urban Forestry Educational Walking Trail
- Population Changes Among Immigrant Residents: Nashville, Tennessee 1990-2000

# Demonstration Modules Based Upon Students' "Applied Urban GIS Research Papers"



Urban Geography

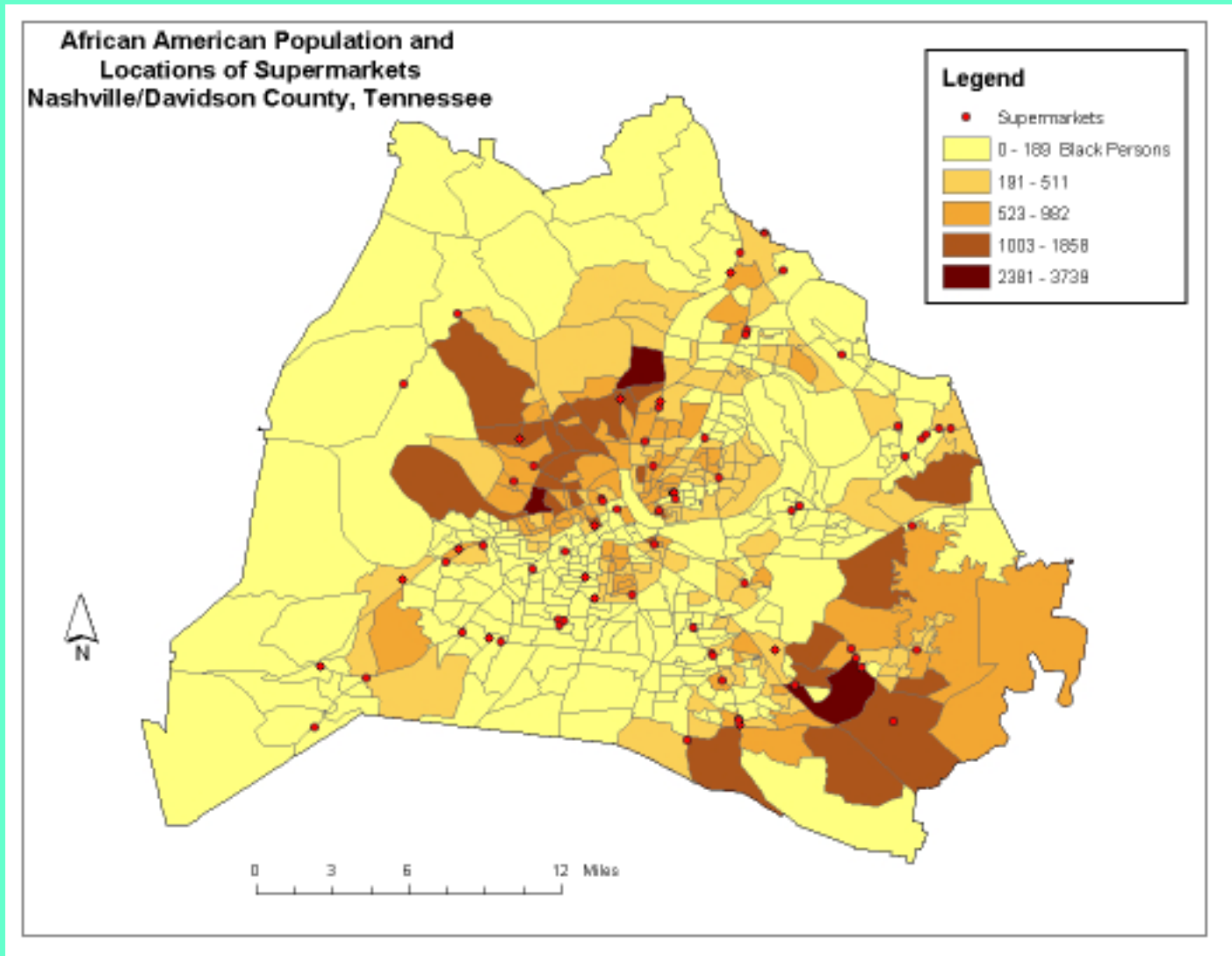
(GEOG 4850)

Spring 2005

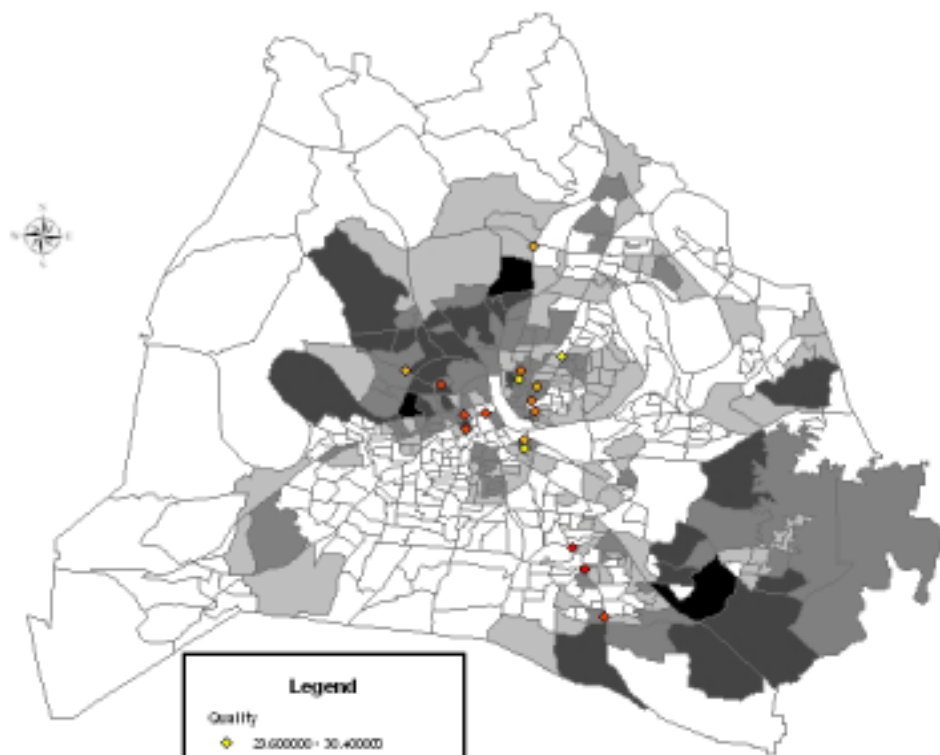


# “GIS and Other Spatial Tools in the Analysis and Delineation of Urban Food Deserts”

Student’s Major: History – Classification: Senior



**Tying Nashville Together**  
**Grocery Store Audits for Neighborhood Stores and**  
**African American Population**  
**Nashville/Davidson County, Tennessee**  
**2004**



**Legend**

**Quality**

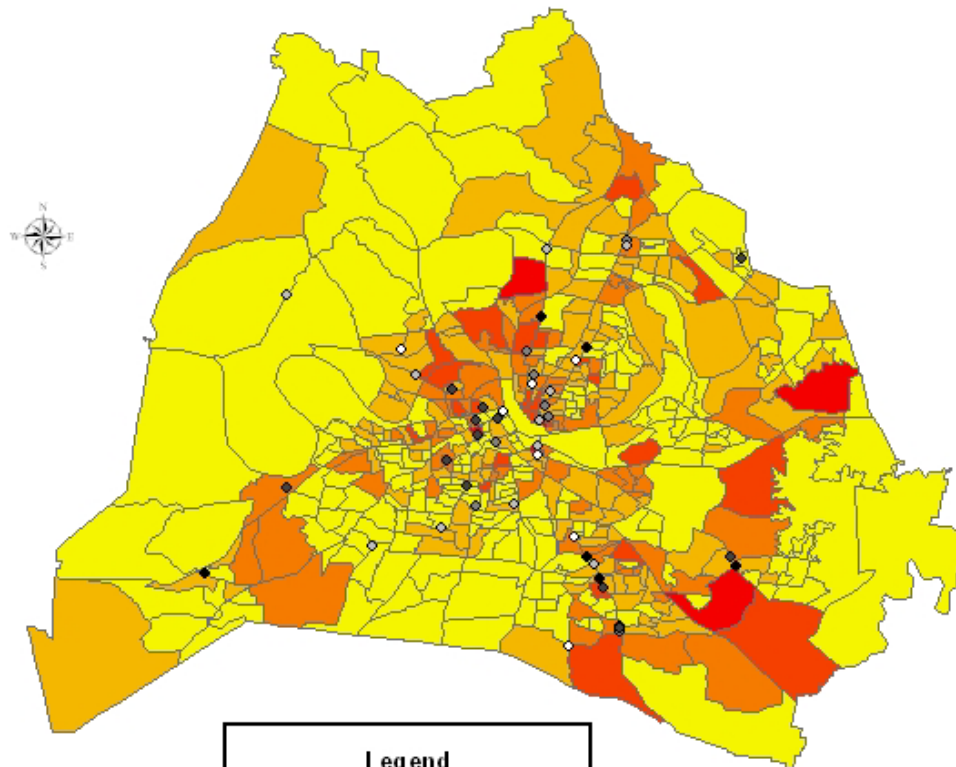
- 20,00000 - 30,40000
- 30,400001 - 40,80000
- 40,800001 - 51,20000
- 51,200001 - 61,60000
- 61,600001 - 72,00000

**Blacks Per Census Block Group**

- 0 - 100
- 100 - 211
- 212 - 322
- 323 - 433
- 434 - 544
- 545 - 655
- 656 - 766
- 767 - 877
- 878 - 988
- 989 - 1000

2.5 Miles

**Tying Nashville Together**  
**Generalized Results for All Store Types Audited and**  
**Persons in Poverty per Census Block Group**  
**(Darker Dot Symbols Represent Higher Quality Stores)**  
**Nashville/Davidson County, Tennessee**  
**2004**



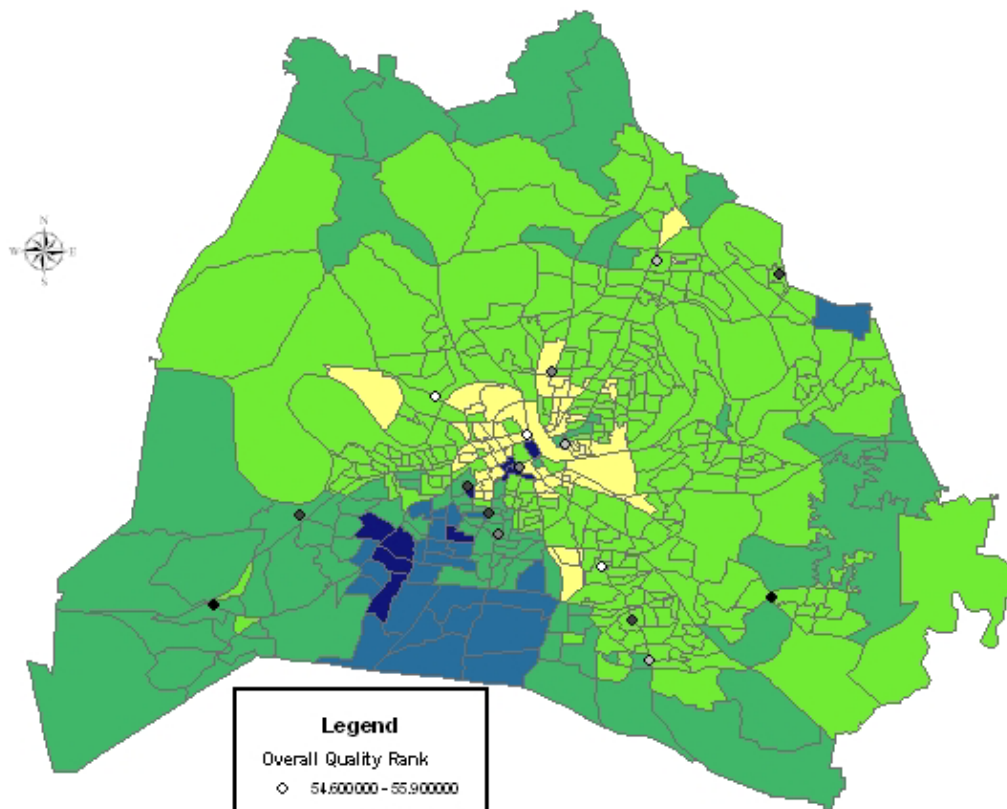
**Legend**

**Persons in Poverty**

0 - 89
90 - 213
214 - 408
409 - 777
778 - 1262



**Tying Nashville Together**  
**Grocery Store Audits for Neighborhood Stores and**  
**Median Home Value per Census Block Group**  
**Nashville/Davidson County, Tennessee**  
**2004**



**Legend**

Overall Quality Rank

- ◇ 54,600,000 - 55,900,000
- ◇ 55,900,001 - 62,900,000
- ◇ 62,900,001 - 67,600,000
- ◇ 67,600,001 - 78,400,000
- ◇ 78,400,001 - 90,000,000

Home Value

- 0 - 62700
- 62701 - 130600
- 130601 - 246800
- 246801 - 485100
- 485101 - 1000001



# Future Food Desert Research Initiatives in Nashville

- The TSU GISc Lab will continue to work with Tying Nashville Together; grocery store audit data will be added to map attribute data for further analysis.
- The partnership with the Vanderbilt Community Outreach Partnership Center (COPC) will continue with efforts focused upon bringing a major chain grocery store to North Nashville.

# “North Nashville History and Urban Forestry Educational Fitness Trail”

Proposed urban design model to encourage physical activity among North Nashville residents

Student’s Major: English – Classification: Senior



From: Nashville  
Metro Parks  
Master Plan

November 2002



Pathfinder Office

File Edit View Data Utilities Settings Window Help

2 GB

### Select Project

Project Name:

Comment:

Default paths for:

Project Folder	c:\Program Default
Backup files	c:\Program Default\Backup
Export files	c:\Program Default\Export
Save files	c:\Program Default\Save

Display this dialog at startup

start Microsoft Outlook MSN Messenger Spring 2005... Pathfinder Office

geograph

Map 1:1230, &lt;- 0.157 km -&gt;



### Feature Properties

Point feature: HistoryMarker

Attribute Name	Value
Title	ALPHA KAPP...

Positions: 44  
 Std Deviation: 3.354 m

Filename: R033017A.ssf  
 New  
 <None>



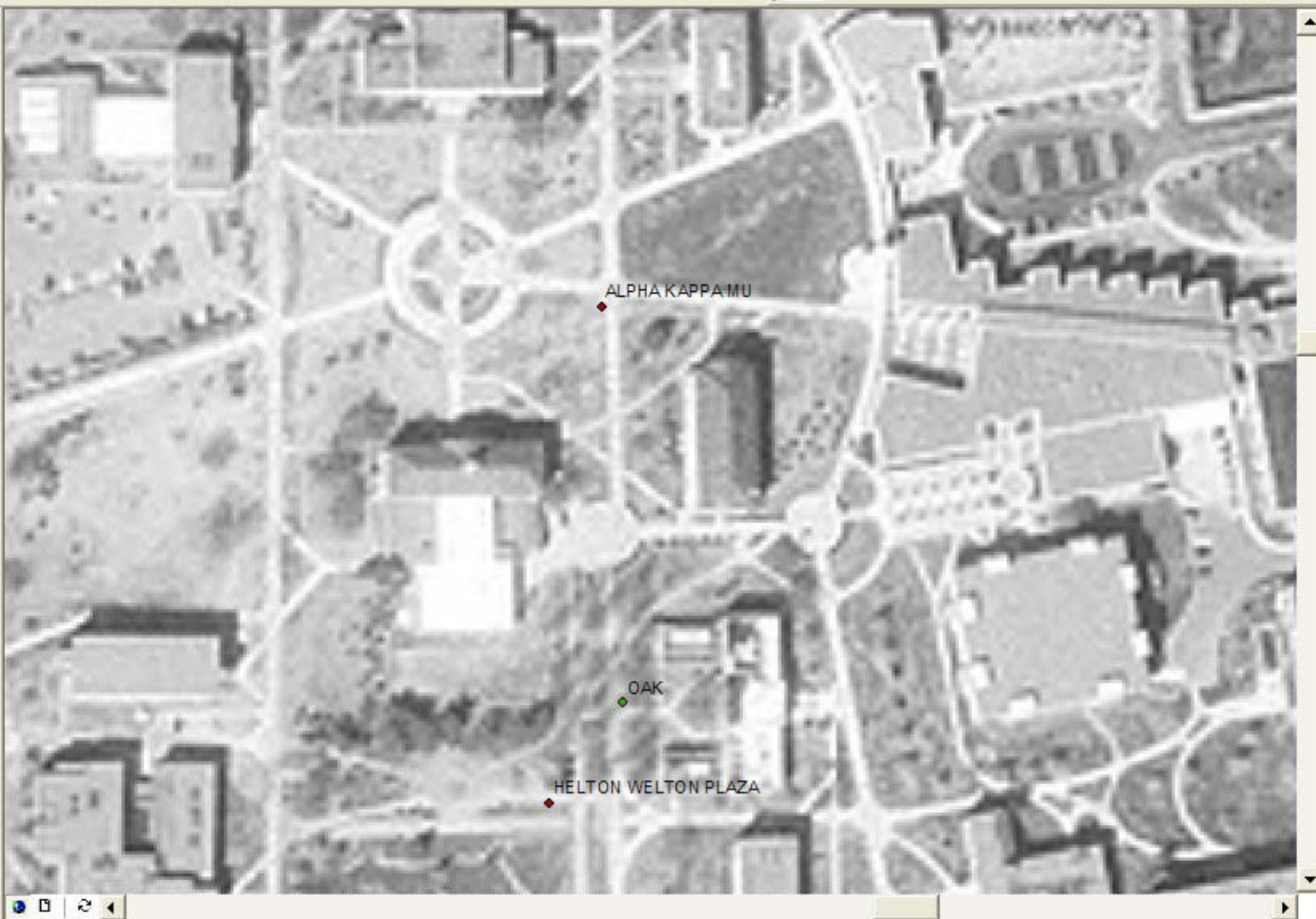




**Layers**

- Tree
  -
- HistoryM
  -
- NASHVILLE\_WEST\_SW.si
  - Value
  - High : 255
  - Low : 0

Display Source



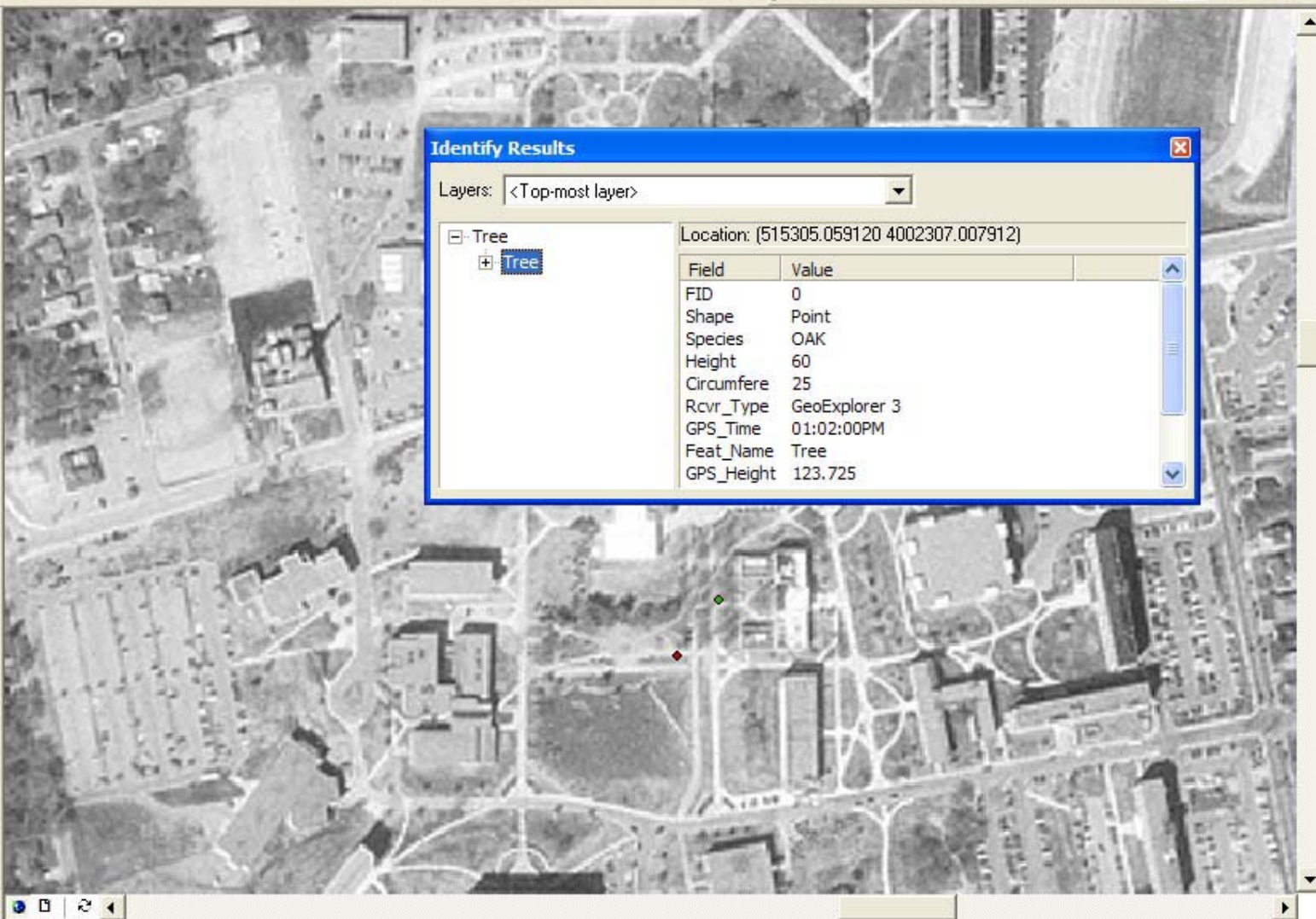
Drawing toolbar with icons for selection, text, and drawing tools. Includes font settings: Arial, size 10, bold, italic, underline, text color, fill color, stroke color.



**Layers**

- Tree
- HistoryM
- NASHVILLE\_WEST\_SW.si
  - Value
  - High : 255
  - Low : 0

Display Source



**Identify Results**

Layers: <Top-most layer>

Tree

Location: (515305.059120 4002307.007912)

Field	Value
FID	0
Shape	Point
Species	OAK
Height	60
Circumfere	25
Rcvr_Type	GeoExplorer 3
GPS_Time	01:02:00PM
Feat_Name	Tree
GPS_Height	123.725

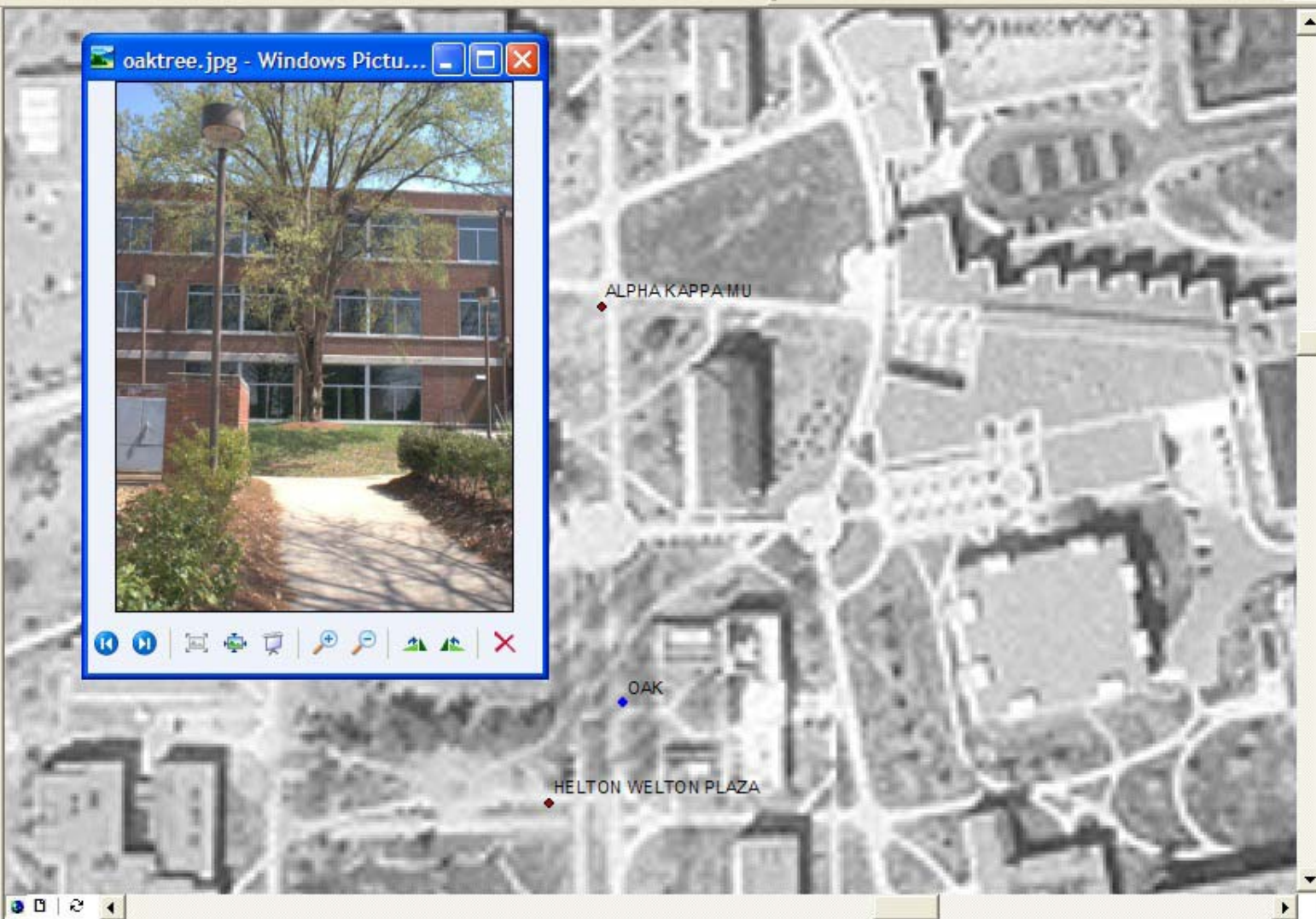




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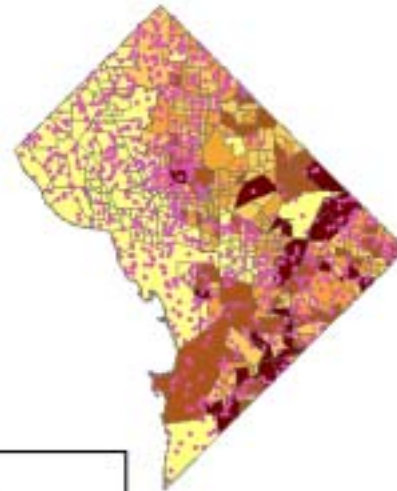
# Long Term Goals

- The GISc Lab has been awarded a grant from the Community Forestry Research Fellowship program to continue the research.
- Research results are expected to indicate that the proposed historic walking path and fitness trail will significantly increase physical activity among North Nashville residents.
- Upon acknowledging that urban design change will potentially reduce racial health disparities, Metro government may fund the project in cooperation with TSU, Fisk University, and Meharry Medical College.
- Upon completion, the walking trail will serve as a vehicle for further research on relationships between physical activity and urban design.

# “Mapping AIDS/HIV Cases: Cases: Washington, DC”

Student's Major: Undecided  
Classification: Senior

## AIDS/HIV CASES AND BLACK PERSONS PER CENSUS BLOCK GROUP WASHINGTON, DC



### Legend

#### Black Persons

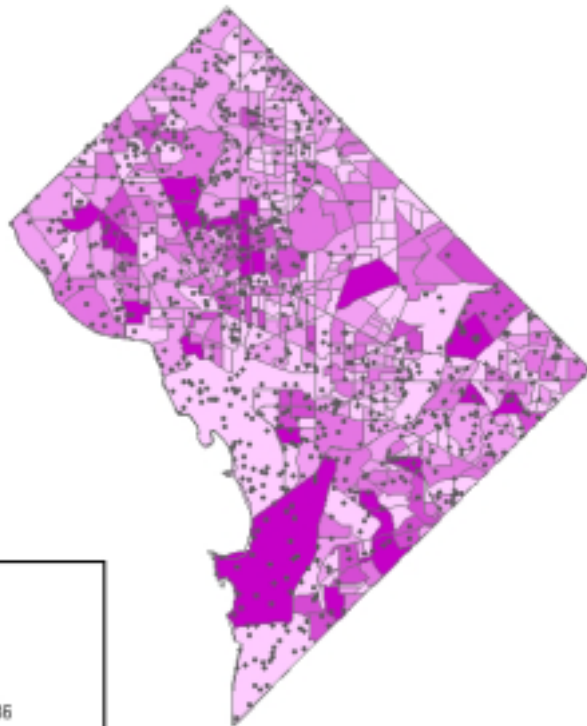


1 Dot = 5

• AIDS/HIV Cases

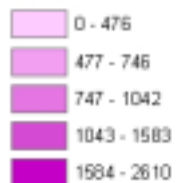
2 1 0 2 Miles

**AIDS/HIV CASES AND  
FEMALE POPULATION PER  
CENSUS BLOCK GROUP  
WASHINGTON, DC**



**Legend**

**Females**



1 Dot = 5

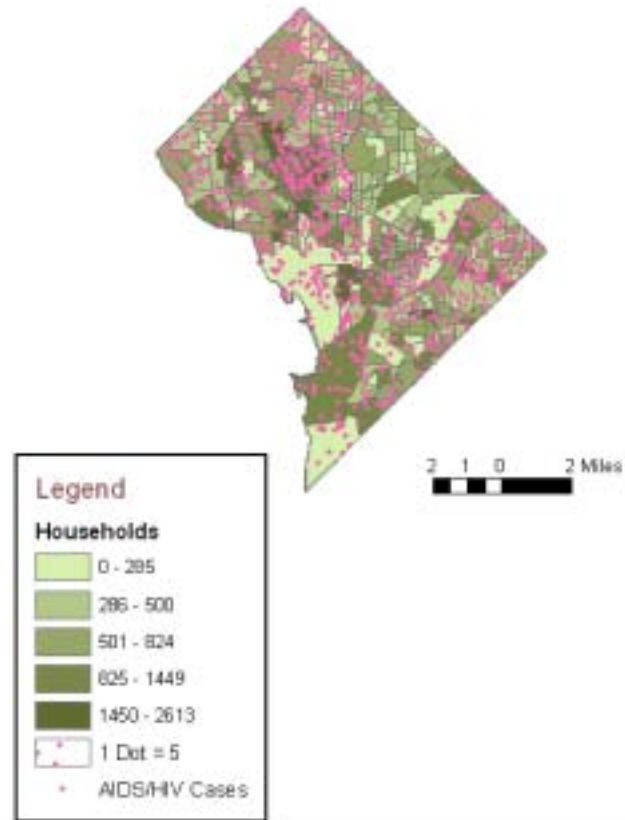
+ AIDS/HIV Cases

1 0.5 0 1 Miles

## Future Plans:

Project will continue in conjunction with researchers from Howard University. Final results will be presented at the Applied Geography Conference in Washington, DC, November 2005.

### AIDS/HIV CASES AND HOUSEHOLDS PER CENSUS BLOCK GROUP WASHINGTON, DC



# Comparison of the Demographics of two East Nashville Neighborhoods with Planned “Neighborhood Wal-Marts”

Student’s Major: Biology – Classification: Sophomore

## Work on Wal-Mart Market prompts mixed reactions

Gallatin Road project seen as shopping option by some in area

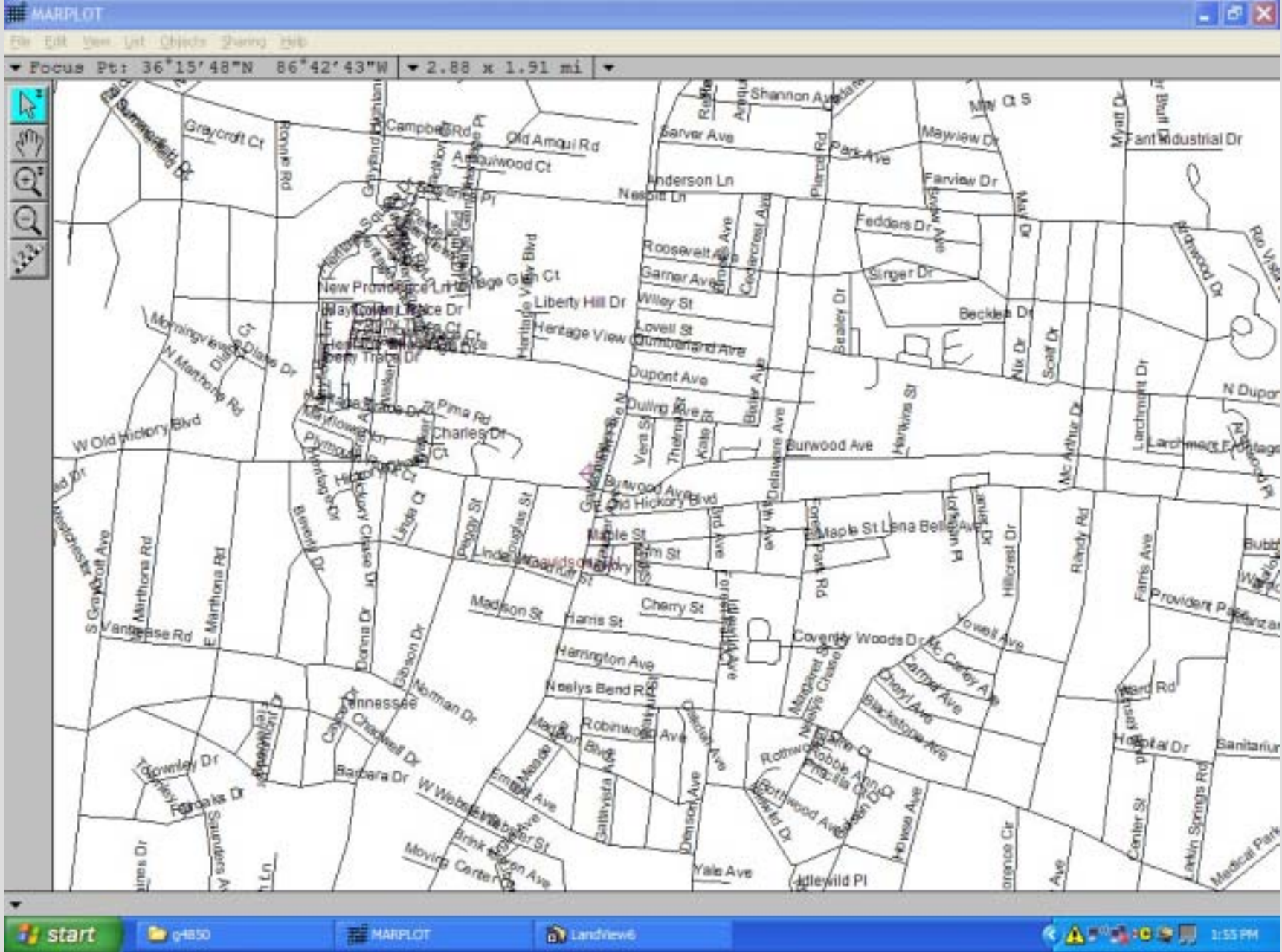


BILLY KINGSLEY / FILE

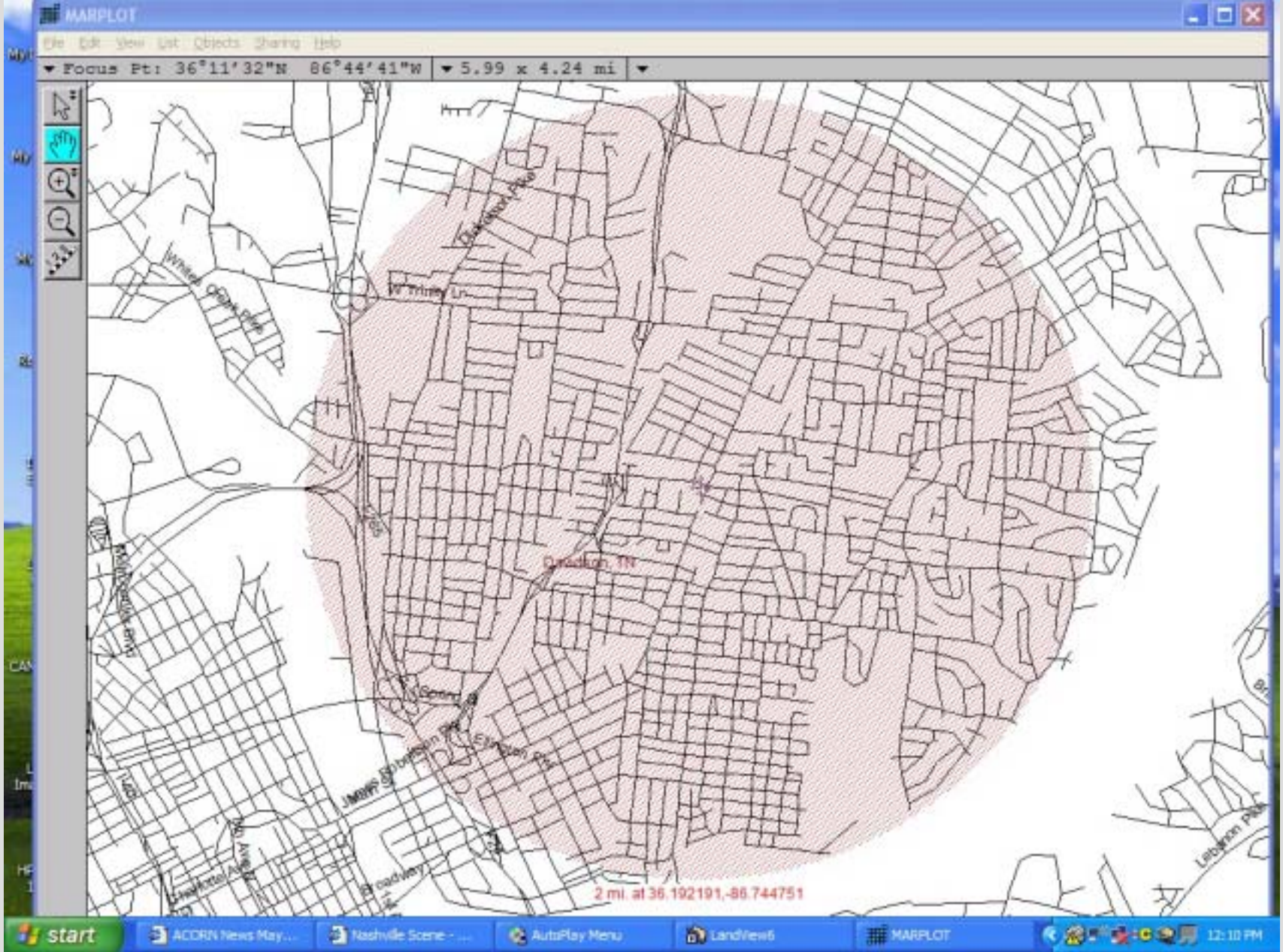
The Wal-Mart Neighborhood Market at Nippers Corner opened in 2003, becoming the first store of its kind built in Davidson County.







LandView 6 GIS with location of one of the East Nashville Wal-Marts



LandView 6 GIS with two-mile radius around an East Nashville Wal-Mart

LandView 6 Census 2000 Population Estimator

Instructions for using this estimator Home

Enter Location and Radius

Decimal degrees	Latitude 36.192062	Longitude -86.744797	Calculate Population using Block points ↓ Most accurate, but limited to the race & ethnicity fields below	Summarize Demographic Profiles using Block Group points ↓ Less accurate, but provides more demographic information
or deg-min-sec				
hemisphere	<input checked="" type="radio"/> North <input type="radio"/> South	<input checked="" type="radio"/> West <input type="radio"/> East		

Radius (miles)  
2.0

Clear all fields

Results (based on Census 2000)

Total population:  
Housing Units:

American  
Native Hawaiian a

summary.1.lv6

Print Close

LandView 6 - Census 2000 Profile of Selected Economic Characteristics (DP-3)  
Summary of Census Block Groups # records summarized: 57

EMPLOYMENT STATUS	Number	PCT	INCOME IN 1999	Number	PCT
Population 16 years and over	37,819	100.0	Households	19,880	100.0
In labor force	23,968	63.4	Less than \$10,000	3,734	19.0
Civilian labor force	23,962	63.4	\$10,000 to \$14,999	1,575	8.0
Employed	21,753	57.5	\$15,000 to \$24,999	3,334	16.9
Unemployed	2,229	5.9	\$25,000 to \$34,999	3,240	16.5
Percent of civilian labor force	9.3	(X)	\$35,000 to \$45,999	3,352	17.0
Armed Forces	0	0.0	\$50,000 to \$74,999	2,762	14.0
Not in labor force	13,820	36.2	\$75,000 to \$99,999	917	4.7
Females 16 years and over	20,152	100.0	\$100,000 to \$149,999	480	2.4
In labor force	11,700	58.1	\$150,000 to \$199,999	127	0.6
Civilian labor force	11,700	58.1	\$200,000 or more	151	0.8
Employed	10,629	52.7	Median household income (dollars)	(X)	(X)
Own children under 6 years	4,525	12.2			

Demographic (DP-1)  
 Social (DP-2)  
 Economic (DP-3)  
 Housing (DP-4)

For Help, press F1

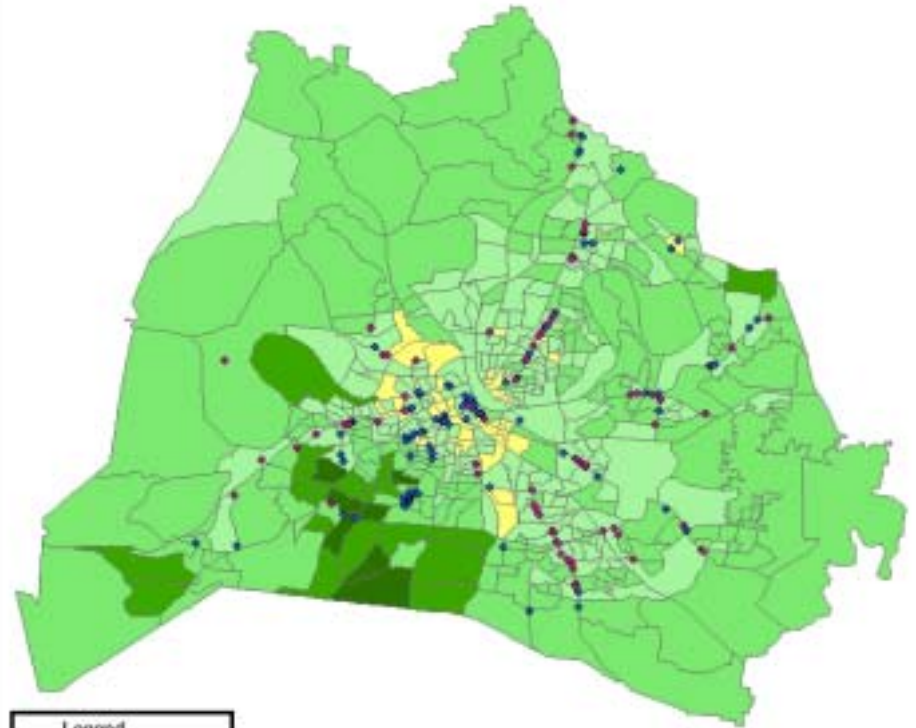
start q:450 Landview6 MAPLOT 1:34 PM

LandView 6 GIS with demographic data at U.S. Census Block Group level at a 2-mile radius around an East Nashville Wal-Mart

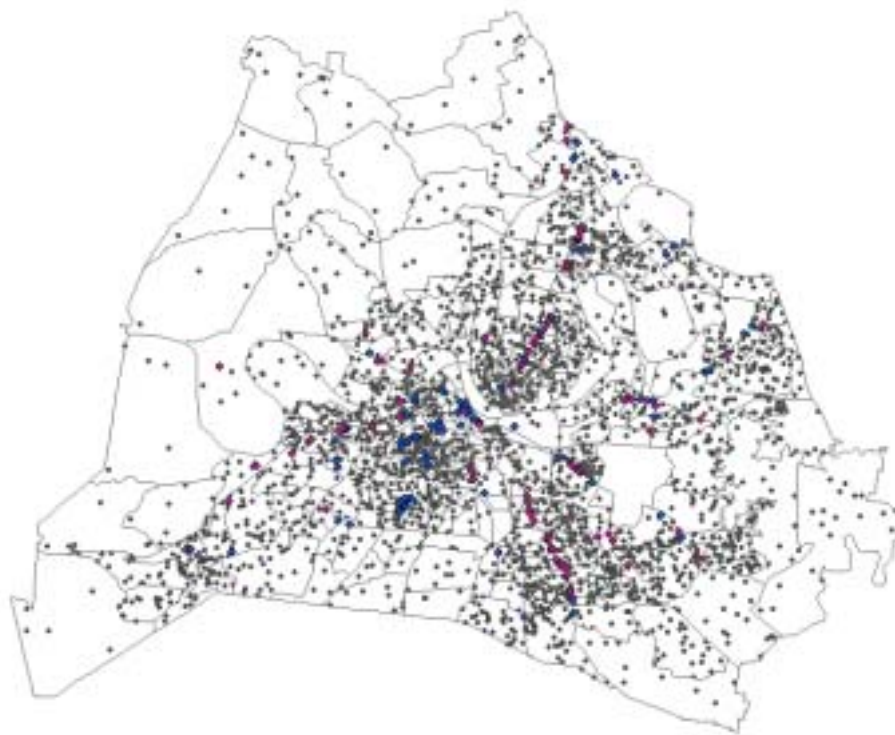
**Spatial Analysis of  
Locations of Check-Cashing  
Businesses versus Full-  
Service Banks in  
Nashville/Davidson County,  
Tennessee**

**Student's Major: Arts &  
Sciences – Classification:  
Senior**

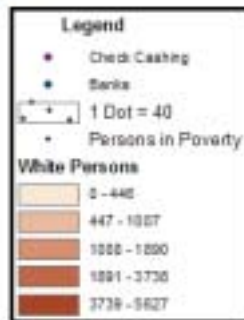
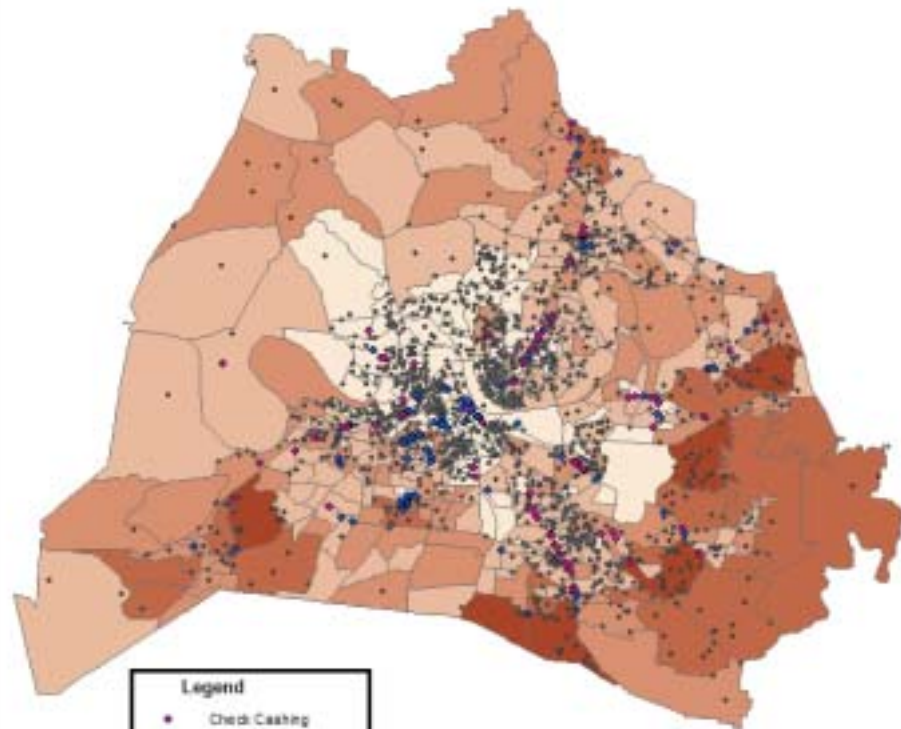
**Median Income, Full Service Banks, and  
Check Cashing Establishments  
Nashville/Davidson County, Tennessee**



# Population Distribution, Full Service Banks, and Check Cashing Establishments Nashville/Davidson County, Tennessee



# White Population, Persons in Poverty, Full Service Banks, and Check Cashing Establishments Nashville/Davidson County, Tennessee



# Corridor Analysis of Land Use along a Nashville Road Selected to be Re-Named in Honor of Dr. Martin Luther King, Jr.

Student's Major: Arts & Sciences – Classification: Senior



http://www3.nashville.org - MetroMap - Microsoft Internet Explorer provided by Tennessee State University

nashville.gov

There are 168 active users on this site.

Active Layers: Ownership Parcels

Search  
Locator  
Layers  
Legend  
Measure  
Select  
Selected Set  
Results  
Print  
Help

Update Map

Map Layers

- Parcels
- Zoning
- Jurisdictions
- Plans and Policies
- Water Features
- Topographic Features
- Planimetric Features
- Utilities
- Aerial Photography
  - 2004 Orthophoto
  - Hill Shade
- Transportation
  - Interstates
  - Street Centerlines
  - Major Street Plan
  - Railroad

Scale 1: 6652

Extent: 1724596.44, 677180.28 Image: 352, 165

The screenshot displays a web-based GIS application. The main map area shows a street grid with various zoning codes such as RM40, RM9, RM20, and R0. A light blue area represents a water feature, likely a river or lake. The sidebar on the left contains a 'Map Layers' panel with a tree view of different data layers, including parcels, zoning, and transportation. The top of the browser window shows the URL and the site name 'nashville.gov'. The bottom of the browser window shows the Windows taskbar with the Start button and several open applications.

Nashville Metropolitan Government's ArcIMS-supported on-line property parcel mapping service used to conduct land use analysis along the proposed route.



## **Evaluation of Incorporation of GIS and other Spatial Analysis Tools in the Urban Geography (GEOG 4850) Course**

- **Students were successfully exposed to basic spatial analysis and cartography principles.**

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- **Students successfully produced term papers which demonstrate their ability to think critically and spatially about “real world” issues inherent to urban environments.**
- **Students missed out on having “hands-on” experiences with GIS; however, in the future the class will be taught in a lab. The modules will continue to be utilized as most students will have little to no prior GIS experience.**



## **Spatial Perspectives on Analysis for Curriculum Enhancement**

### **Sources of Support for CSISS/SPACE Workshop Participants**

**There are no fees required to participate in a SPACE workshop. Participants may apply for awards of up to a maximum of **\$1000**. Faculty from minority serving institutions may be eligible for additional funds. Other awards of up to **\$1500** are available to support participants' efforts to implement spatial concepts in their courses and/or share their experiences with others.**

**[www.csiss.org](http://www.csiss.org)**



## **Spatial Perspectives on Analysis for Curriculum Enhancement**

### **Summer Workshops 2005**

- **Introducing GIS for Undergraduate Social Science Courses**  
**1-6 August 2005, San Francisco, California**
- **GIS and Spatial Modeling for the Undergraduate Social Science Curriculum**  
**10-15 July 2005, Columbus, Ohio**
- **Spatial Analysis for the Undergraduate Social Science Curriculum**  
**18-23 July 2005, Santa Barbara, California**

**[www.csiss.org](http://www.csiss.org)**

# **Geographic Information Sciences Laboratory**

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**[dpadgett@tnstate.edu](mailto:dpadgett@tnstate.edu)**

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