

Final Report

**Development of an Electronic Freight Theft Management System to
Minimize Capture Time, Aid in Cargo Theft Recovery, and Improve
State Economic Development-Phase III**

BD548/RPWO#12

Submitted to

**The Florida Department of Transportation
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16. Abstract The University of Central Florida's Center for Advanced Transportation Systems Simulation (UCF-CATSS) recently developed an infrastructure for managing Florida freight theft data (FDOT contract D022861). This work was first conceived as a result of the Motor Carrier Compliance Office Cargo Security Legislative Summit and funded by FDOT in cooperation with the Florida Highway Patrol (FHP). The infrastructure refers to the configuration that combined the Fax Alert system with an electronic freight theft management system and included the database and web site. This proof-of-concept project was designed to develop and demonstrate a Geographic Information System (GIS) component to further advance the functionality of the Fax Alert system. The enhancements include theft value distribution, individual theft data, aggregate theft data, theft locations and querying tools. The GIS component serves to improve law enforcement investigations and aid in recovery efforts.			
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Executive Summary

Background

The University of Central Florida's Center for Advanced Transportation Systems Simulation (UCF-CATSS) recently developed an online infrastructure for managing Florida freight theft data (1) in cooperation with the Florida Highway Patrol. This system was first conceived as a result of the successful cargo theft summit hosted by the office of Motor Carrier Compliance (MCCO), a unit of the Florida Department of Transportation (FDOT). The infrastructure refers to the configuration that combines the existing "Fax Alert" system with an electronic freight theft management system including the database and web site.

The "Fax Alert" system allows theft victims to submit freight theft reports by using a fax machine. The infrastructure modification noted above provides an online reporting system that has the potential to increase collaborative efforts among different law enforcement agencies and to reduce response time to freight theft. The data entered into the online system is stored in a database for future access, continuous updating, and cross-referencing by any partnered law enforcement agency.

Requested System Enhancements

Upon deployment and assessment of the Electronic Freight Theft Management System, MCCO and FHP requested the following Geographic Information System (GIS) enhancements to the existing system:

- Theft value distribution by county
- Aggregate theft data by county
- Individual theft locations

- Individual theft data
- Aggregate theft data
- Querying tools

The project results described in this final report profile the processes and steps used to create a GIS system to address the requested enhancements.

Objectives

1. Create functionality that addresses each of the requested enhancements.
2. Implement a pilot test GIS mapping application that encompasses all of the requested functionalities.

Findings and Conclusions

The proof-of-concept GIS component developed under this project presents the possibilities of using mapping as a tool to fight cargo theft within the State of Florida. Visual representation of theft location and analysis tools can be an invaluable addition to existing tools.

In developing the requested enhancements, it was found that:

- Under theft distribution by county, law enforcement officers and officials will have the ability to quickly identify which counties are experiencing higher concentrations of freight. This should allow law enforcement officials to more appropriately allocate resources. To leverage this value, accessing current data is critical.
- Under aggregate theft data by county, law enforcement officers and officials will have the ability to select adjoining counties to compare thefts among adjoining counties.

- Under individual theft locations, law enforcement officers and officials will be able to select a specific theft and receive the theft date and location.
- Under individual theft data, law enforcement officers and officials will be able to select a specific theft and receive pertinent information about the theft including values, vehicle description, theft report control number, and departmental case number.
- Under aggregate theft data, law enforcement officers and officials will be able to select several adjacent theft locations in order to assist in determining if any commonalities exist among them.
- Querying tools will provide law enforcement officers and officials with the ability to search theft data by fields other than purely geographic location. This could include, but would not be limited to: date of theft, value of equipment, cargo value, driver, vehicle style, etc.

The enhancements listed above can increase the toolset used by law enforcement officers when conducting cargo theft investigations.

In the course of developing this proof-of-concept GIS component, additional functional requirements were identified. In order to maximize the effectiveness of this GIS component, the following functional requirements will need to be examined.

1. The historical data used to build this GIS component are static. An active implementation would have to connect to current data. To achieve this end, the use of connector software such as ESRI's spatial database engine,

ArcSDE, would need to be incorporated. ArcSDE allows live data, stored in the Electronic Freight Theft Management System, to be presented on a map as well as to be queried using built-in analysis tools. Although the data that is presented in this GIS component are static, it represents database views that would be available in a dynamic system.

2. Another item is the geocoding of addresses input by the users. In order to get positive matches using the address locators, specific guidelines for theft and recovery locations will have to be designed and followed. For example, a user that enters a theft location as an intersection might enter “USHWY 441 AND I4”. This would not generate a geocoded location within the GIS system. If it was entered as “United States Highway 441 & I-4”, it would. Other descriptive locations such as “Ramada Inn on 441” would not be allowed. In order to overcome this hurdle, the existing online Electronic Freight Theft Management System (1) will have to be redesigned so that addresses that are entered by the users are verified at the time of reporting.
3. Another item to address would be who would have access to the mapping system. Because private information could be made available using such a site, it is recommended that such a site be hosted on an intranet or Internet site secured by login.

Benefits

Used in conjunction with the existing Electronic Freight Theft Management System (1) online reporting tool, a system such as this could assist in recovering stolen

equipment and goods. The benefits of such a GIS system would affect law enforcement, trucking owner/operators, and insurers.

The mapping and trend analysis tools could assist law enforcement in setting up effective sting operations that will help prevent future theft. This, along with stiffer penalties for cargo theft, would reduce the costs to trucking owners/operators and their insurers which will trickle down to the consumers — the ultimate bearer of the costs.

The future integration of the GIS enhancements demonstrated in this proof-of-concept project with the existing online Electronic Freight Theft Management System (1) can provide a more robust technological tool for law enforcement to more efficiently recover stolen equipment and cargo.

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INTRODUCTION

The goal of this project is to develop a proof-of-concept GIS component that extends the functionality of an earlier project (1) developed through a partnership between Center for Advanced Transportation Systems Simulation (CATSS) and Florida Highway Patrol (FHP), Motor Carrier Compliance Office (MCCO) and the Florida Department of Transportation (FDOT). The previous project had been developed as a means to submit cargo theft information online for immediate distribution to law enforcement. The result of the current project serves as proof-of-concept for using the captured data for GIS analysis.

The main objectives of this project are to:

1. Develop a mapping system for the Electronic Freight Theft Management System that is accessible from the Internet.
2. Enhance the previously developed system to provide the user with the ability to query Florida cargo thefts and recovery.

METHODOLOGY

Collection of GIS Datasets

The GIS data that were used to generate the online mapping were downloaded from the Florida Geographic Data Library (FGDL) at <http://www.fgdl.org/download/data.html>. The specific datasets that were downloaded and utilized in this project are listed in Table 1, Table 2 and Table 3.

Table 1. Florida Geographic Data Library Datasets—Geopolitical

Filename	Description	Download Location
cities	Cities and Towns	ftp://ftp1.fgdl.org/pub/state/cities.zip
cnty	Counties	(Dataset used no longer available)
majrds	Major Roads	ftp://ftp1.fgdl.org/pub/state/majrds.zip
mjrivp	Major Rivers	ftp://ftp1.fgdl.org/pub/state/mjrivp.zip

Table 2. Florida Geographic Data Library—Counties Alachua - Nassau

Filename	Description	Download Location
tgr0001	Alachua	ftp://ftp1.fgdl.org/pub/county/alachua/alachua_core/tgr0001.zip
tgr0002	Baker	ftp://ftp2.fgdl.org/pub/county/baker/baker_core/tgr0002.zip
tgr0003	Bay	ftp://ftp2.fgdl.org/pub/county/bay/bay_core/tgr0003.zip
tgr0004	Bradford	ftp://ftp1.fgdl.org/pub/county/bradford/bradford_core/tgr0004.zip
tgr0005	Brevard	ftp://ftp2.fgdl.org/pub/county/brevard/brevard_core/tgr0005.zip
tgr0006	Broward	ftp://ftp1.fgdl.org/pub/county/broward/broward_core/tgr0006.zip
tgr0007	Calhoun	ftp://ftp1.fgdl.org/pub/county/calhoun/calhoun_core/tgr0007.zip
tgr0008	Charlotte	ftp://ftp2.fgdl.org/pub/county/charlotte/charlotte_core/tgr0008.zip
tgr0009	Citrus	ftp://ftp2.fgdl.org/pub/county/citrus/citrus_core/tgr0009.zip
tgr0010	Clay	ftp://ftp2.fgdl.org/pub/county/clay/clay_core/tgr0010.zip
tgr0011	Collier	ftp://ftp1.fgdl.org/pub/county/collier/collier_core/tgr0011.zip
tgr0012	Columbia	ftp://ftp2.fgdl.org/pub/county/columbia/columbia_core/tgr0012.zip
tgr0013	Dade-Miami	ftp://ftp2.fgdl.org/pub/county/dade/dade_core/tgr0013.zip
tgr0014	Desoto	ftp://ftp1.fgdl.org/pub/county/desoto/desoto_core/tgr0014.zip
tgr0015	Dixie	ftp://ftp2.fgdl.org/pub/county/dixie/dixie_core/tgr0015.zip
tgr0016	Duval	ftp://ftp1.fgdl.org/pub/county/duval/duval_core/tgr0016.zip
tgr0017	Escambia	ftp://ftp2.fgdl.org/pub/county/escambia/escambia_core/tgr0017.zip
tgr0018	Flagler	ftp://ftp2.fgdl.org/pub/county/flagler/flagler_core/tgr0018.zip
tgr0019	Franklin	ftp://ftp1.fgdl.org/pub/county/franklin/franklin_core/tgr0019.zip
tgr0020	Gadsden	ftp://ftp1.fgdl.org/pub/county/gadsden/gadsden_core/tgr0020.zip
tgr0021	Gilchrist	ftp://ftp2.fgdl.org/pub/county/gilchrist/gilchrist_core/tgr0021.zip
tgr0022	Glades	ftp://ftp1.fgdl.org/pub/county/glades/glades_core/tgr0022.zip
tgr0023	Gulf	ftp://ftp2.fgdl.org/pub/county/gulf/gulf_core/tgr0023.zip
tgr0024	Hamilton	ftp://ftp2.fgdl.org/pub/county/hamilton/hamilton_core/tgr0024.zip
tgr0025	Hardee	ftp://ftp1.fgdl.org/pub/county/hardee/hardee_core/tgr0025.zip
tgr0026	Hendry	ftp://ftp1.fgdl.org/pub/county/hendry/hendry_core/tgr0026.zip
tgr0027	Hernando	ftp://ftp1.fgdl.org/pub/county/hernando/hernando_core/tgr0027.zip
tgr0028	Highlands	ftp://ftp2.fgdl.org/pub/county/highlands/highlands_core/tgr0028.zip
tgr0029	Hillsborough	ftp://ftp1.fgdl.org/pub/county/hillsborough/hillsborough_core/tgr0029.zip
tgr0030	Holmes	ftp://ftp2.fgdl.org/pub/county/holmes/holmes_core/tgr0030.zip
tgr0031	Indian River	ftp://ftp2.fgdl.org/pub/county/indianriver/indianriver_core/tgr0031.zip
tgr0032	Jackson	ftp://ftp1.fgdl.org/pub/county/jackson/jackson_core/tgr0032.zip
tgr0033	Jefferson	ftp://ftp1.fgdl.org/pub/county/jefferson/jefferson_core/tgr0033.zip
tgr0034	Lafayette	ftp://ftp1.fgdl.org/pub/county/lafayette/lafayette_core/tgr0034.zip
tgr0035	Lake	ftp://ftp2.fgdl.org/pub/county/lake/lake_core/tgr0035.zip
tgr0036	Lee	ftp://ftp2.fgdl.org/pub/county/lee/lee_core/tgr0036.zip
tgr0037	Leon	ftp://ftp2.fgdl.org/pub/county/leon/leon_core/tgr0037.zip
tgr0038	Levy	ftp://ftp1.fgdl.org/pub/county/levy/levy_core/tgr0038.zip
tgr0039	Liberty	ftp://ftp2.fgdl.org/pub/county/liberty/liberty_core/tgr0039.zip
tgr0040	Madison	ftp://ftp2.fgdl.org/pub/county/madison/madison_core/tgr0040.zip
tgr0041	Manatee	ftp://ftp1.fgdl.org/pub/county/manatee/manatee_core/tgr0041.zip
tgr0042	Marion	ftp://ftp1.fgdl.org/pub/county/marion/marion_core/tgr0042.zip
tgr0043	Martin	ftp://ftp1.fgdl.org/pub/county/martin/martin_core/tgr0043.zip
tgr0044	Monroe	ftp://ftp2.fgdl.org/pub/county/monroe/monroe_core/tgr0044.zip
tgr0045	Nassau	ftp://ftp1.fgdl.org/pub/county/nassau/nassau_core/tgr0045.zip

Table 3. Florida Geographic Data Library—Counties Okaloosa - Washington

Filename	Description	Download Location
tgrr0046	Okaloosa	ftp://ftp1.fgdl.org/pub/county/okaloosa/okaloosa_core/tgrr0046.zip
tgrr0047	Okeechobee	ftp://ftp1.fgdl.org/pub/county/okeechobee/okeechobee_core/tgrr0047.zip
tgrr0048	Orange	ftp://ftp1.fgdl.org/pub/county/orange/orange_core/tgrr0048.zip
tgrr0049	Osceola	ftp://ftp1.fgdl.org/pub/county/osceola/osceola_core/tgrr0049.zip
tgrr0050	Palm Beach	ftp://ftp2.fgdl.org/pub/county/palmbeach/palmbeach_core/tgrr0050.zip
tgrr0051	Pasco	ftp://ftp2.fgdl.org/pub/county/pasco/pasco_core/tgrr0051.zip
tgrr0052	Pinellas	ftp://ftp1.fgdl.org/pub/county/pinellas/pinellas_core/tgrr0052.zip
tgrr0053	Polk	ftp://ftp1.fgdl.org/pub/county/polk/polk_core/tgrr0053.zip
tgrr0054	Putnam	ftp://ftp2.fgdl.org/pub/county/putnam/putnam_core/tgrr0054.zip
tgrr0055	Santa Rosa	ftp://ftp2.fgdl.org/pub/county/santarosa/santarosa_core/tgrr0055.zip
tgrr0056	St. Johns	ftp://ftp2.fgdl.org/pub/county/stjohns/stjohns_core/tgrr0056.zip
tgrr0057	Seminole	ftp://ftp2.fgdl.org/pub/county/seminole/seminole_core/tgrr0057.zip
tgrr0058	Sarasota	ftp://ftp2.fgdl.org/pub/county/sarasota/sarasota_core/tgrr0058.zip
tgrr0059	St. Lucie	ftp://ftp1.fgdl.org/pub/county/stlucie/stlucie_core/tgrr0059.zip
tgrr0060	Sumter	ftp://ftp1.fgdl.org/pub/county/sumter/sumter_core/tgrr0060.zip
tgrr0061	Suwannee	ftp://ftp2.fgdl.org/pub/county/suwannee/suwannee_core/tgrr0061.zip
tgrr0062	Taylor	ftp://ftp1.fgdl.org/pub/county/taylor/taylor_core/tgrr0062.zip
tgrr0063	Union	ftp://ftp1.fgdl.org/pub/county/union/union_core/tgrr0063.zip
tgrr0064	Volusia	ftp://ftp2.fgdl.org/pub/county/volusia/volusia_core/tgrr0064.zip
tgrr0065	Wakulla	ftp://ftp1.fgdl.org/pub/county/wakulla/wakulla_core/tgrr0065.zip
tgrr0066	Walton	ftp://ftp1.fgdl.org/pub/county/walton/walton_core/tgrr0066.zip
tgrr0067	Washington	ftp://ftp2.fgdl.org/pub/state/tgrr0055.zip/tgrr0067.zip

The decision to use these datasets was based on previous experience working with these sets as well as for the purpose of maintaining the same scale among all data sets.

Modification of FGDL Geographic Datasets

In order to reduce the amount of unnecessary data on the map and improve readability, the “cities” dataset was reduced to those cities having estimated population in 1998 of 5,000 or more. This reduced the number of cities displayed from 1113 to 185. The added benefit of this reduction is a quicker response when rendering the map. This could also benefit future access as the database of thefts and recoveries grows. Furthermore, this may reduce access time as additional features for the system are added.

Creation of Custom Geographic Datasets

In order to display theft data on the map, it was necessary to extract data from the provided database and convert it to a geocoded dataset. The database was provided by the Florida Highway Patrol (FHP) with the data collected from the current “Fax Alert” Cargo Theft and Recovery Task Force. This was accomplished by using the Tiger Roads 1:100,000 datasets downloaded from the FGDL. A sampling of 226 theft cases were extracted from the database. These cases were selected because they contained complete addresses. Within ESRI’s ArcCatalog, a custom address locator was created for each Florida county. The theft data sample was then processed through each of the address locators in order to generate a theft shape file for each of the counties that had thefts in that sample. A shapefile is defined by ESRI as data structure that stores nontopological geometry and attribute information for the spatial features in a data set. The geometry for a feature is stored as a shape comprising a set of vector coordinates(2). Using the “Append” tool in the ArcCatalog Toolbox, these theft shape files were merged into one shape file. The counties in this data sample that had thefts include:

- Alachua
- Broward
- Clay
- Columbia
- Dade
- Desoto
- Duval
- Gadsden
- Hamilton
- Highlands
- Hillsborough
- Indian River
- Lake
- Manatee
- Marion
- Orange
- Osceola
- Pasco
- Pinellas
- Polk
- Sumter
- Suwannee

Creation of the AXL File

The AXL file is an XML style file that ArcIMS utilizes for generating the online maps and any geographic analysis tools. The AXL file was created manually rather than using the ArcIMS Author because we needed a customized file created specifically so that the aggregate values for thefts could be presented on the map. Using the ArcIMS Author with this file now would overwrite the customization and should be avoided.

FUNCTIONALITY

The Toolbar

This EFTMS map Web site contains a toolbar that is always present and provides the basic functionality for the site. Table 4 explains what happens when a mouse pointer is used to select each icon. A “click” refers to the operation of the left computer mouse button. A layer, as referred to in this documentation, is defined as what is visible on the map and active in terms of data display.

Table 4. The Toolbar Functionality

Icon	Name	Description
	Zoom In	• When used as a single click, the map will zoom in one level with the point clicked in the center. • When used as a rectangle select, the map will zoom to the area selected.
	Zoom Out	• When used as a single click, the map will zoom out one level with the point clicked in the center. • When used as a rectangle select, the map zooms out inversely to the amount of screen selected.
	Pan	Allows the map to be “pushed” by dragging the mouse pointer.
	Zoom to Full Extent	Zooms the map out to the fullest extent possible.
	Zoom to Last Extent	Zooms the map to the coverage of the previous zoom.
	Identify	A single click of the map causes information about the underlying features to be displayed.

	Query	Allows use of SQL queries to find relevant data.
	Select by Rectangle	Select features over a selected area.
	Clear Selection	Clear selected features from the result table.
	Toggle Layers/Legend	Toggles between Layers and Legend.
	Help	Online help.

Default View

When the EFTMS map Web site is first opened (or manually refreshed), the default view presents an overview of theft monetary values for the entire State of Florida as displayed in Figure 1. Pie charts overlaying the counties represent the percentage of monetary loss within each county compared to the total monetary loss across the state. Counties such as Dade, Broward and Duval had disproportionately high theft values so the red area for each of their pie charts are larger.

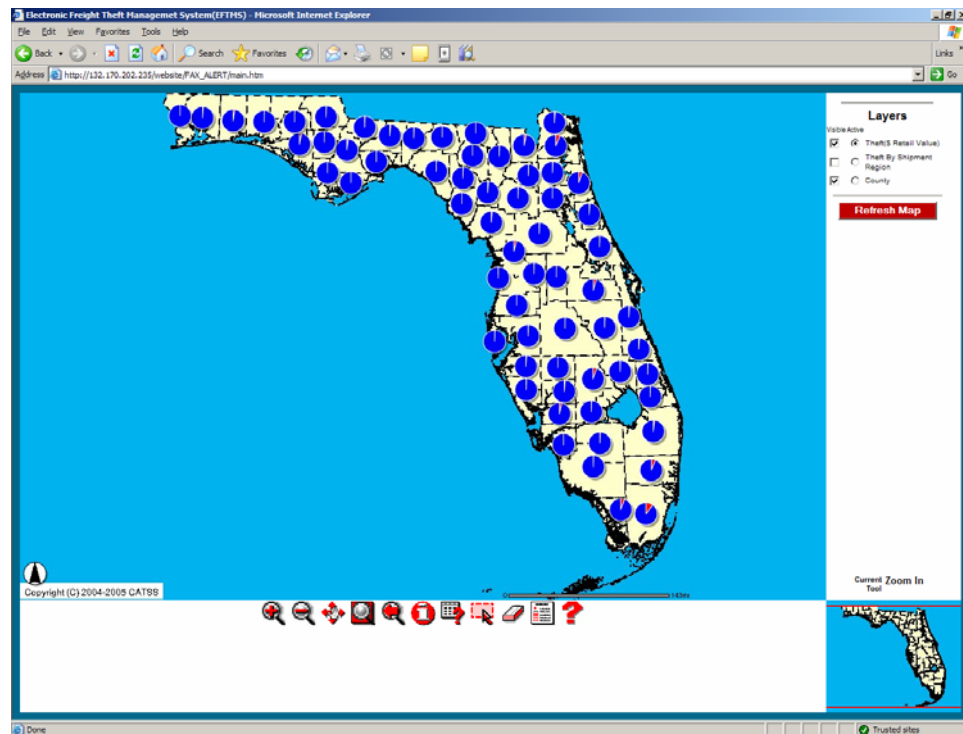


Figure 1. Initial Extent (Default View)

Using the Identify tool on this view will present a data table for any county that is clicked. Figure 2 shows the result of clicking on Orange County. The returned data (theft retail value and county information) corresponding to the selection is shown in an expanded view below Figure 2 for enhanced readability.

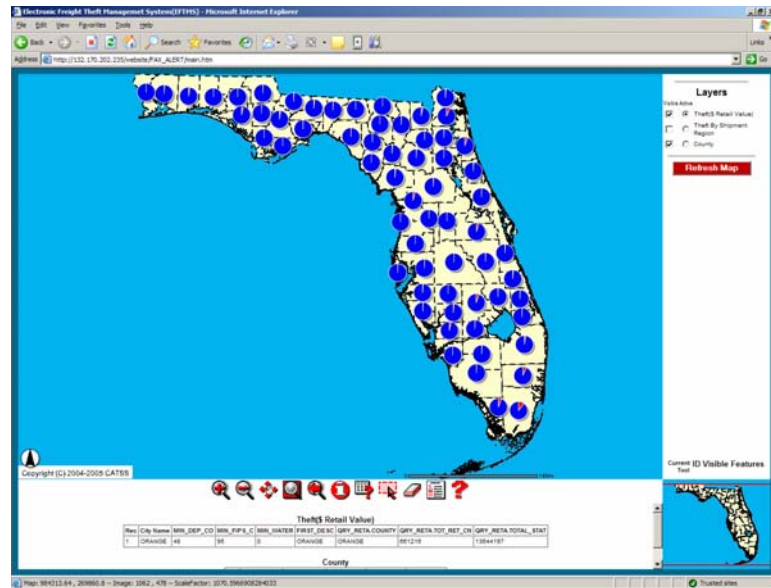


Figure 2. Initial Extent. Orange County selected

Theft(\$ Retail Value)

Rec	City Name	MIN_DEP_CO	MIN_FIPS_C	MIN_WATER	FIRST_DESC	QRY_RETA.COUNTY	QRY_RETA.TOT_RET_CN	QRY_RETA.TOTAL_STAT
1	ORANGE	48	95	0	ORANGE	ORANGE	661216	13644197

County

Rec	CountryName	MIN_DEP_CO	MIN_FIPS_C	MIN_WATER	FIRST_DESC
1	ORANGE	48	95	0	ORANGE

Using the Select by Rectangle on this view for all counties within the drawn rectangle allows data from several counties to be combined for viewing on the map. Figure 3 and Figure 4 demonstrate this functionality and show the resultant output. Note

that when the “Select by Rectangle” is used, the counties included will change color (currently yellow) on the map.

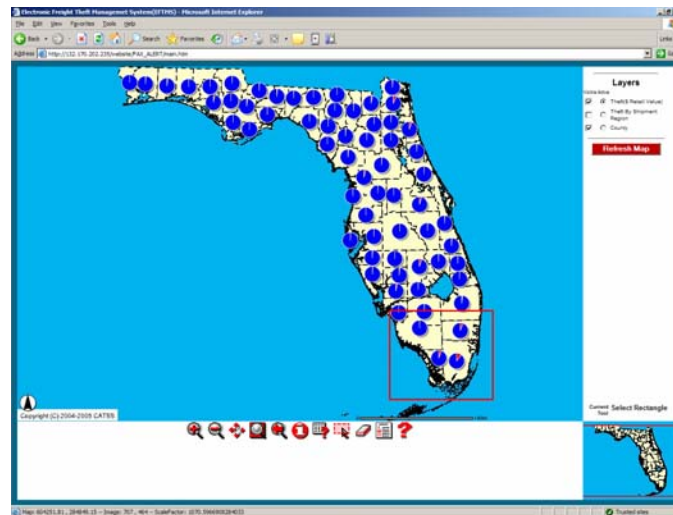


Figure 3. Initial Extent. Several counties being selected

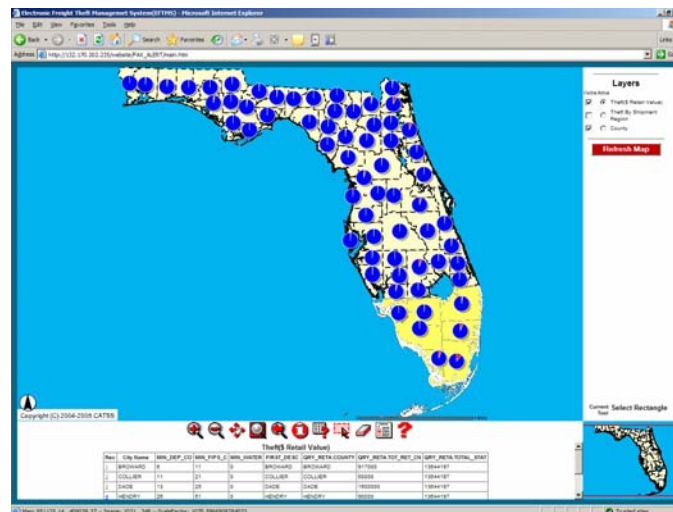


Figure 4. Initial Extent. Several counties selected

Theft(\$ Retail Value)

Rec	City Name	MIN_DEP_CO	MIN_FIPS_C	MIN_WATER	FIRST_DESC	QRY_RETA.COUNTY	QRY_RETA.TOT_RET_CN	QRY_RETA.TOTAL_STAT
1	BROWARD	6	11	0	BROWARD	BROWARD	917000	13644197
2	COLLIER	11	21	0	COLLIER	COLLIER	50000	13644197
3	DADE	13	25	0	DADE	DADE	1600000	13644197
4	HENDRY	26	51	0	HENDRY	HENDRY	90000	13644197
5	LEE	36	71	0	LEE	LEE	6000	13644197
6	MONROE	44	87	0	MONROE	MONROE	802900	13644197
7	PALM BEACH	50	99	0	PALM BEACH	PALM BEACH	310000	13644197

[Zoom to these records](#)

The Zoom In tool can be used by a single click to zoom into an area of interest until the desired magnification is found. Figure 5, Figure 6 and Figure 7 demonstrate the single click zoom.

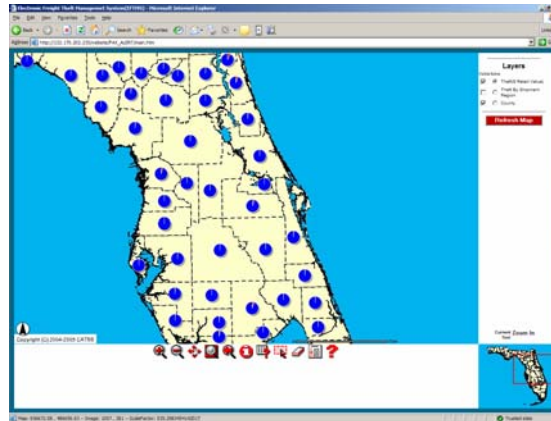


Figure 5. Zoom Level 1 (Orange County)

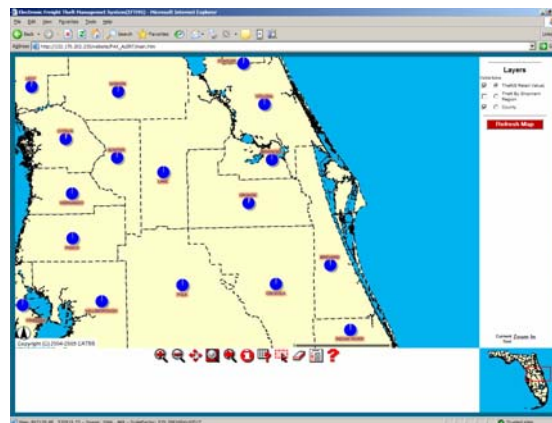


Figure 6. Zoom Level 2 (Orange County)

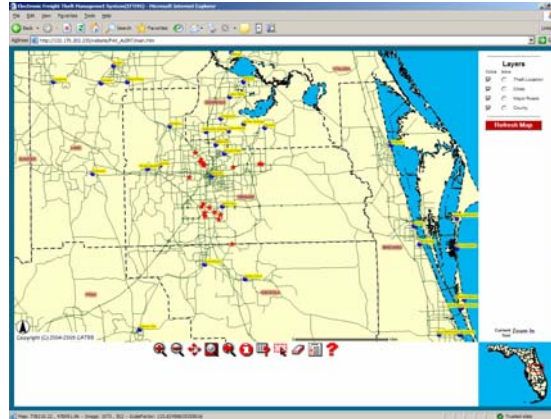


Figure 7. Zoom Level 3 (Orange County)

Zoomed View

Once a certain level of zoom is obtained, major roads, city names and theft locations will appear. The “Layers” frame is updated accordingly. This level of zoom is set within the AXL file under the maxscale attribute of a layer. Once visible on the map, these features can be identified using the “Identify” and “Select by Rectangle” tools. Figure 8 demonstrates the selection of a single theft location using the “Identify” tool. The data displayed below the map include SCORE (the level of confidence of the geocoded address matching), COUNTY, ADDRESS, CONTROLNMB (control number of the theft report which is a primary field of identification for each theft record and corresponding recovery record). To maintain a certain amount of confidentiality, no more additional theft information is provided on this public Web server although more additional information can be included on a closed system.

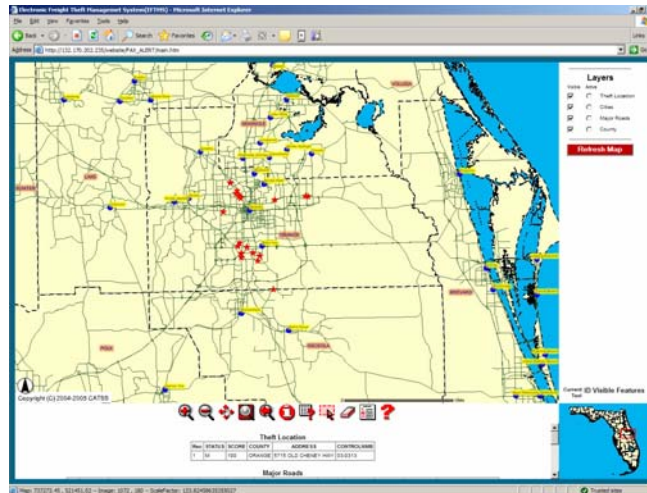


Figure 8. Selection of individual theft location

Thrift Location

Rec	SCORE	CTRL_NUM	DATE	COUNTY	RTL_VALUE	TRC_VALUE	TRL_VALUE	LEG_CT	STREET	CITY	STATE	ZIP
1	100	02-10211243623863	Thu, 3 Oct 2002 00:00:00	ORANGE	200000	35000	0	02-1021	2540 SHADER RD	ORLANDO	FL	32804

Major Roads

Rec	ROADWAY	LOCALNAME	USROUTE	STROUTE	CLASS	DESCRIPT	INST_LAB	USRD_LAB	STRD_LAB	CNTRD_LAB	LOCRD_LAB
1	75000033	OLD CHENEY HIGHWAY			Local Road	OLD CHENEY HIGHWAY					OLD CHENEY HIGHWAY
2	75000033	OLD CHENEY HIGHWAY			Local Road	OLD CHENEY HIGHWAY					OLD CHENEY HIGHWAY
3	75000033	OLD CHENEY HIGHWAY			Local Road	OLD CHENEY HIGHWAY					OLD CHENEY HIGHWAY
4	75000033	OLD CHENEY HIGHWAY			Local Road	OLD CHENEY HIGHWAY					OLD CHENEY HIGHWAY
5	75000033	OLD CHENEY HIGHWAY			Local Road	OLD CHENEY HIGHWAY					OLD CHENEY HIGHWAY
6	75003000	SE MORAN BLVD		SR 436	State Road	SR 436			436		SE MORAN BLVD
7	75003000	SE MORAN BLVD		SR 436	State Road	SR 436			436		SE MORAN BLVD

County

Rec	CountryName	MIN_DEP_CO	MIN_FIPS_C	MIN_WATER	FIRST_DESC
1	ORANGE	48	95	0	ORANGE

Using the “Select by Rectangle” tool on theft locations generates the same data as a single selection with the exception that all the theft location icons change in color from red to yellow. This is represented in Figure 9 and Figure 10.

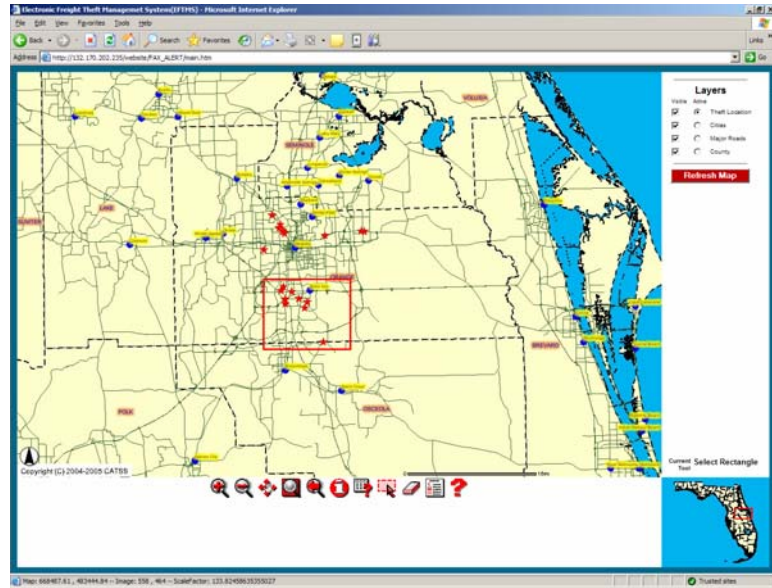


Figure 9. Selecting several theft locations

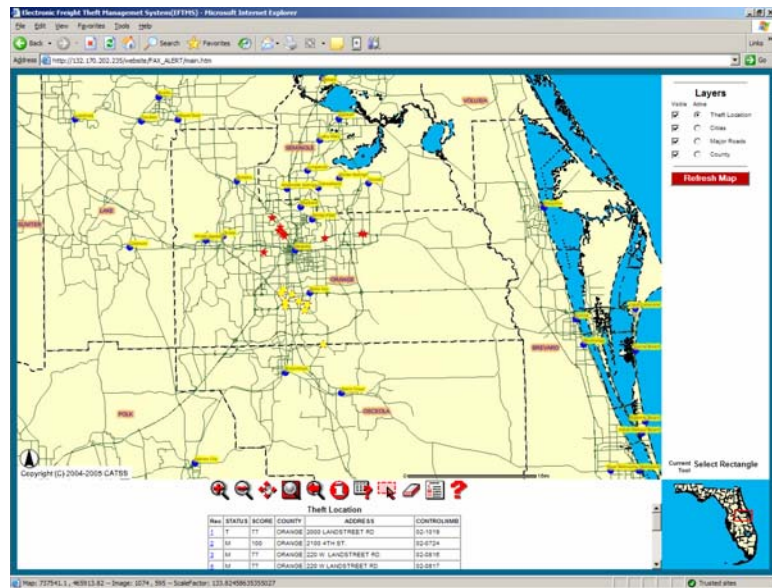


Figure 10. Selection of several theft locations

Theft Location

Rec	SCORE	CONTROL NUMBER	DATE OF THEFT	COUNTY	RETAIL VALUE	TRUCK VALUE	TRAILER VALUE	LEGACY CONTROL NUMBER	STREET	CITY	STATE	ZIP
1	100	02-0723125475693	Fri, 12 Jul 2002	ORANGE	0	50000	0	02-0723	11104 ROCKET BLVD	ORLANDO	FL	32824
2	100	02-07241027513162	Fri, 12 Jul 2002	ORANGE	0	6000	0	02-0724	2100 4TH ST	ORLANDO	FL	32824
3	77	02-08161461100983	Fri, 9 Aug 2002	ORANGE	50000	20000	0	02-0816	220 W LANDSTREET RD	ORLANDO	FL	32824
4	77	02-0817-1090201812	Fri, 9 Aug	ORANGE	50000	20000	0	02-0817	220 W LANDSTREET RD	ORLANDO	FL	32824

			2002									
5	100	02-08311078629465	Fri, 23 Aug 2002	ORANGE	50000	53000	0	02-0831	9498 S ORANGE BLOSSOM TRL	ORLANDO	FL	32837
6	100	02-0909-993792766	Tue, 3 Sep 2002	ORANGE	50000	11000	0	02-0909	9565 S ORANGE BLOSSOM TRL	ORLANDO	FL	32837
7	100	02-10191588880672	Fri, 11 Oct 2002	ORANGE	50000	85000	0	02-1019	2000 W LANDSTREET RD	ORLANDO	FL	32809
8	100	02-1022252913452	Tue, 1 Oct 2002	ORANGE	0	9000	0	02-1022	8001 S ORANGE BLOSSOM TRL	ORLANDO	FL	32809
9	75	02-1023-896570691	Wed, 9 Oct 2002	ORANGE	50000	18000	0	02-1023	2450 TITAN RD	ORLANDO	FL	32809
10	100	03-0103-1259592470	Mon, 30 Dec 2002	ORANGE	25000	10000	0	03-0103	1401 TRADEPORT DR	ORLANDO	FL	32824
11	100	03-01121209858320	Mon, 9 Dec 2002	ORANGE	20000	15000	0	03-0112	2180 PREMIER ROW	ORLANDO	FL	32809
12	100	03-0215-1249805449	Fri, 7 Feb 2003	ORANGE	0	15000	0	03-0215	2180 PREMIER ROW	ORLANDO	FL	32809

[Zoom to these record](#)

CONCLUSION

The mapping system developed under this project presents the possibilities of using GIS mapping as a tool to fight cargo theft within the State of Florida. Visual representation of theft location and analysis tools can be an invaluable addition to existing tools.

In developing the requested enhancements, it was found that:

- Under theft distribution by county, law enforcement officers and officials will have the ability to quickly identify which counties are experiencing greater monetary loss. This should allow enforcement officials to more appropriately allocate resources. To leverage this value, accessing current data is critical.
- Under aggregate theft data by county, law enforcement officers will have the ability to select adjoining counties to see succinctly theft monetary losses comparisons among adjoining counties.
- Under individual theft locations, law enforcement officers will be able to select a specific theft and receive the theft date and location.
- Under individual theft data, law enforcement officers will be able to select a specific theft and receive pertinent information about the theft including values, vehicle description, theft report control number, and departmental case number.
- Under aggregate theft data, law enforcement officers will be able to select several adjacent theft locations in order to assist in determine if any commonalities exist between them.

- Querying tools will provide law enforcement officers with the ability to search theft data by fields other than purely geographic location. This could include, but would not be limited to, date of theft, value of equipment, cargo value, driver, vehicle style, etc.

The enhancements listed above can increase the toolset used by law enforcement officers when they are conducting cargo theft investigations.

In the course of developing this proof-of-concept GIS component, additional functional requirements were identified. In order to maximize the effectiveness of this GIS component, the following functional requirements will need to be examined.

1. The historical data used to build this GIS component are static. An active implementation would have to connect to current data. To achieve this end, the use of connector software such as ESRI's spatial database engine, ArcSDE, would need to be incorporated. ArcSDE allows live data to be presented on the map as well as to be queried using the built-in analysis tools. Although the data sets presented in this GIS component are static, they represent database views that would be available in a dynamic system.
2. A significant hurdle to overcome would be the geocoding of addresses input by the users. In order to get positive matches using the address locators as described, specific guidelines for locations of theft and recoveries will have to be designed and followed. For example, currently a user that enters a theft location as an intersection might enter "USHWY 441 AND I4". This would not generate a geocoded location within the system. If it was entered as United States Highway 441 & I-4, it would. Other descriptive locations such

as “Ramada Inn on 441” would not be allowed. In order to overcome this hurdle, the existing online Electronic Freight Theft Management System will have to be redesigned so that addresses that are entered by the users are verified at the time of reporting.

3. Another item to address would be the decision on access to the mapping system. Because private information could be made available using such a site, it is recommended that such a site be hosted on an intranet or Internet secured by login.

REFERENCES

1. Kerr, P. “Draft Scope of Work for Development of an Electronic Freight Theft Management System for the State of Florida”, FDOT Contract #DO22861, June 2005.
2. ESRI Shapefile Technical Description – An ESRI White Paper-July 1998, Environmental Systems Research Institute, Inc., 1998