

# Introduction to ArcLogistics 9.3

*Mike Sweeney*  
*ESRI-Charlotte*



# What is ArcLogistics Route?

- **A Desktop Application to Automate Routing and Scheduling**
- **Imports customer data**
- **Geocodes Stops**
- **Assign “orders” to vehicles**
- **Optimize and sequence routes**
  - **while considering constraints, e.g. time windows, capacity, specialty, maximums, user constraints, etc.**
- **Tools for route editing**
- **Reports and Maps**
- **Exports finished route data**

# Application Areas Served

- **Local government users**
  - Public works – point to point garbage pick up
  - Building inspectors
  - Environmental health inspectors
  - Road repair crews
  - Para-transit operators
  - Turn on – turn off operations
  - Meals on Wheels
  - Property assessors
  - Technicians
  - Home Health Nurses
  - Parole Officers
  - Child Protective Services
  - Serving Warrants
- **School districts**
  - Special needs children routing

# Typical Benefits

- **Reduce Costs**
  - Less vehicles
  - Reduce overtime
  - Reduce miles
  - Reduce gas consumption
- **Increase Productivity**
  - More stops per driver per hour
  - Dispatcher spends less time routing
- **Improve Customer Service and Satisfaction**
  - Deliver on time
  - Offer tighter time windows

# ArcLogistics Route is not

- **An SDK – Network Analyst**
- **Web based – Network Analyst**
- **Not designed for**
  - **Periodic routing – Professional Services**
    - (e.g. water delivery, health inspectors)
  - **Arc routing – Professional Services or BP**
    - (snow plowing, newspaper delivery, residential trash)
  - **Long haul trucking**

# Typical Routing Problem

- 10 – 100 vehicles per routing problem
- 100 – 1000 stops per day
- Complex business rules
  - Time windows
  - Specialties
  - Deliveries & pickups
  - Paired Orders
  - Capacities
  - Various stop durations

# Underlying Technology

- **ArcGIS Engine 9.3**
- **Network Dataset (Network Analyst)**
- **VRP Solver (Network Analyst)**
- **Routing projects stored as a file geodatabase**

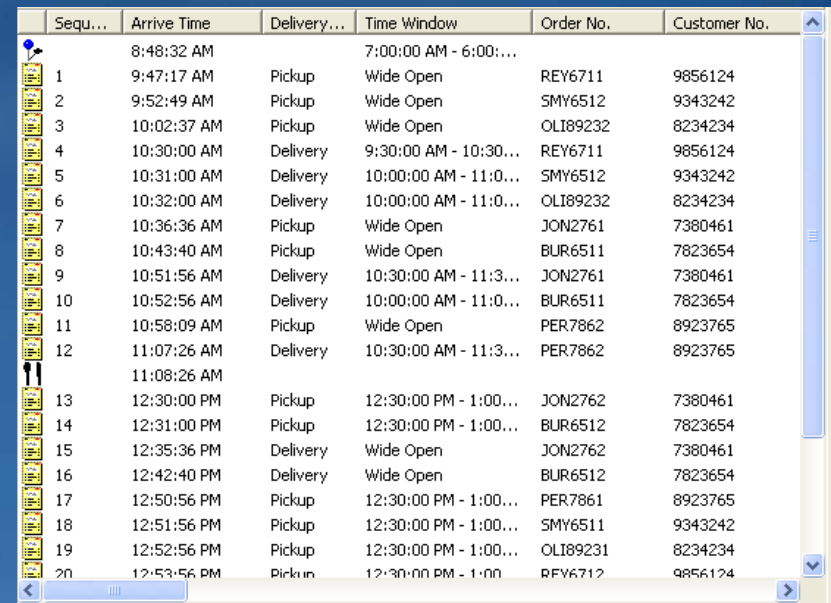
# Flexible data model

- **Any Network Analyst Network Dataset**
  - Time and Distance attributes
- **Address locator**
- **Fallback/zone locator (optional)**
- **Any base map (mxd)**



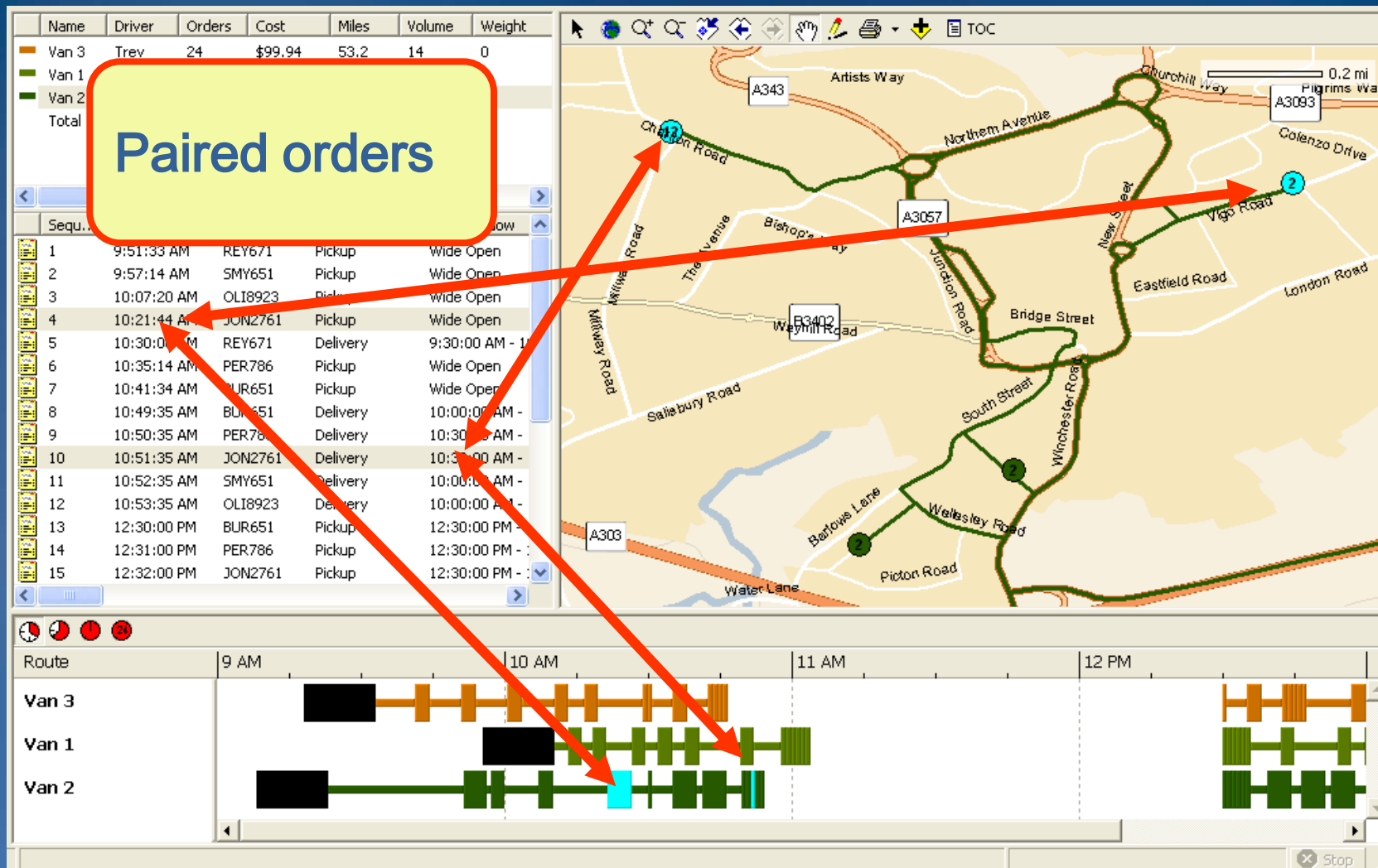
# Pick Ups & Deliveries

- Routes can contain Orders that are a mixture of pick ups and deliveries
- Capacities are tracked and honored



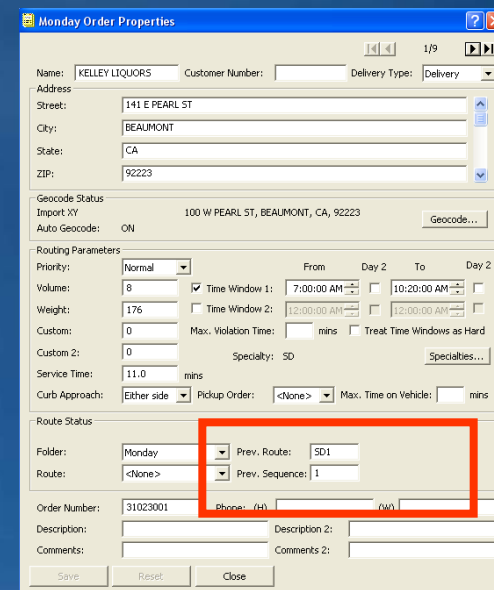
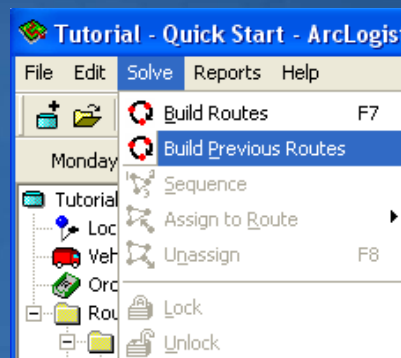
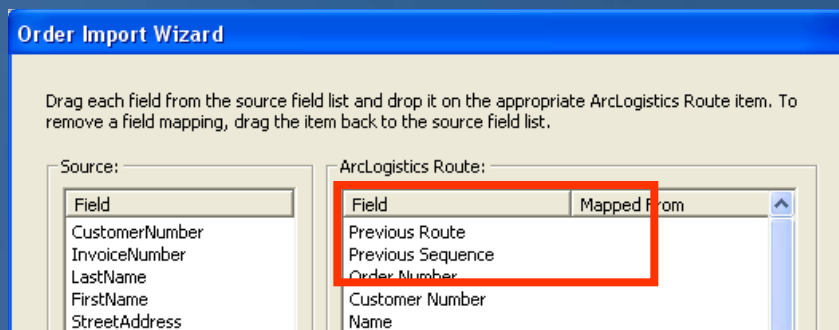
Sequ...	Arrive Time	Delivery...	Time Window	Order No.	Customer No.
	8:48:32 AM		7:00:00 AM - 6:00:...		
1	9:47:17 AM	Pickup	Wide Open	REY6711	9856124
2	9:52:49 AM	Pickup	Wide Open	SMY6512	9343242
3	10:02:37 AM	Pickup	Wide Open	OLI89232	8234234
4	10:30:00 AM	Delivery	9:30:00 AM - 10:30...	REY6711	9856124
5	10:31:00 AM	Delivery	10:00:00 AM - 11:0...	SMY6512	9343242
6	10:32:00 AM	Delivery	10:00:00 AM - 11:0...	OLI89232	8234234
7	10:36:36 AM	Pickup	Wide Open	JON2761	7380461
8	10:43:40 AM	Pickup	Wide Open	BUR6511	7823654
9	10:51:56 AM	Delivery	10:30:00 AM - 11:3...	JON2761	7380461
10	10:52:56 AM	Delivery	10:00:00 AM - 11:0...	BUR6511	7823654
11	10:58:09 AM	Pickup	Wide Open	PER7862	8923765
12	11:07:26 AM	Delivery	10:30:00 AM - 11:3...	PER7862	8923765
	11:08:26 AM				
13	12:30:00 PM	Pickup	12:30:00 PM - 1:00...	JON2762	7380461
14	12:31:00 PM	Pickup	12:30:00 PM - 1:00...	BUR6512	7823654
15	12:35:36 PM	Delivery	Wide Open	JON2762	7380461
16	12:42:40 PM	Delivery	Wide Open	BUR6512	7823654
17	12:50:56 PM	Pickup	12:30:00 PM - 1:00...	PER7861	8923765
18	12:51:56 PM	Pickup	12:30:00 PM - 1:00...	SMY6511	9343242
19	12:52:56 PM	Pickup	12:30:00 PM - 1:00...	OLI89231	8234234
20	12:53:56 PM	Pickup	12:30:00 PM - 1:00...	REY6712	9856124

# Paired orders



# Predefined Sequence

- Orders can have a predefined sequence
- Previous Route & Previous Sequence fields



Tutorial - ArcLogistics Route

File Edit Solve Reports Help

Wednesday Routes

Tutorial

- Locations
- Vehicles
- Orders Inbox
- Routing Folders
  - Tuesday
  - Wednesday
    - Unassigned Order
    - Routes
      - SD
      - SD1
      - SD2
      - SD3
      - SD4

Name	Orders	Miles	Time
SD1	13	62.646	8.44231
SD	13	48.6767	7.09698
SD2	8	59.1301	6.56529
SD4	10	28.0655	5.06661
SD3	6	38.9283	4.49994

2 List Views

Table of Contents

Layers

- AllSt\_ND
- HwySt
- MajorSt
- AllSt
- Lakes
- Parks
- dtl-cnty

TOC Barriers

12 PM 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM 8 AM 9 AM 10 AM 11 AM

Stop

The screenshot displays the ArcLogistics Route software interface. The main window is titled 'Tutorial - ArcLogistics Route' and features a menu bar (File, Edit, Solve, Reports, Help) and a toolbar. The central map area shows a city street grid with several colored routes (SD1, SD, SD2, SD4, SD3) and various geographic features like lakes and parks. A 'Layers' panel on the right lists map elements such as 'AllSt\_ND', 'HwySt', 'MajorSt', 'AllSt', 'Lakes', 'Parks', and 'dtl-cnty'. A 'Table of Contents' (TOC) panel is also visible. On the left, a 'Tutorial' tree shows the project structure, including 'Wednesday Routes' and 'Routes' for different service days. A table in the center-left lists route details: Name, Orders, Miles, and Time. A yellow callout box with a red border highlights the text '2 List Views' over the table. Another yellow callout box with a red border highlights the text 'Table of Contents' over the TOC panel. At the bottom, a timeline shows hours from 12 PM to 11 AM, and a 'Stop' button is located in the bottom right corner.



# Maps & ArcGIS Online Services

Rhode Island test - ArcLogistics Route

File Edit View Solve Reports Help

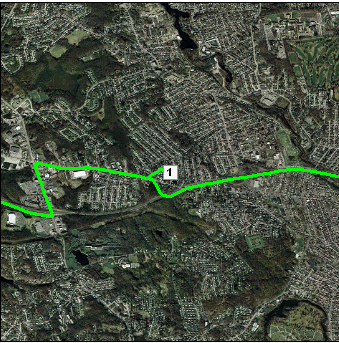
Tuesday Routes

Name	Driver	Orders	Cost	Miles	Volume	Time	Weight	Custom
Truck 1	Lou	10	\$161.64	54.0	215	8.4	950	0
Truck 2	Sam	9	\$187.18	60.5	295	9.4	1,075	0
Truck 3	John	8	\$186.44	62.0	310	9.3	900	0
Truck 4	Karl	9	\$201.06	73.9	290	9.7	975	0
<b>Total</b>		<b>36</b>	<b>\$736.32</b>	<b>250.5</b>	<b>1,110</b>	<b>36.8</b>	<b>3,900</b>	<b>0</b>

### Route Manifest

Vehicle: Truck 3      Print Date/Time: 5/3/2007      1:41:34PM  
 Driver: John      Routing Folder: Tuesday

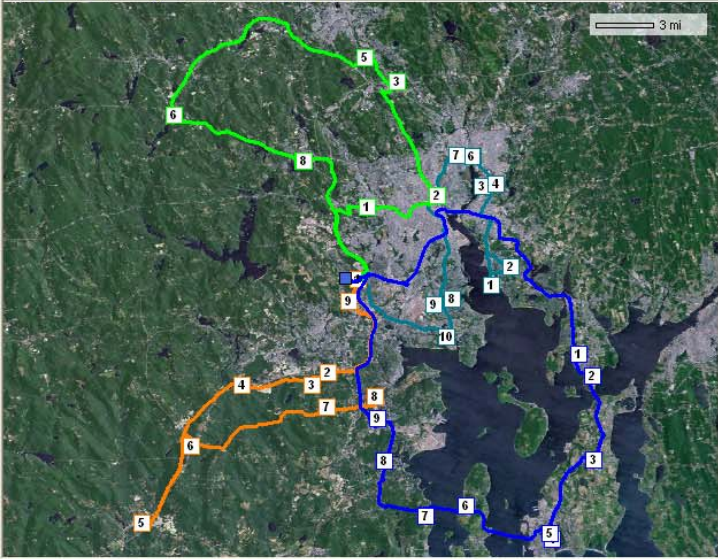
Customer	Address	Time	Order
Start (Warehouse)	80 Hope Street, 2921	ETA 8:00:00 AM TW1	
		SRVC 30.0	




Start at Warehouse  
 Go East on Hope Rd toward Phenix Ave  
 Drive 0.1 mi ~ < 1 min  
 Bear left on Phenix Ave  
 Drive < 0.1 mi ~ < 1 min  
 Turn right on Wilbur Ave  
 Drive 0.7 mi ~ 1 min  
 Continue on State Hwy 51  
 Drive < 0.1 mi ~ < 1 min  
 Turn left at Wilbur Ave to stay on State Hwy 51  
 Drive 0.2 mi ~ < 1 min  
 Bear right onto ramp and go North East on State Hwy 37  
 Drive < 0.1 mi ~ < 1 min  
 Take ramp and go North on I 295  
 Drive 5 mi ~ 5 min  
 Take ramp and go North East on US Hwy 6  
 Drive 0.9 mi ~ < 1 min  
 Take ramp to State Hwy 5  
 Drive 0.3 mi ~ < 1 min  
 Turn left on State Hwy 5  
 Drive 0.5 mi ~ < 1 min  
 Bear right onto ramp to State Hwy 6A  
 Drive < 0.1 mi ~ < 1 min  
 Bear right on State Hwy 6A  
 Drive 0.8 mi ~ 1 min  
 Turn left on Borden Ave  
 Drive 0.1 mi ~ < 1 min  
 Turn right on Meadow St  
 Drive < 0.1 mi ~ < 1 min  
 Finish at 9 MEADOW ST, on the right

Customer	Address	Time	Order
Delivery: John Doe	9 MEADOW ST, 2919	ETA 8:40:31 AM	#

Volume	Weight
20	125
50	125
20	125
15	75
20	75
15	75
20	75
15	75
20	125
20	75



10 AM    11 AM    12 PM    1 PM    2 PM    3 PM    4 PM    5 PM    6 PM



Stop

# Maps & ArcGIS Online Services

Monarch\_UC - ArcLogistics Route

File Edit View Solve Reports Help

Friday 3/9/07 Routes

Monarch\_UC

- Locations
- Vehicles
- Orders Inbox
- Routing Folders
  - Friday 3/2/07
  - Tuesday 3/6/07
  - Wednesday 3/7/07
  - Thursday 3/8/07
  - Friday 3/9/07
    - Unassigned Order
    - Routes
      - 01
      - 02
      - 03
      - 04
      - 05
      - 06
      - 07
      - 08
      - 09
      - 10
      - 11
      - 12
      - 13
      - 14
      - 16
      - 17
      - 18
      - 19
      - 21
      - 22
      - 23
      - 24
      - 25
      - 26
      - 27
      - 28
      - 29
      - 30
      - 31
      - 32
      - 33

N.	Driver	Orders	Cost	Miles	Volume	Time
01	Hartle...	14	\$275.70	113.5	439	9.7
02	Boller...	17	\$283.35	108.5	477	10.2
03	Boyle...	20	\$266.92	88.8	480	9.9
04	Christ...	0	\$0.00	0.0	0	0.0
05	Kelly...	13	\$435.12	222.1	459	13.2
06	Tilley ...	0	\$0.00	0.0	0	0.0
07	Meye...	6	\$291.20	114.2	612	9.3
08	Riche...	9	\$377.73	191.9	552	11.4
09	Fetty...	7	\$398.11	166.4	749	12.8
10	Cutler...	7	\$338.69	131.0	808	11.0
11	Butch...	6	\$386.43	173.9	802	12.1
12	Gahim...	7	\$383.65	169.6	761	12.1

Sequence	Arrive Time	Order No.	Customer No.	Name
	7:00:00 AM			Monarc
1	8:09:00 AM	F4901009	2	#316/...
2	9:00:00 AM	B9699002	6	***NO...
3	9:11:00 AM	S5910002	3	ROCKY
4	9:33:00 AM	T9705002	6	T G I FF
5	10:00:00 AM	D9889003	6	OUTBA
6	10:21:00 AM	B7035002	2	BLUE C
7	10:42:00 AM	B1405003	2	BRITTC
8	11:04:00 AM	B1399002	6	BUFFAL
9	12:12:00 PM	M8211002	6	FIONN
	12:37:00 PM			Lunch
10	1:23:00 PM	W9355002	2	NO DE...
11	1:41:00 PM	T9702002	2	ALIBI'S
12	2:17:00 PM	P1382002	2	***DO...
13	2:39:00 PM	B1250001	4	BEEF 'C

ArcLogistics Route 9

- MX\_Weather\_Current
- Cities
- Major Cities
- Interstate Highways
- Highways
- Major Roads
- Streets
- Railroads
- State Borders
- Minor Rivers, Creeks
- Lakes, Major Rivers
- Lakes, North America
- Parks
- Postal Codes
- City Limits
- Counties
- States
- MX\_Precipitation
- Countries

Route

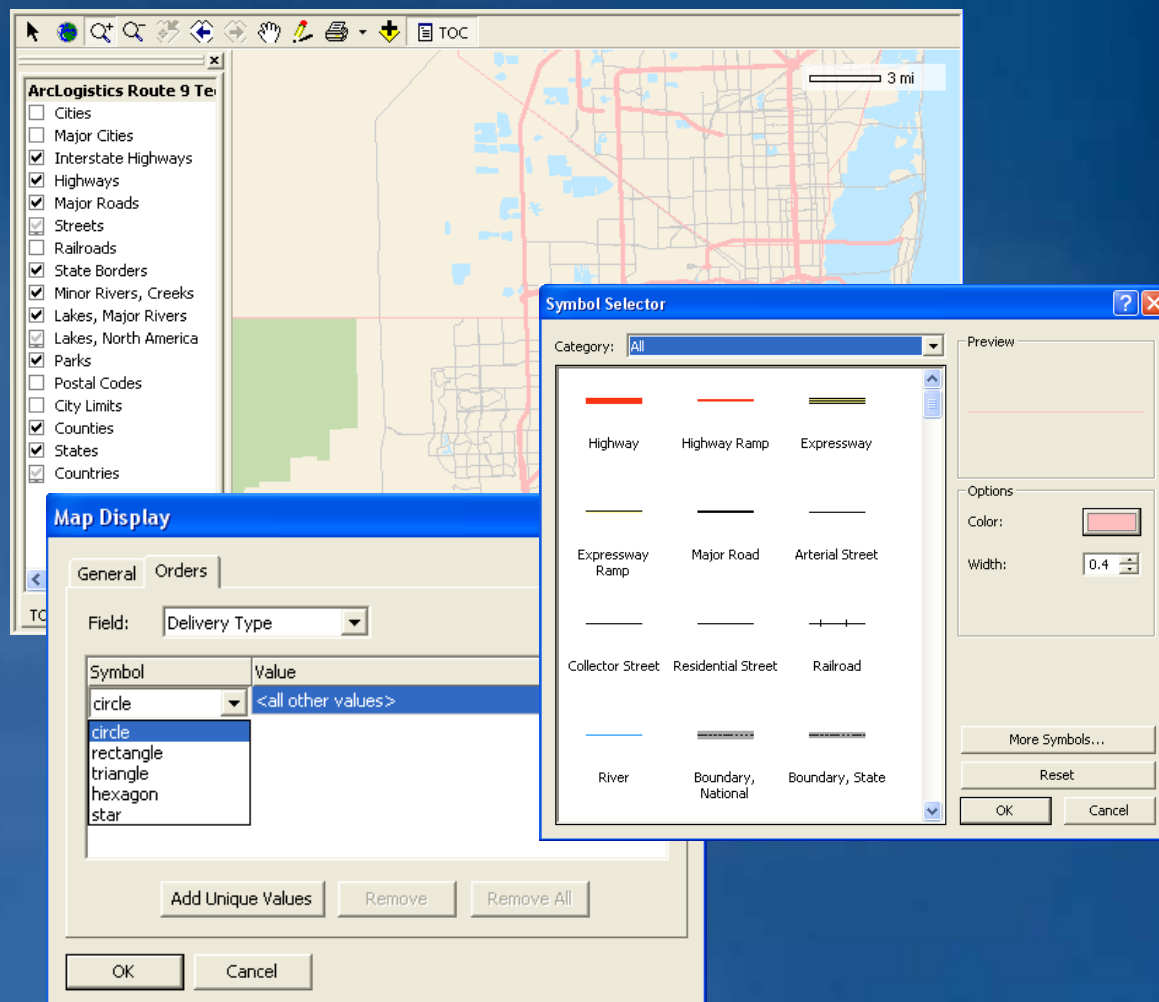
Route	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM
01												
02												

1 Route(s) Selected

Stop

# Maps

- Table of contents
  - Hide/display
- Symbology control
- Label layers
- Symbolize Orders



# Street Data

- Comes with TeleAtlas street data for North America or Europe in SDC format
- Consumes any Network Dataset (NDS)
- Use your own street data with NDS created with Network Analyst
- Honor street restrictions if available
- Add barriers e.g. hazmat areas
- U turn policy



# Street Data

- Speed management
- U Turn policy
- Restrictions honored

Parameters

Specify the parameter values for the network attributes.

Attribute	Parameter	Value
Time	15 MPH	15
Time	20 MPH	20
Time	25 MPH	25
Time	35 MPH	35
Time	45 MPH	45
Time	50 MPH	50
Time	55 MPH	55
Time	65 MPH	65
Time	OtherRoads	5

Reset OK Cancel

Thursday Properties

Name: Thursday

Rate the importance of meeting time windows.  
Low Medium High

Rate the importance of reducing excess transit time for paired orders.  
Low Medium High

Depart within Time Windows

Allow U-Turns: Everywhere

Time Attribute: Time

Length Attribute: Length

Restrictions:

OneWay

Avoid Tolls

Do not use ferries

Parameters...

Save Reset Close

# Orders

- Additional capacity
- Pick ups and deliveries
- Two additional text fields
- Curb approach
- Two soft time windows
- Order pairing
  - Time on vehicle – ridership rules

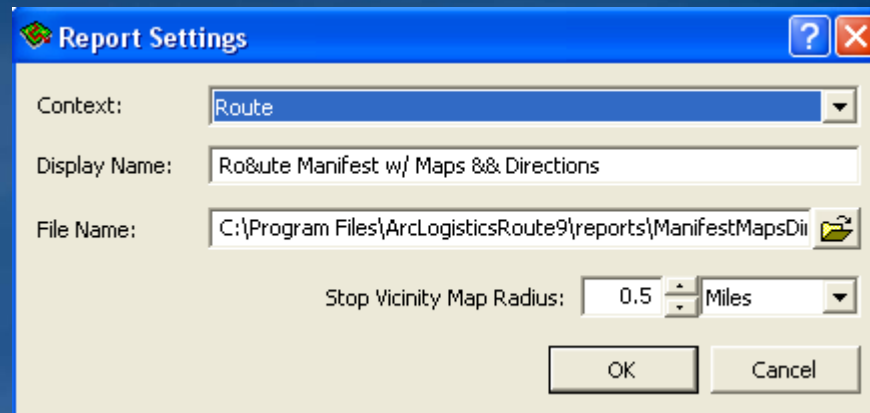
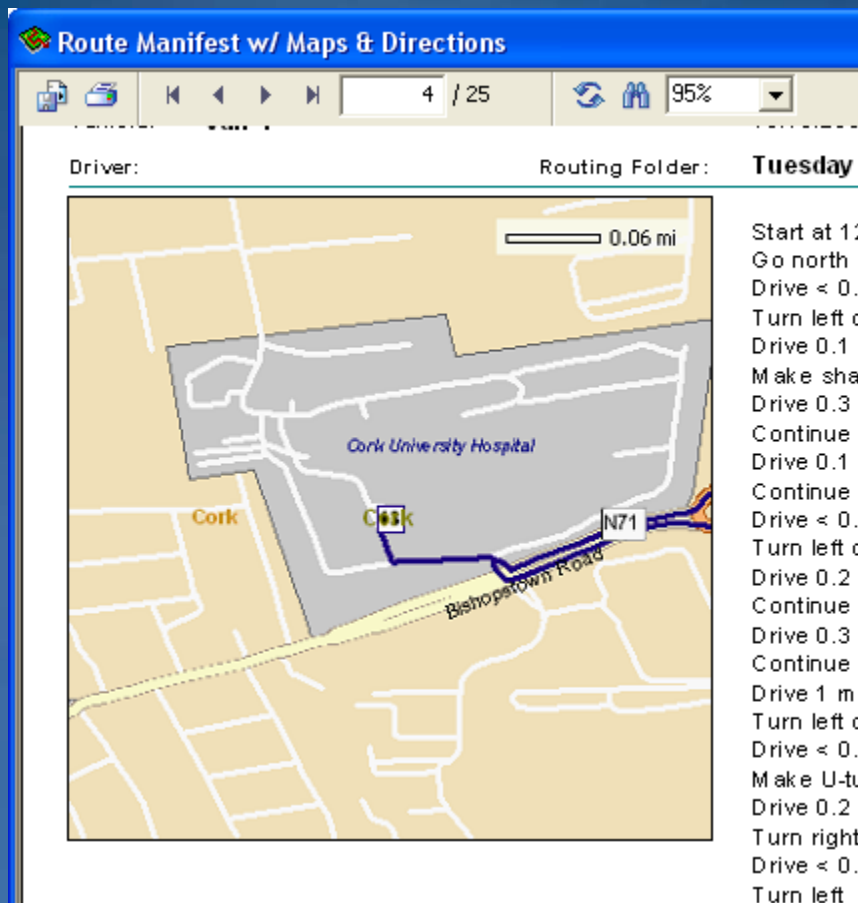
The screenshot shows the 'Inbox Order Properties' dialog box with the following fields and values:

- Name: Mallow General Hosp Customer Number: [empty] Delivery Type: Pickup
- Address: Street: Limerick Road City: CORK Cross Street: [empty]
- Geocode Status: User Pick: N20, CORK Auto Geocode: OFF Geocode... [button]
- Routing Parameters: Priority: Normal Volume: 1 Weight: 0 Custom: 0 Custom 2: 0 Service time: 12.0 mins Max. Violation Time: [empty] mins Specialty: <None> Treat Time Windows as Hard [checkbox] Time Window 1: 12:20:00 PM - 12:50:00 PM Time Window 2: 12:00:00 AM - 12:00:00 AM
- Curb Approach: Either side Delivery Order: Blitch (Blíé) Max. Time on Vehicle: 60 mins
- Route Status: Folder: <Orders Inbox> Prev. Route: [empty] Prev. Sequence: [empty]
- Order Number: Bli663 Phone (H): [empty] Phone (U): [empty]
- Description: [empty] Description 2: [empty]
- Comments: [empty] Comments 2: [empty]

Buttons: Save, Reset, Close

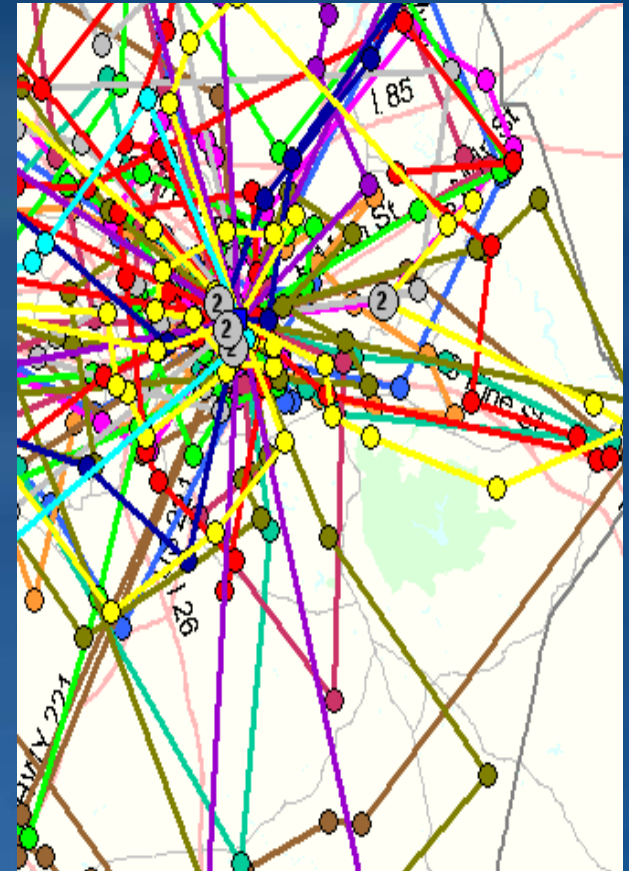
# Reports

- Adjust size of Stop Vicinity Maps



# The Building Codes Department Logistics Problem

- 9 inspectors performing inspections on a daily basis
- ~ 50 inspections per day
- Complex business rules
  - Work rules
  - Variable inspection durations
  - Specialties
  - Time windows



# Pilot Study Objectives

- **Reduce Costs**
- **Increase Productivity**
- **Improve Customer Service and Satisfaction**

# Pilot Study Parameters

- **Data provided to ESRI by the City of Greenville**
- **Study date from 2/1 – 3/31**
- **Three inspectors**
- **Total of 720 inspections over eight weeks**

# IRS News

- IRS recently increased the mileage rates from \$.505 to \$.585 per mile
- Represents a 16% increase in costs for mileage reimbursement



**Internal Revenue Service**  
United States Department of the Treasury

INDIVIDUALS | BUSINESSES | CHARITIES & NON-PROFITS | GOVERNMENT ENTITIES | TAX PROFESSIONALS | RETIREMENT F

### IRS Increases Mileage Rates through Dec. 31, 2008

IR-2008-82, June 23, 2008

Downloadable Audio File: [▶ Mileage Rates](#)

WASHINGTON — The Internal Revenue Service today announced optional standard mileage rates for the final six months of 2008. Taxpayers can use the optional standard rates to calculate the deductible costs of operating an automobile for business, charitable, medical or moving purposes.

The rate will increase to 58.5 cents a mile for all business mileage through Dec. 31, 2008. This is an increase of eight (8) cents a mile for the first six months of 2008, as set forth in [Rev. Proc. 2007-52](#).

In recognition of recent gasoline price increases, the IRS made the final months of 2008. The IRS normally updates the mileage rate for the next calendar year.

"Rising gas prices are having a major impact on individual Americans. In light of the increase in prices, the IRS is adjusting the standard mileage rates to better reflect the cost of operating an automobile," said IRS Commissioner Doug Shulman. "We are increasing the reimbursement rate to be fair to taxpayers."

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- [Summertime Tax Tips](#)

## Mileage Rate Changes

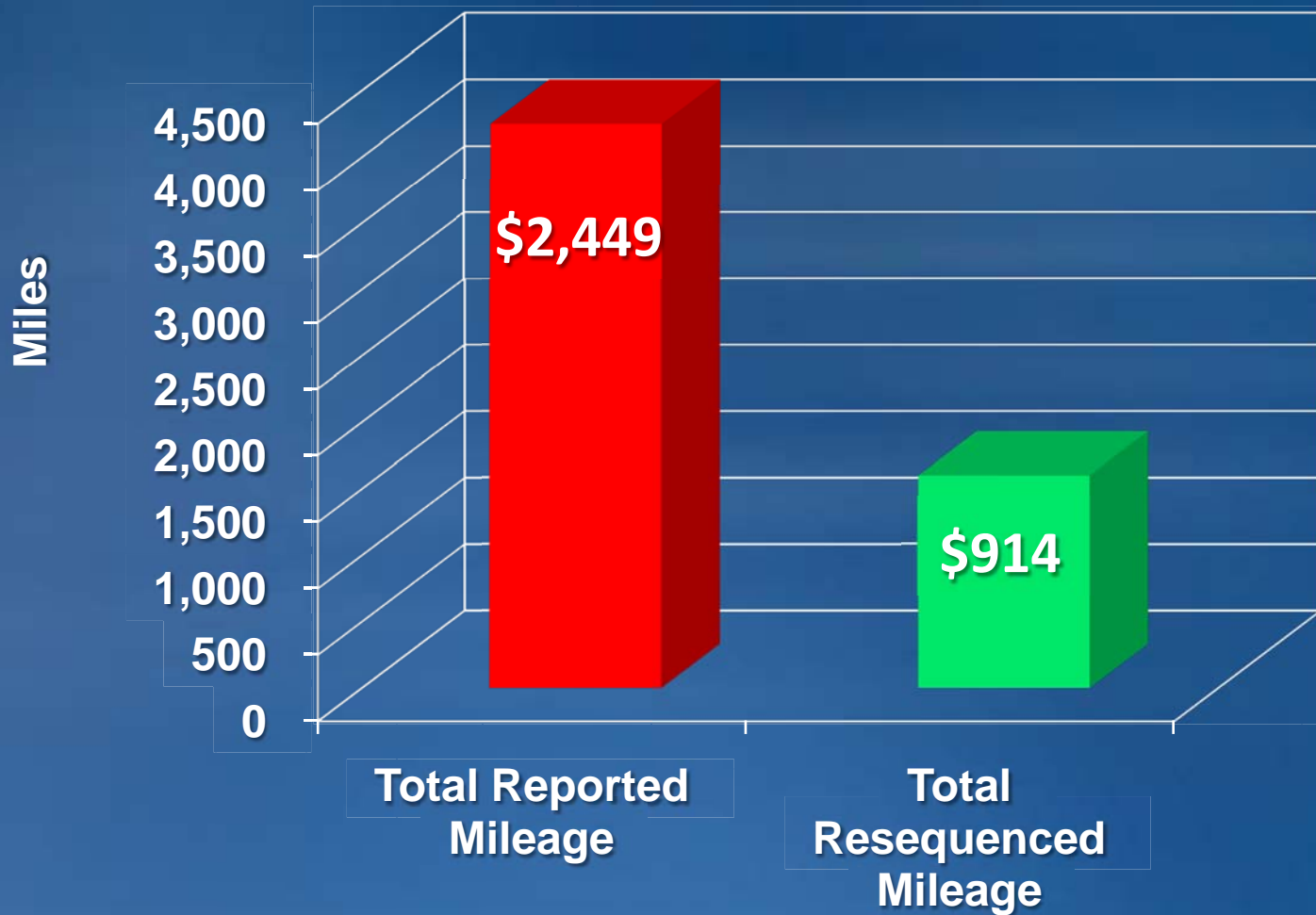
Purpose	Rates 1/1 through 6/30/08	Rates 7/1 through 12/31/08
Business	50.5	58.5
Medical/Moving	19	27
Charitable	14	14

[Subscribe to IRS Newswire](#)



# City of Greenville, SC - Building Codes Department

62.7% mileage reduction during pilot study

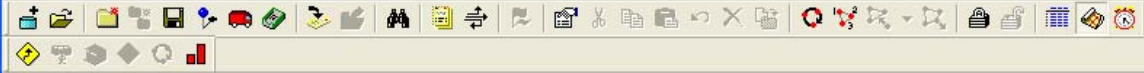




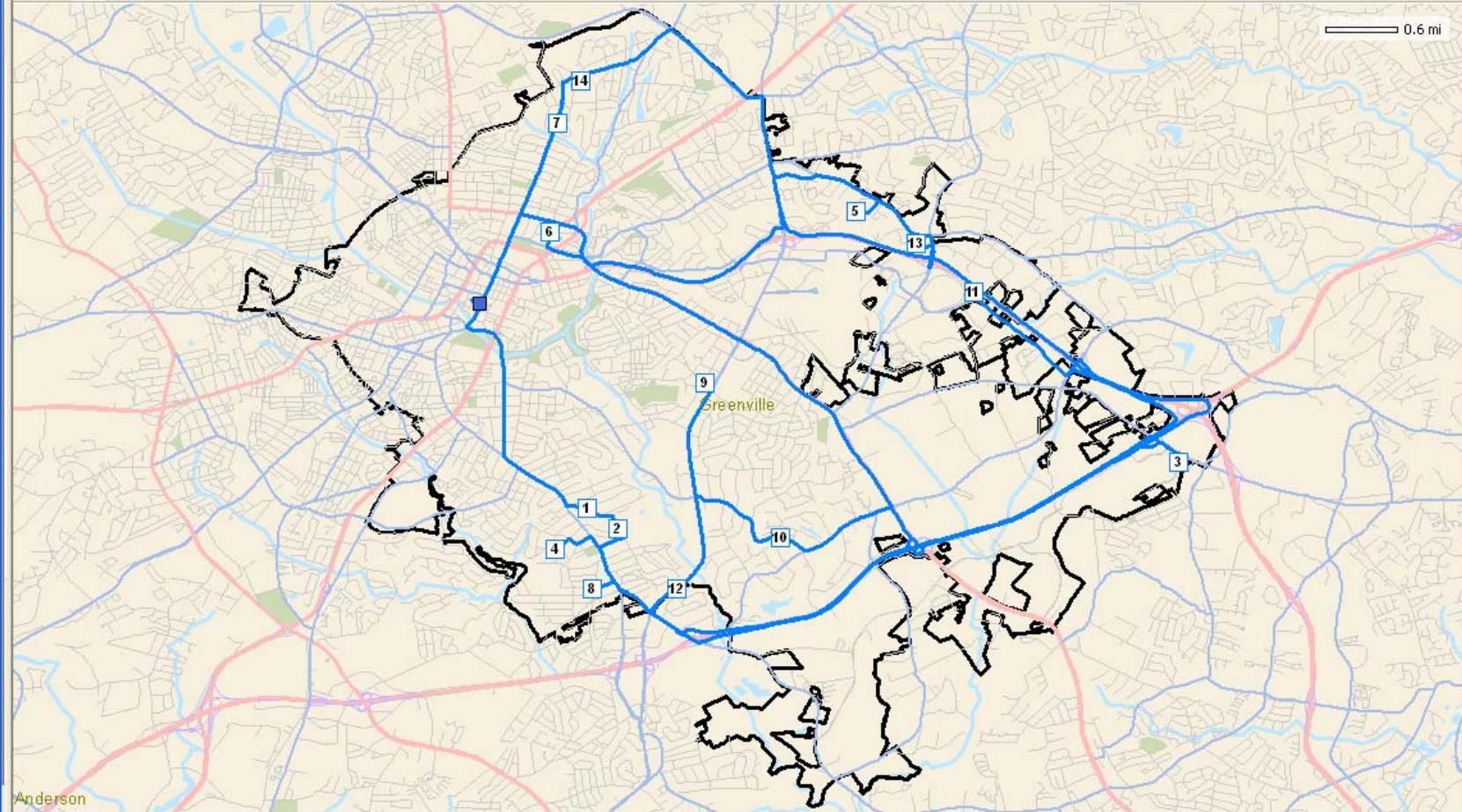
# Greenville\_Inspections\_Random - ArcLogistics Route



File Edit View Solve Reports Help



2/19/2008 Palmer Route



1 Route(s) Selected

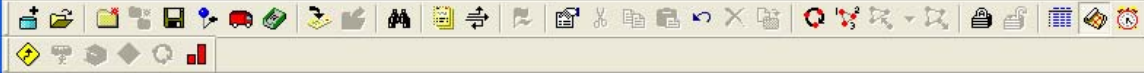
Stop



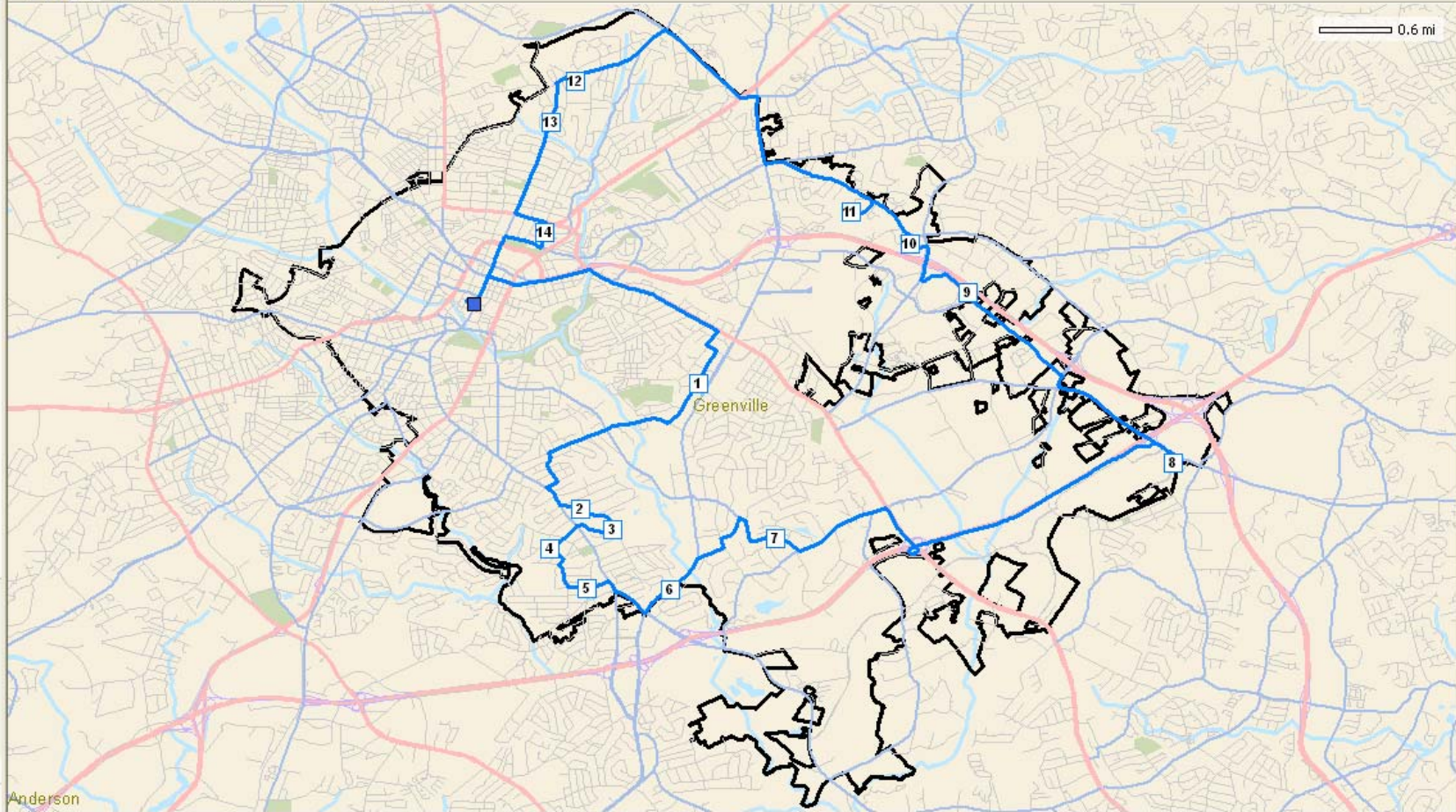
# Greenville\_Inspections\_Optimized - ArcLogistics Route



File Edit View Solve Reports Help



2/19/2008 Palmer Route



Anderson

1 Route(s) Selected

Stop

# Software Demonstration

Greenville\_CIO - ArcLogistics

File Edit View Solve Reports Help

Resequested Routes

Greenville\_CIO

- Locations
- Vehicles
- Orders Inbox
- Routing Folders
  - Current
  - Resequested
    - Unassigned Order
    - Routes
  - Geographic
  - Optimized

Name	Orders	Cost	Miles
Inspector1	14	\$14.865	25.3
Inspector2	7	\$6.239	10.6
Inspector3	6	\$6.877	11.7
Total	27	\$27.981	47.6

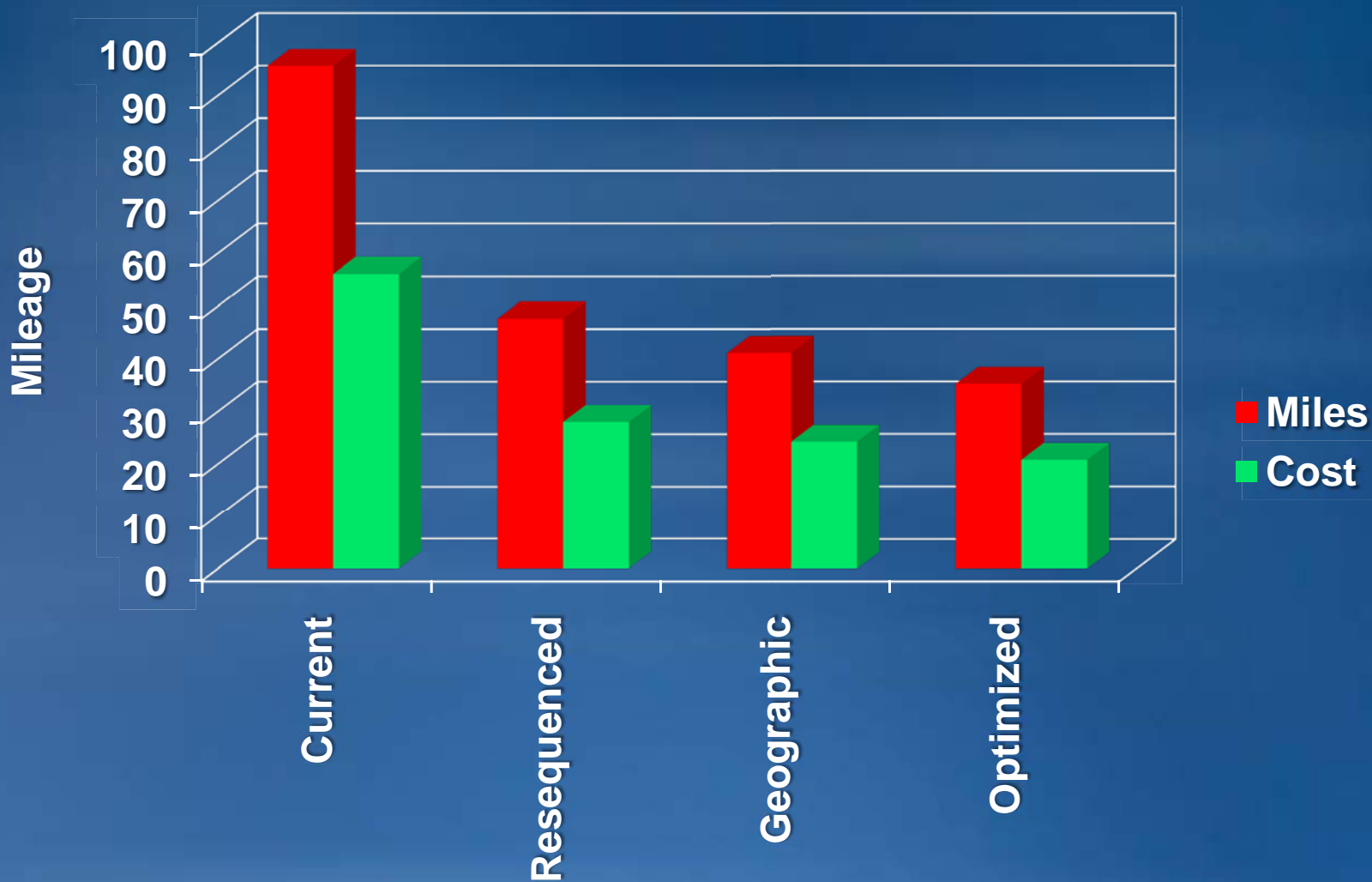
Route

Route	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM
Inspector1	█	█	█	█	█	█	█	
Inspector2		█	█	█	█			
Inspector3		█	█	█	█			

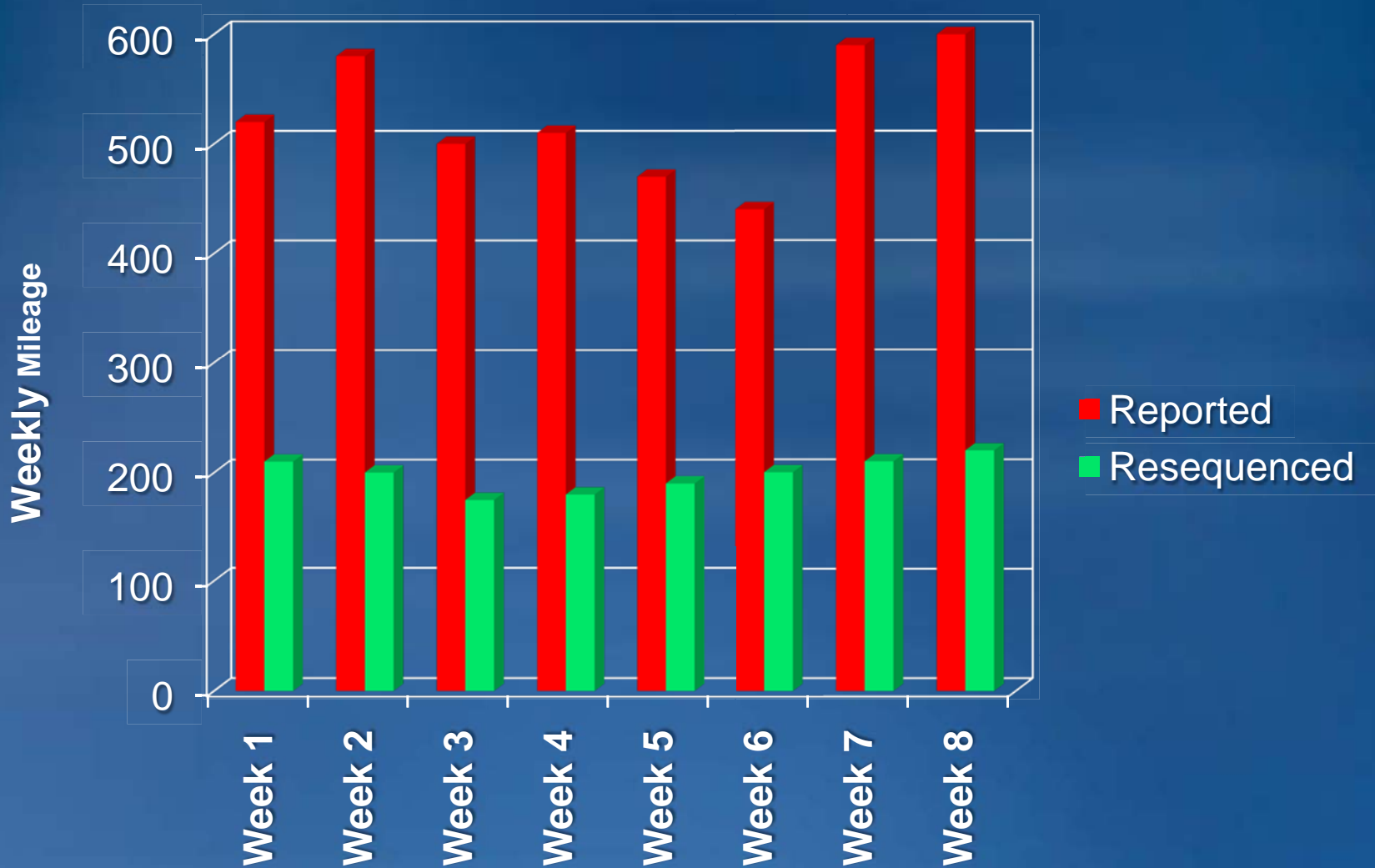
3 Route(s)

Stop

# City of Greenville, SC - Building Codes Department



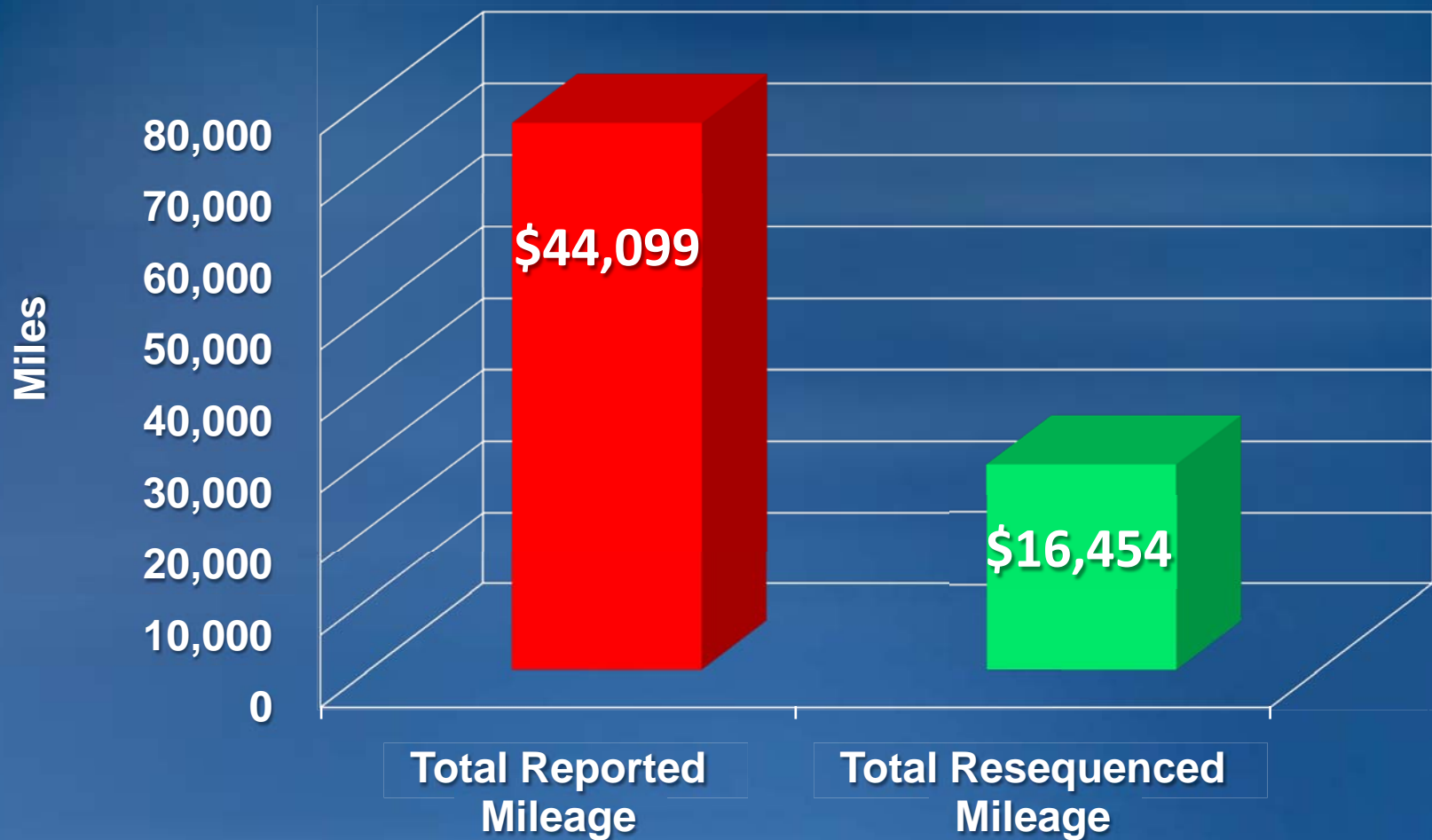
# City of Greenville, SC - Building Codes Department





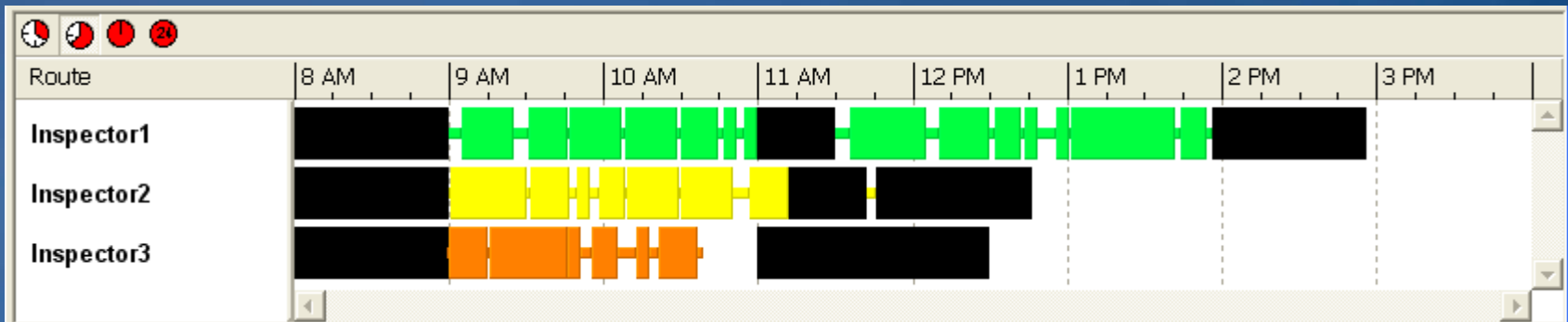
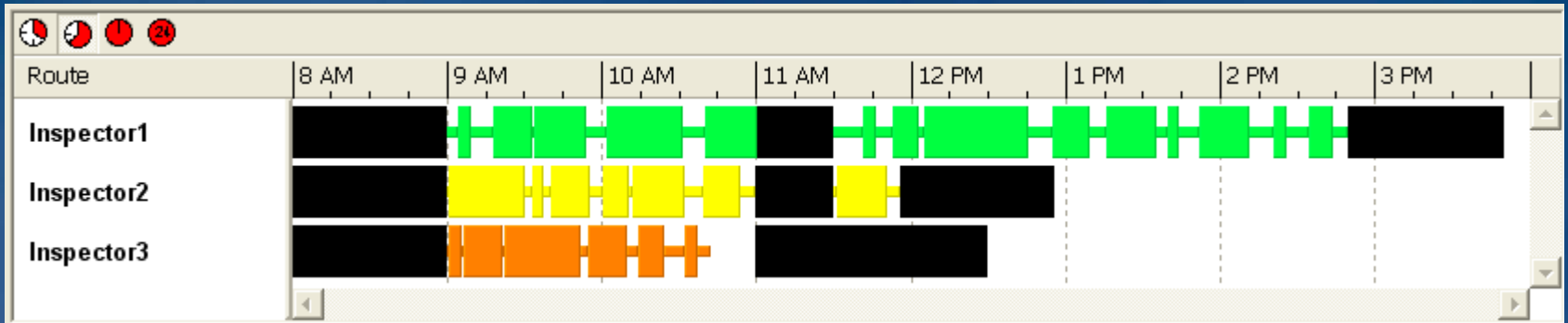
# City of Greenville, SC - Building Codes Department

Projected annual Savings of \$27,645



# City of Greenville, SC - Building Codes Department

## Increased Productivity



# City of Greenville, SC - Building Codes Department Improve Customer Service and Satisfaction

**ArcLogistics Navigator**

3D

1x

**Simulation Mode**

at 403 WILTON ST, GREENVILLE, SC, 29601

W Washington St  
First Presbyterian Church

W Mcbee Ave  
Downtown Baptist Church

W Court St

E Court St

Greenville

Turn right on SR 183

.3 mi  
0:29

Turn right on Toy St

Main

Stop ETA  
8:57 AM



# US Computing – Web based logistics Solution

**Compass**  
Vehicle Routing System.

Manage Locations | Trip Orders | Route Planning | Fleet Management

Trip Orders | Routes | Time Line

Generate Route | Remove | Remove All

Bus 01

- Statistics
  - Order Count = 16
  - Total Cost = \$186.53
  - Total Time = 187 min
- Driving Directions
  - Start at Downtown Depot
  - Estimated Time: 9:14 AM
  - Go south on Webster St toward Ofarrell St
  - Drive < 0.1 mi ~ < 1 min
  - Turn right on Byington St
  - Drive < 0.1 mi ~ < 1 min
  - Turn right on Ellis St
  - Drive < 0.1 mi ~ < 1 min
  - Turn left on Fillmore St
  - Drive 0.9 mi ~ 2 min
  - Turn left on Duboce Ave
  - Drive 0.2 mi ~ < 1 min
  - Make sharp right on Market St

San Francisco

product of  
U.S. Computing Inc.

The screenshot displays a web-based interface for a vehicle routing system. At the top, the 'Compass' logo and 'Vehicle Routing System' text are visible. Below this is a navigation bar with links for 'Manage Locations', 'Trip Orders', 'Route Planning', and 'Fleet Management'. The main interface is divided into three tabs: 'Trip Orders', 'Routes', and 'Time Line'. Under the 'Routes' tab, there are buttons for 'Generate Route', 'Remove', and 'Remove All'. A sidebar on the left shows details for 'Bus 01', including statistics (Order Count = 16, Total Cost = \$186.53, Total Time = 187 min) and a list of driving directions starting from 'Downtown Depot'. The main area features a map of the San Francisco Bay Area with a blue route highlighted. The route starts in San Francisco, goes south on Webster St, turns right on Byington St, then right on Ellis St, left on Fillmore St, left on Duboce Ave, and finally right on Market St. The map includes labels for various cities like Mill Valley, Berkeley, and Oakland, as well as major highways like I-80 and I-580.

**Questions?**