

2010 ESRI International User Conference

Re-engineering the Consequences Assessment Tool Set (CATS)

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Session: Understanding Vulnerabilities and Calculating Risks



What is CATS?

- CATS is a consequence management tool package which integrates hazard prediction, hazard containment, consequence assessment, and routing using critical population and infrastructure data.
- Using the overlay of the hazard footprint superimposed on a GIS street map, a user can:
 - quickly establish areas potentially at risk,
 - assess affected population and infrastructure,
 - facilitate initial resource deployment and
 - assess needs and locate resources for a sustained response or mitigation strategy.

CATS Overview

Models

HE ERG2008 HAZUS

HPAC ALOHA JEM

Databases

HSIP GOLD 2008 LandScan

Analysis

CATS Roadblock Report

Date/Time: 10/7/2009 12:55:41 PM
 Report Layer Name: ERG - (1) DisasterHydrom - 07 Oct 2009 11:00:11
 Road Layer Name: DC Street
 Buffer Distance: 100 Miles

Summary Statistics: 6 ST and 3750 ST
 Latitude: 38.9160
 Longitude: -77.0400

Assessment Report

Date/Time: 10/7/2009 1:13:42 PM
 Report Name: Population - Census Block Group by Zip
 Assessment Layer Name: Census Block Group
 Grouping Layer Name: DC Zip Codes
 Area of Interest Layer Name: ALOHA_AIRMANAGACORRIDOR

Total - Assessed Values:

Feature	POPULATION
...	...

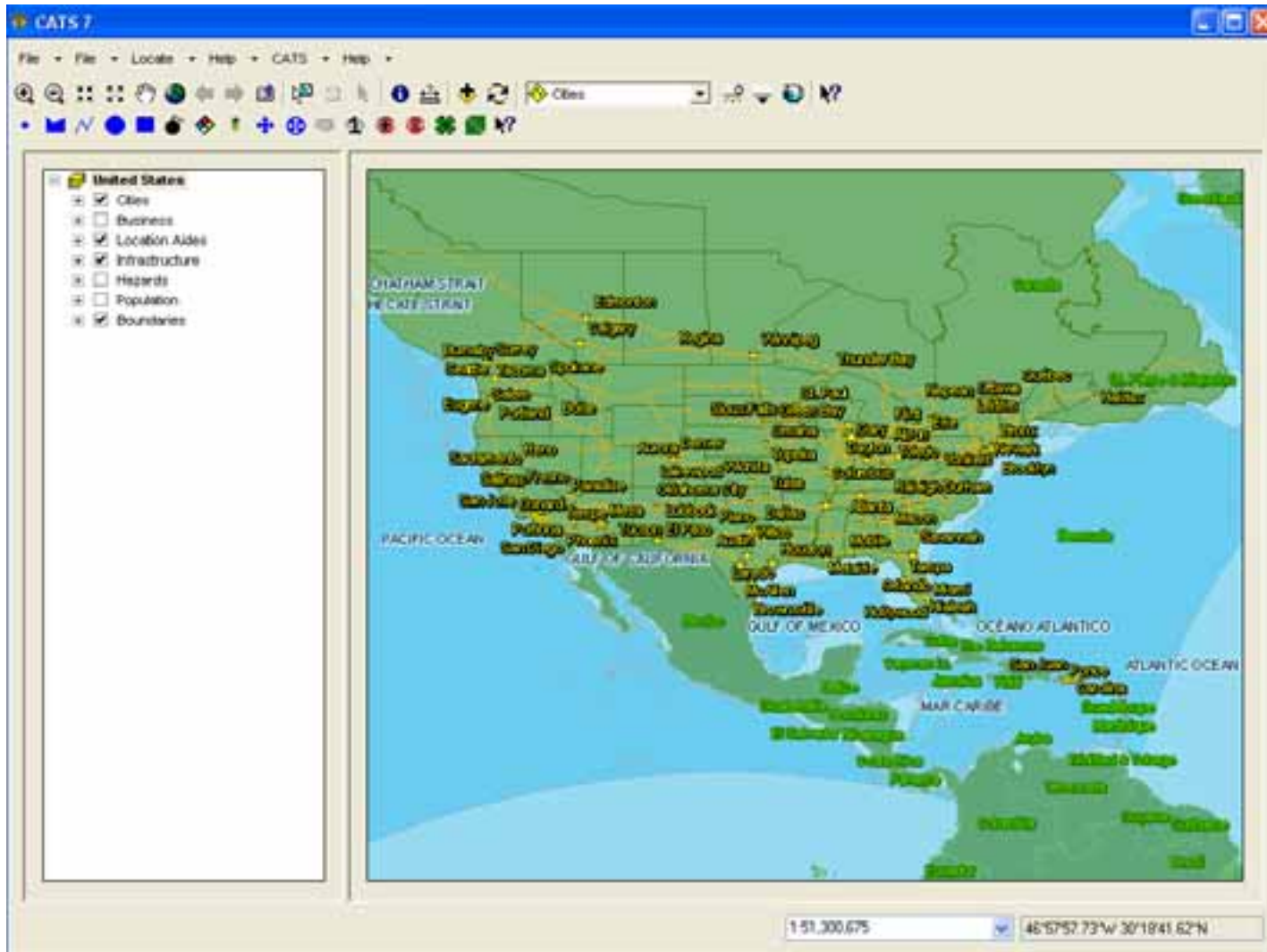
CATS Routing Report

Date/Time: 01/12/2010 11:11:08 AM
 Area of Interest Layer Name: ERG - (1) DisasterHydrom - 07 Oct 2009 11:00:11
 Road Layer Name: DC Street
 Start/End Points: (0,0) - (100,100)

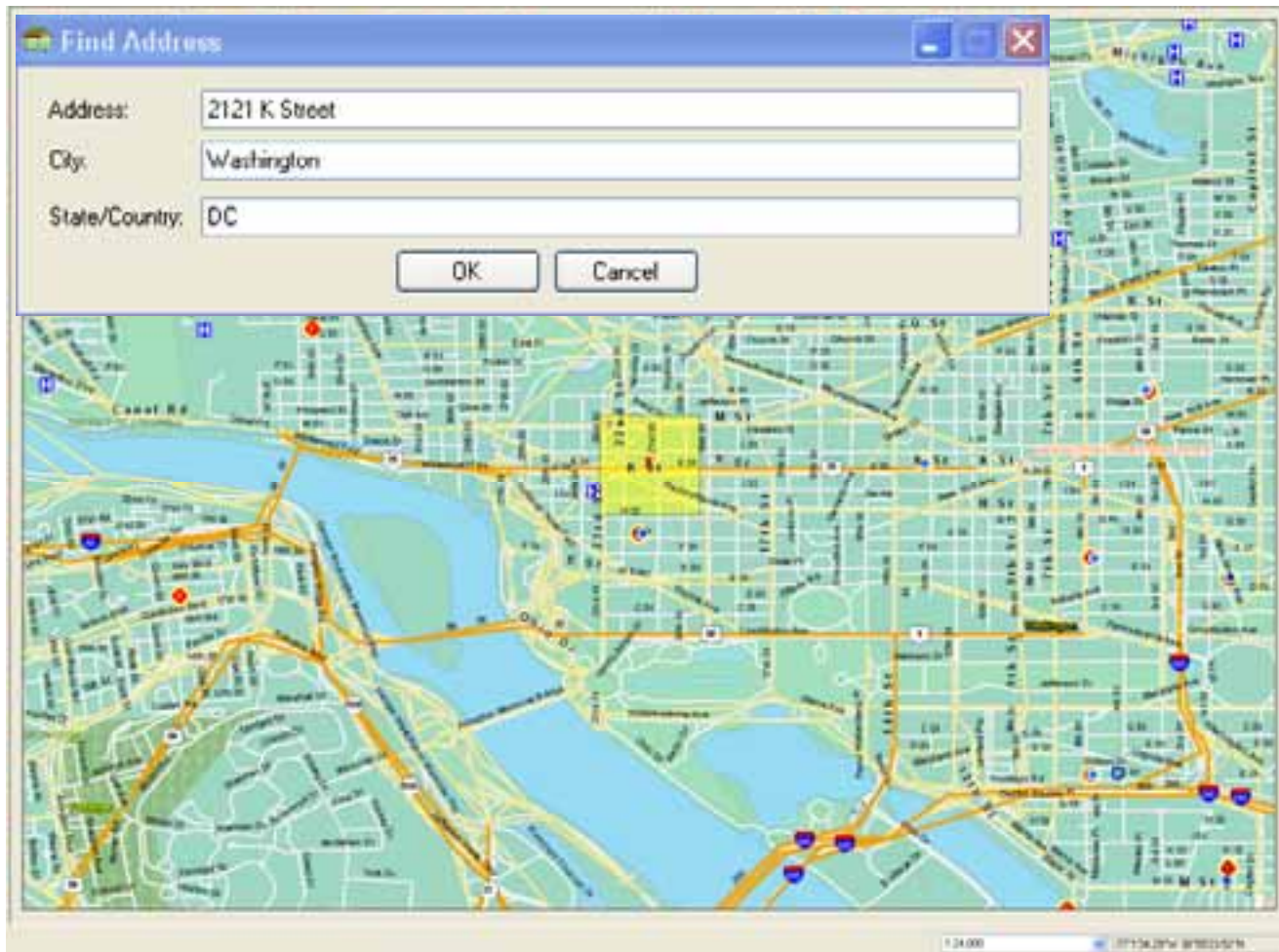
Total Route Distance: 2.22 Miles

Direction	Distance Miles
...	...

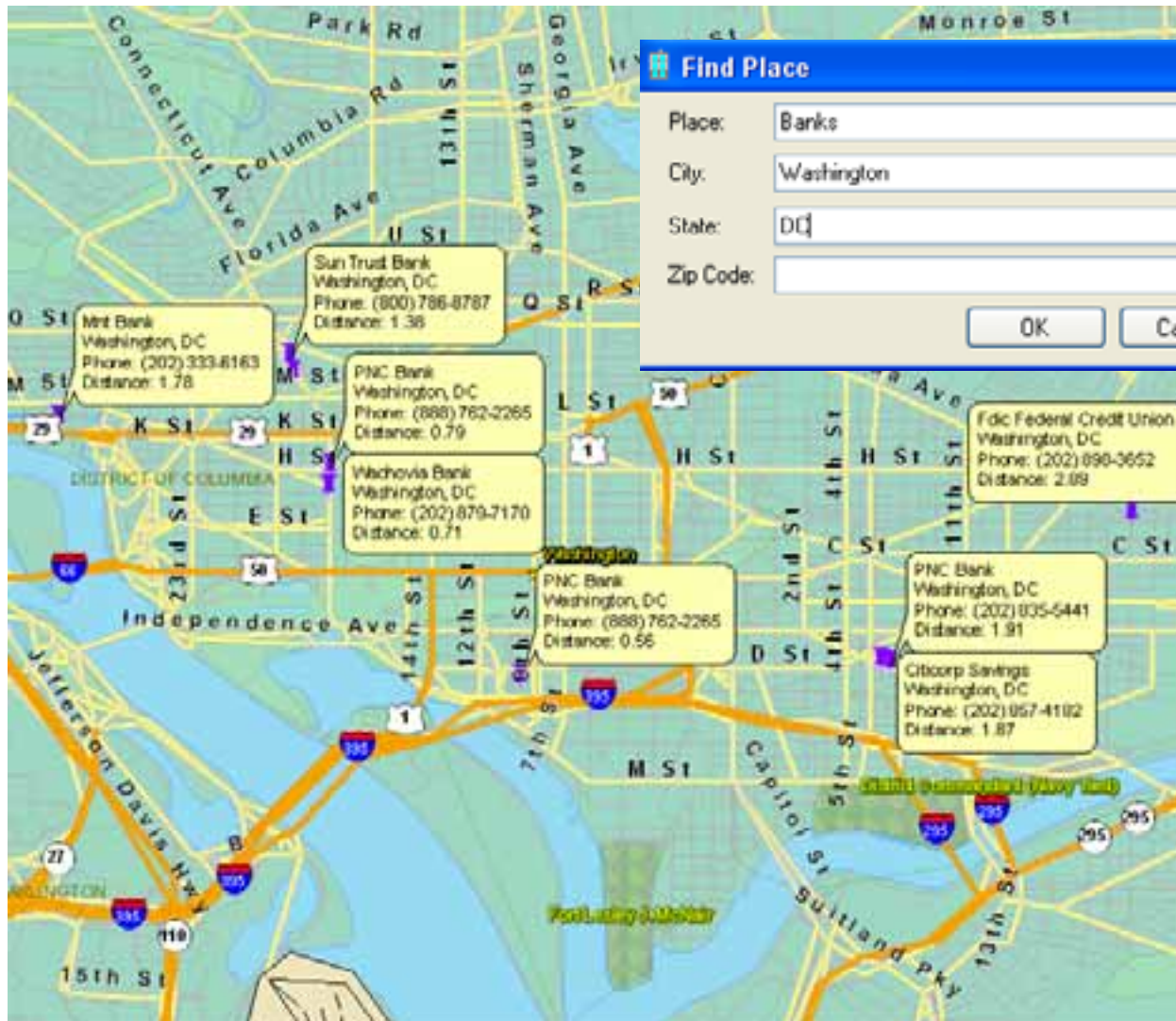
CATS Framework



Address Matching



Find Place



Get Weather



Generate Hazard Footprint and Roadblocks



Emergency Response Guide (ERG)

Toxic Industrial Materials Input

Agent
 Agent UN
1163 - 11 Dimethylhydrazine

Conditions
Day/Night: Day Fire
Spill Size: Large (Greater than 300 Kilograms)

Wind Conditions
Wind Direction: 310
 Wind Uncertainty

Roadblocks

Area of Interest
Layer: ERG - 11 Dimethylhydrazine - Large Day - 27 Apr 2010 154014

Buffer Distance: 100 Display Buffer on the map

Roads
Layer: Streets

Name Column: ST_NAME Produce Report

Report Road Attributes
Columns: ST_NAME
Alias: ST_NAME

Roadblocks Report

Computer Assisted Traffic (CATS)

CATS Roadblock Report

Date-Time: 4/27/2010 3:48:34 PM

Area of Interest Layer Name: ERG - 11 Dimethylhydrazine - Large Dry - 27 Apr 2010 154014

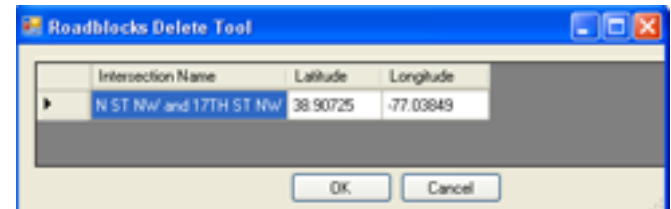
Road Layer Name: Streets

Buffer Distance: 100 Meters



Roadblocks Found: 60

Roadblocks Editor Add/Delete



Intersection Name	Latitude	Longitude
CONSTITUTION AVE NW and Unknown and 16TH ST NW	38.8931	-77.0366
CONSTITUTION AVE NW and 20TH ST NW	38.8931	-77.0450
C ST NW and 21ST ST NW	38.8935	-77.0467
20TH ST NW and CONSTITUTION AVE NW	38.8931	-77.0450
ELLIPSE RD NW and 16TH ST NW	38.8936	-77.0365
17TH ST NW and 17TH ST SW	38.8999	-77.0395
Unknown and Unknown and Unknown and Unknown and Unknown	38.8895	-77.0398
Unknown and Unknown and Unknown	38.8915	-77.0433
Unknown and Unknown and Unknown and Unknown	38.8916	-77.0434
Unknown and Unknown and Unknown and Unknown	38.8919	-77.0450
21ST ST NW and C ST NW	38.8935	-77.0467
CONNECTICUT AVE NW and Unknown	38.9090	-77.0428

Population at Risk

Consequence Assessment Toolset (CATS)

Assessment Report

Date/Time: 4/27/2010 3:55:11 PM

Report Name: 207 census blkgroup - no grouping

Assessment Layer Name: 2007 Census Blockgroup Population

Area of Interest Layer Name: ERG - 11 Dimethylhydrazine - Large Day - 27 Apr 2010 154014



Total - Accrual Values

Features	POP2007 At Risk
11	5,611

Consequence Assessment Toolset (CATS)

1 - Area of Interest Level

name: Protective Action

1.1 - Area of Interest - Accrual Values

Features	POP2007 At Risk
12	5,463

1.2 - Assessed Details

POP2007 At Risk
195
258
76
576
1
348
1084
1867
982
0
74
0

Infrastructure at Risk

Consequence Assessment Toolkit (CATV)

Assessment Report

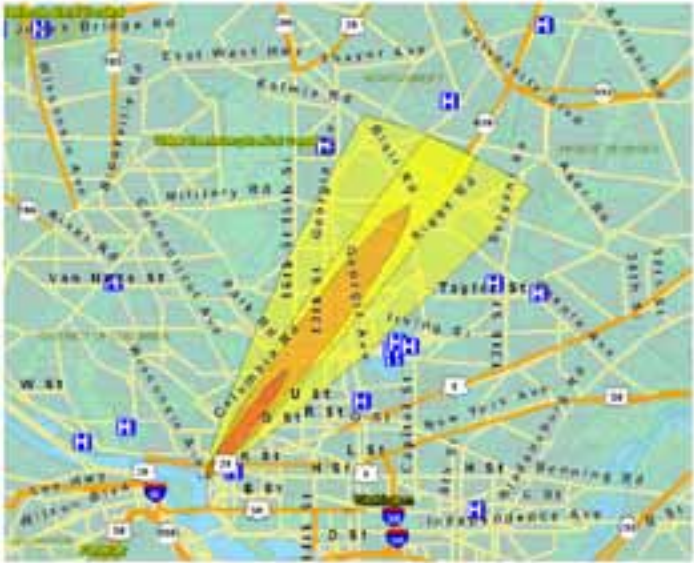
Date/Time: 4/28/2010 1:09:51 PM

Report Name: hospitals

Assessment Layer Name: Hospitals

Area of Interest Layer Name: ALOHA CHLORINE Confidence - 28 Apr 2010 130402 2500 Meters

Surrounding Buffer:

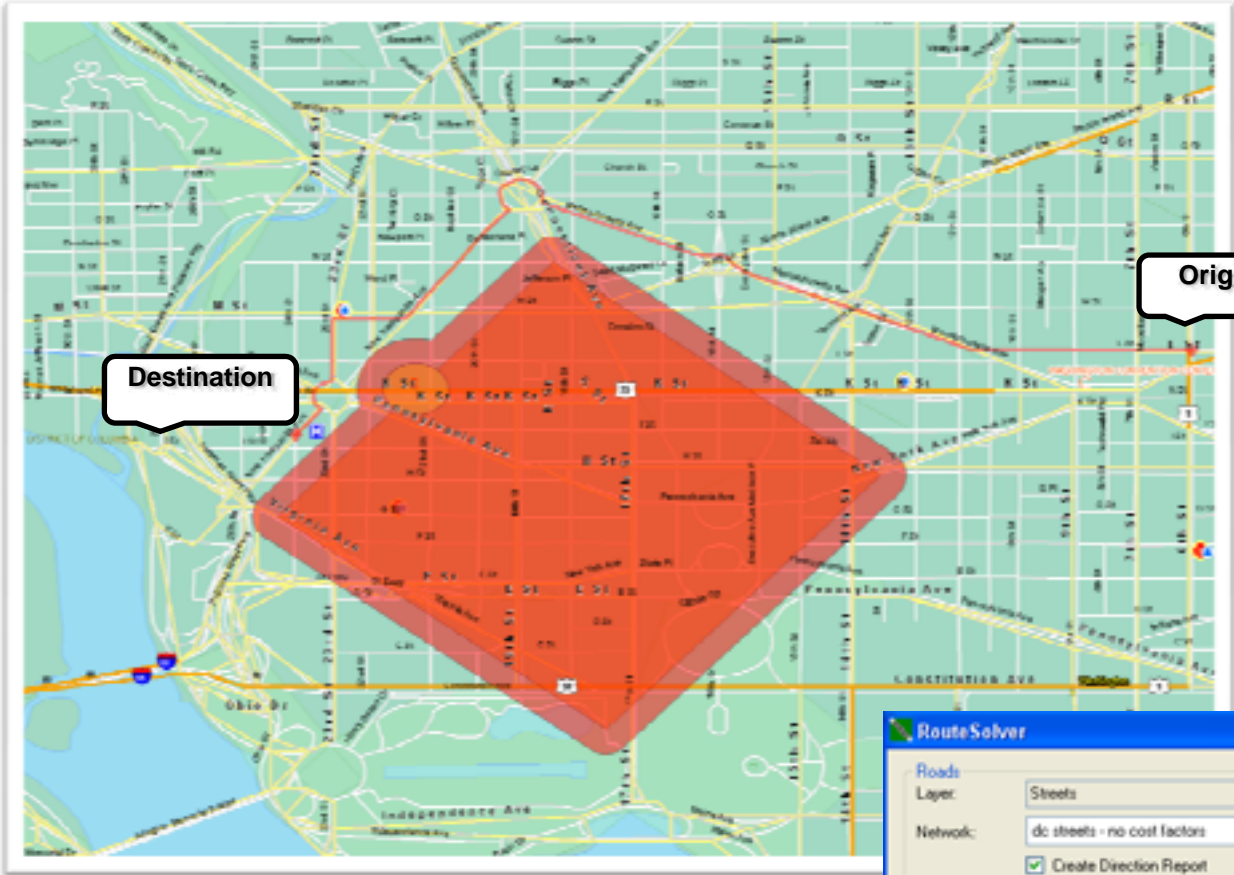


NAME	BEDSIZE At Risk
GEORGE WASHINGTON UNIVERSITY HOSPITAL	GEORGETOWN UNIVERSITY HOSPITAL
HOWARD UNIVERSITY HOSPITAL	CHILDREN'S NATIONAL MEDICAL CENTER
WASHINGTON HOSPITAL CENTER	VETERANS AFFAIRS MEDICAL CTR
NATIONAL REHABILITATION HOSPITAL	HOSPITAL FOR SICK CHILDREN PEDIATRICS CENTER
PROVIDENCE HOSPITAL	WALTER REED ARMY MEDICAL CENTER-DOD
WASHINGTON ADVENTIST HOSPITAL	

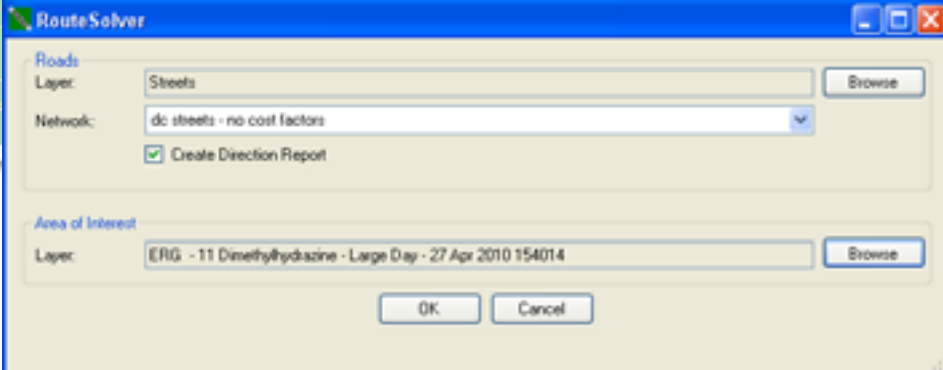
Total - Accrual Values

Features	BEDSIZE At Risk
11	4,795

Vehicle Routing



Network Builder



Routing Report

Consequence Assessment Toolset (CATS)

CATS Routing Report

Date/Time: 4/27/2010 4:00:55 PM

Area of Interest Layer Name: ERG - 11 Dimethylhydrazine - Large Day - 27 Apr 2010 154014

Road Layer Name: Streets

Network Name: dc streets - no cost factors



Direction	Distance Miles
Begin driving on I ST NW towards MASSACHUSETTS AVE NW.	0.42
Bear right onto MASSACHUSETTS AVE NW.	0.50
Merge onto SCOTT CIR NW.	0.03
Merge onto MASSACHUSETTS AVE NW.	0.47
Bear left onto DUPONT CIR NW.	0.06
Turn right onto NEW HAMPSHIRE AVE NW.	0.32
Bear right onto M ST NW.	0.14
Turn left onto 23RD ST NW.	0.15
Turn right onto WASHINGTON CIR NW.	0.09
Turn right onto NEW HAMPSHIRE AVE NW. Your destination is ahead.	0.08

Total Route Distance: 2.28 Miles

HSIP GOLD/Freedom

HSIP GOLD

- 📁 Agriculture
- 📁 Borders
- 📁 Boundaries
- 📁 **Chemicals**
- 📁 Commercial
- 📁 Communications
- 📁 Education
- 📁 EmergencyServ
- 📁 Energy
- 📁 Finance
- 📁 FoodIndustry
- 📁 Geonames
- 📁 Government
- 📁 Hazmat
- 📁 LawEnforcement
- 📁 MailShipping
- 📁 Manufacturing
- 📁 Mining
- 📁 NatSymbols
- 📁 NaturalHazards
- 📁 PubHealth
- 📁 PubVenues
- 📁 TransAir
- 📁 TransGround
- 📁 TransWater
- 📁 WaterSupply



Question: What is HSIP Freedom and how does it differ from HSIP Gold?

Answer: HSIP Freedom is a subset of the HSIP Gold datasets developed and compiled by NGA over the past few years. Approximately 190 datasets were identified from HSIP Gold as license-free and distributable to state and local Homeland Security/Homeland Defense mission areas. HSIP Freedom can be shared and distributed among state and local government agencies and is being made available through the HSIN GIS Community of Interest (COI).

Summary

CATS Features

- **CATS – CJMTK, ArcEngine, ArcGIS 9.3.1 Extension**
- Internal Models: High Explosive, ERG 2008, ALOHA
- External Models: JEM, HPAC, HAZUS
- Enhanced roadblocks
 - Roadblock editor – add, delete, move roadblocks
- Route planning
 - Build CATS road network (CRN) file
 - Find shortest path
 - Routing around hazards
- Net tools
 - Geocoding
 - Find address
 - Find location
 - Place Tools
 - Find place
 - Find place by radius
 - Weather Tools
 - Find Weather
 - Find Weather by latitude/longitude
 - Find closest weather lat/lon
- Scope and establish initial development plan for web services
- Correct developmental, architectural issues, maintenance and operability issues
- HSIP GOLD data bundle
- HSIP Freedom data
- Software issue methodology

Summary

CATS Requirements

Hardware Requirements

- CPU: 2.2 GHz or higher
- Processor: Intel Core Duo, Pentium 4, or Xeon
- Memory: 2GB or higher
- Display: 24 bit color depth
- Resolution: 1024 X 768 Recommended or higher at normal size (96 dpi)
- Swap Space: 500 MB Minimum
- Disk Space 3.2 GB
- Video/Graphics: 24-bit capable graphics accelerator with a minimum of 512MB video memory

Software Requirements

- CJMTK or ArcGIS Desktop or Engine 9.3.1 or 10 with the Spatial Analyst Extension
- Net Framework 3.5 SP1 (For ESRI 9.3.1 products) or .Net Framework 4 (For ESRI 10 products)
- Aloha 5.4.1.2
- Adobe Acrobat Reader
- Storage: Shapefile, File-based Geodatabase, Personal and Enterprise SDE

Operating Systems (32 or 64 bit):

- Windows XP SP2
- Windows 7
- Windows Server 2003 SP2
- Windows Server 2008

Interoperability

- Joint Effects Model (JEM) 1.1
- Hazard Prediction and Assessment Capability (HPAC) 4/5
- Hazards U.S. Multi-Hazard (HAZUS-MH) 1.4