



EMERGENCY MANAGEMENT AGENCY

LAKE COUNTY, OHIO

Larry Greene, EMA Director



Geospatial Tools and the Flood of 2006



The Flood of 2006

Lake County, Ohio



Richard
Kotapish,
GIS Director

“We are prepared for any unforeseen event that may or may not occur.”

President George W. Bush



Storm Stats

- 1,000 yr. (48 hr. event)
- 500+ yr. storm (5 hr. event)
- 6,000+ homes flooded
- \$20,000,000 in damage claims for homes and businesses
- \$16,000,000 in Public Sector damage
- 73 departments responded
- 11 counties responded

Geospatial toolbox

The suite of tools in use include:

- Pictometry's Electronic Field Study (angled aeriels)
- ESRI Arc Map GIS software
- ESRI ArcReader GIS viewing software
- Internet mapping using ArcIMS
- County dispatch mapping using Intergraph's IPS solution
- Municipal dispatch mapping using ESRI's Map Objects software

Prepare!



Exercises for Perry Nuclear
Plant prepared everybody

Prepare!



Exercises for Perry Nuclear
Plant prepared everybody

Prepare!



Technological Infrastructure in place helped greatly:

- Reverse 911
- Computer Aided Dispatch systems integrated into Incident Command System
- **Full communications interoperability between all First Responders**
- ArcMap, Pictometry installed at EOC
- GIS integrated into the Emergency Operations Center

Chronology highlights

Friday July 28th, 2006

Strike Team mobilization phone call received at 06:00

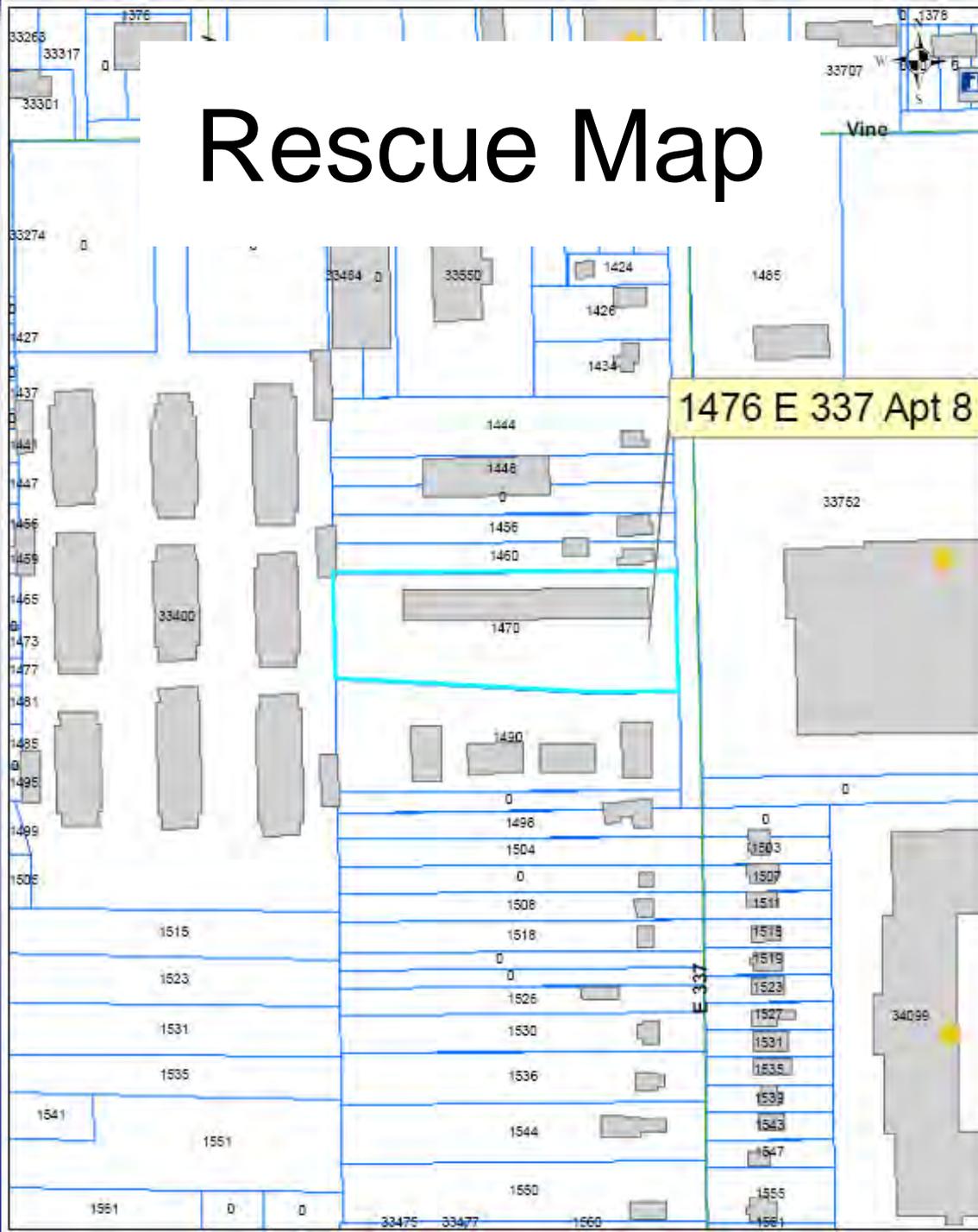
Arrived at the Eastlake Command trailer providing search and rescue mapping asap

Eastlake Rescue Maps

Command Vehicle fireman used COS GIS, preparing maps of the victims locations in the middle of the night

Augmented with ArcMap when I arrived on site in Eastlake.

Rescue Map



Chronology highlights

Road closures map by mid-morning on the day of flood to Dispatch, PIO, Executive Group room, public information phone bank. Just a *list* of closures would not give dispatch the ability to re-route, given the number of closures; these maps gave them eyes.

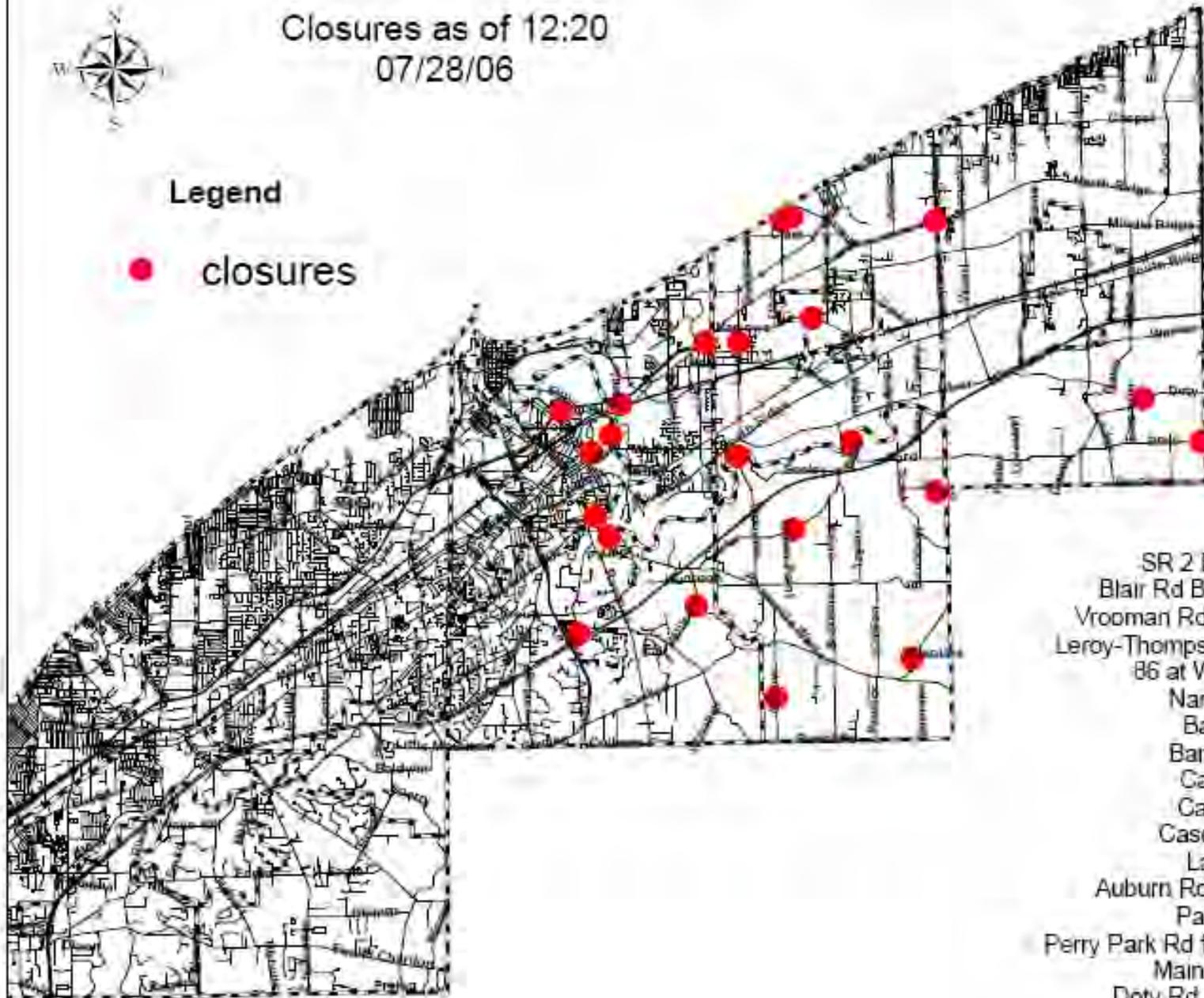




Closures as of 12:20
07/28/06

Legend

● closures



- SR 2 East of 535
- Blair Rd Bridge @ Grand
- Vrooman Rd Bridge @ Grand
- Leroy-Thompson Rd @ Valentine
- 86 at Wyman Park
- Narrows Rd
- Balch Rd
- Bank Street
- Carter Rd
- Callow Rd
- Casement Rd
- Lane Rd
- Auburn Rd - Spear to 608
- Parmly Rd
- Perry Park Rd from Clark to Parmly
- Main St Bridge
- Doty Rd Bridge (gone)
- Ross Rd Bridge (gone)
- Williams Rd @ Cascade (gone)

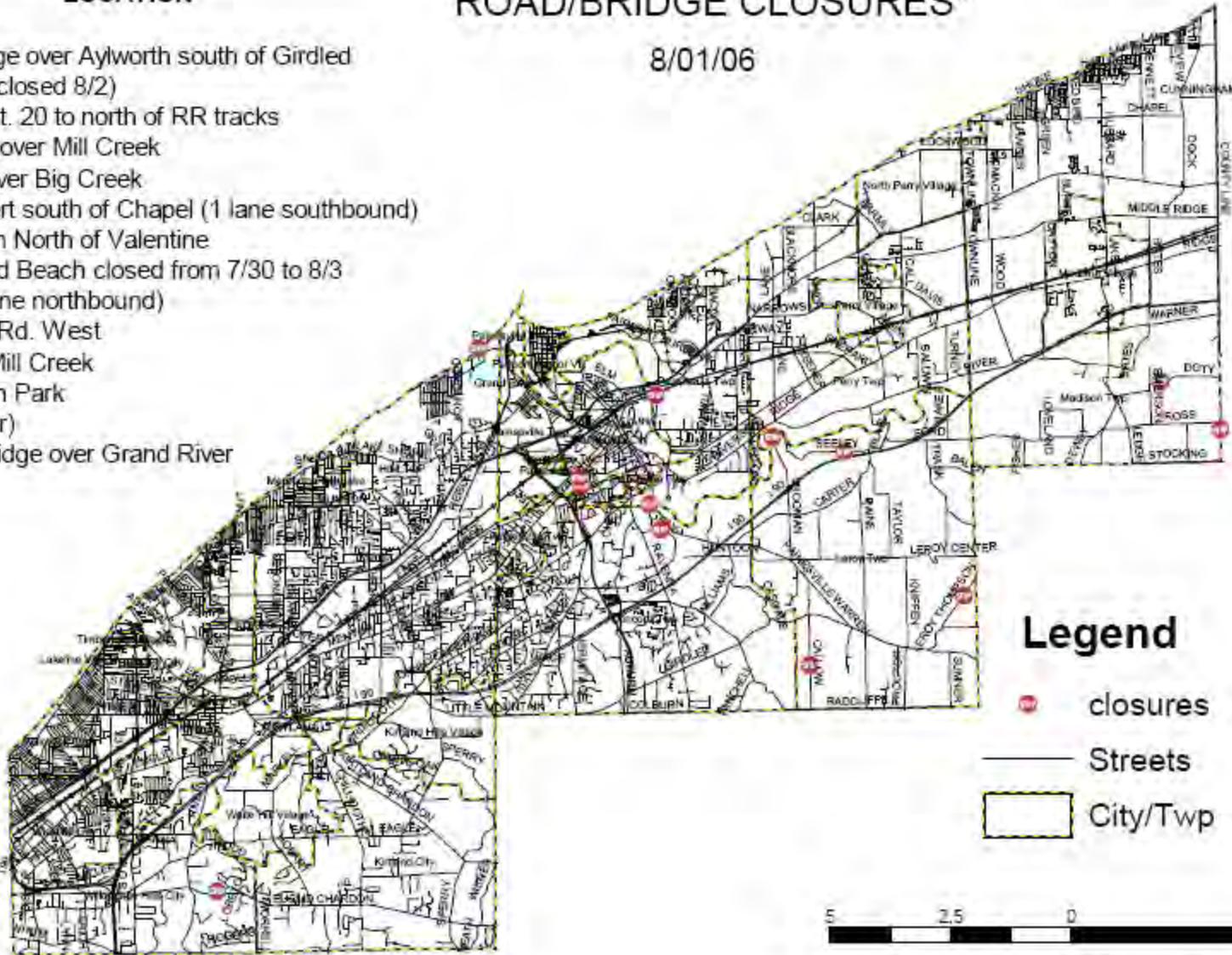
LOCATION

ROAD/BRIDGE CLOSURES*

8/01/06



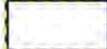
Callow Rd. Bridge over Aylworth south of Girdled
Casement Rd. (closed 8/2)
Chestnut St. - Rt. 20 to north of RR tracks
Doty Rd. bridge over Mill Creek
Fay Rd. North over Big Creek
Green Rd. culvert south of Chapel (1 lane southbound)
Leroy Thompson North of Valentine
Mentor Headland Beach closed from 7/30 to 8/3
Parmly Rd. (1 lane northbound)
Pleasant Valley Rd. West
Ross Rd. over Mill Creek
Rt. 86 at Wyman Park
Seeley Rd (lower)
Vrooman Rd. bridge over Grand River

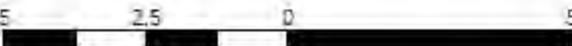


Legend

 closures

 Streets

 City/Twp

 5 2.5 0 5 Miles

* This is not a complete list

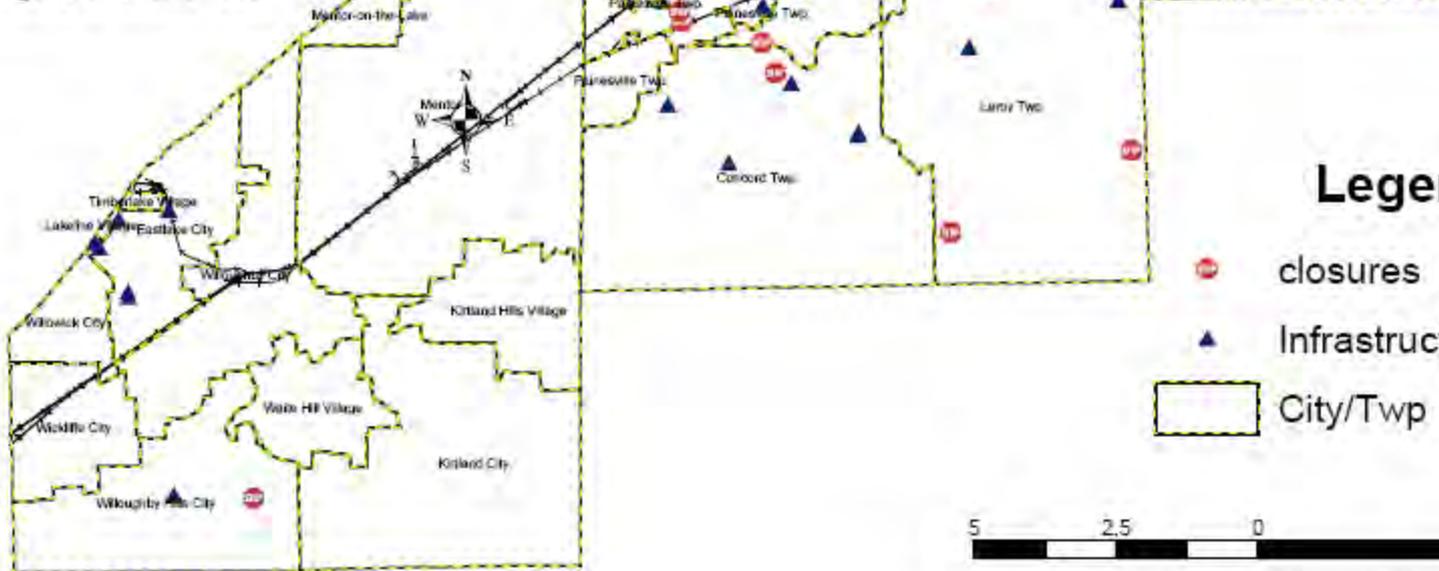
LOCATION

ROAD/BRIDGE CLOSURES*

8/01/06



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Seeley Rd (lower)
Vrooman Rd. bridge over Grand River



Legend

-  closures
-  Infrastructure Damage
-  City/Twp

5 2.5 0 5 Miles

* This is not a complete list

Chronology highlights

Damaged infrastructure maps were delivered to Dispatch, PIO, public info desks within 24 hrs. of the County-wide Damage Assessment meeting attended by all jurisdictions. (High risk sites for additional problems/closures.)

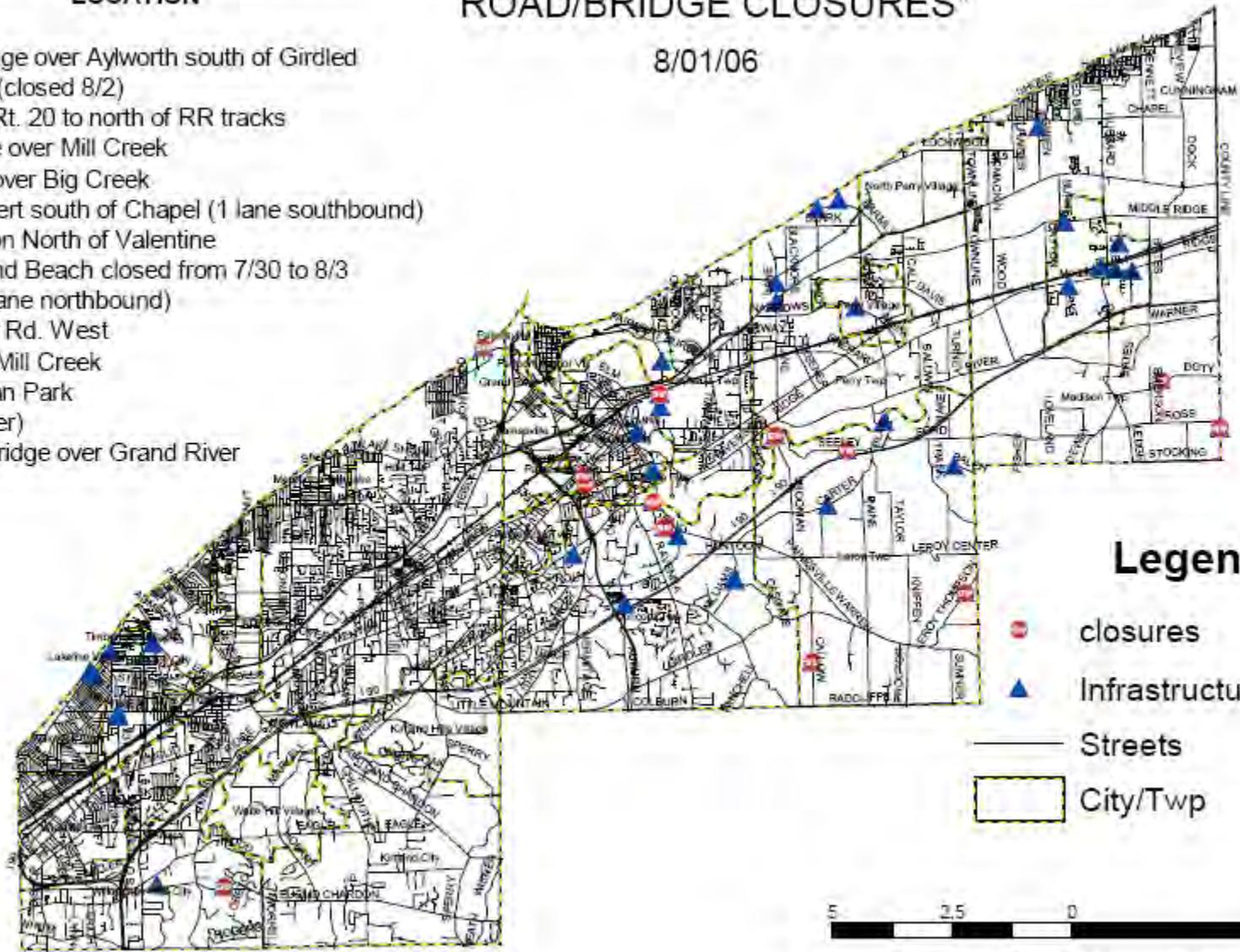
LOCATION

ROAD/BRIDGE CLOSURES*

8/01/06



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Legend

-  closures
-  Infrastructure Damage
-  Streets
-  City/Twp

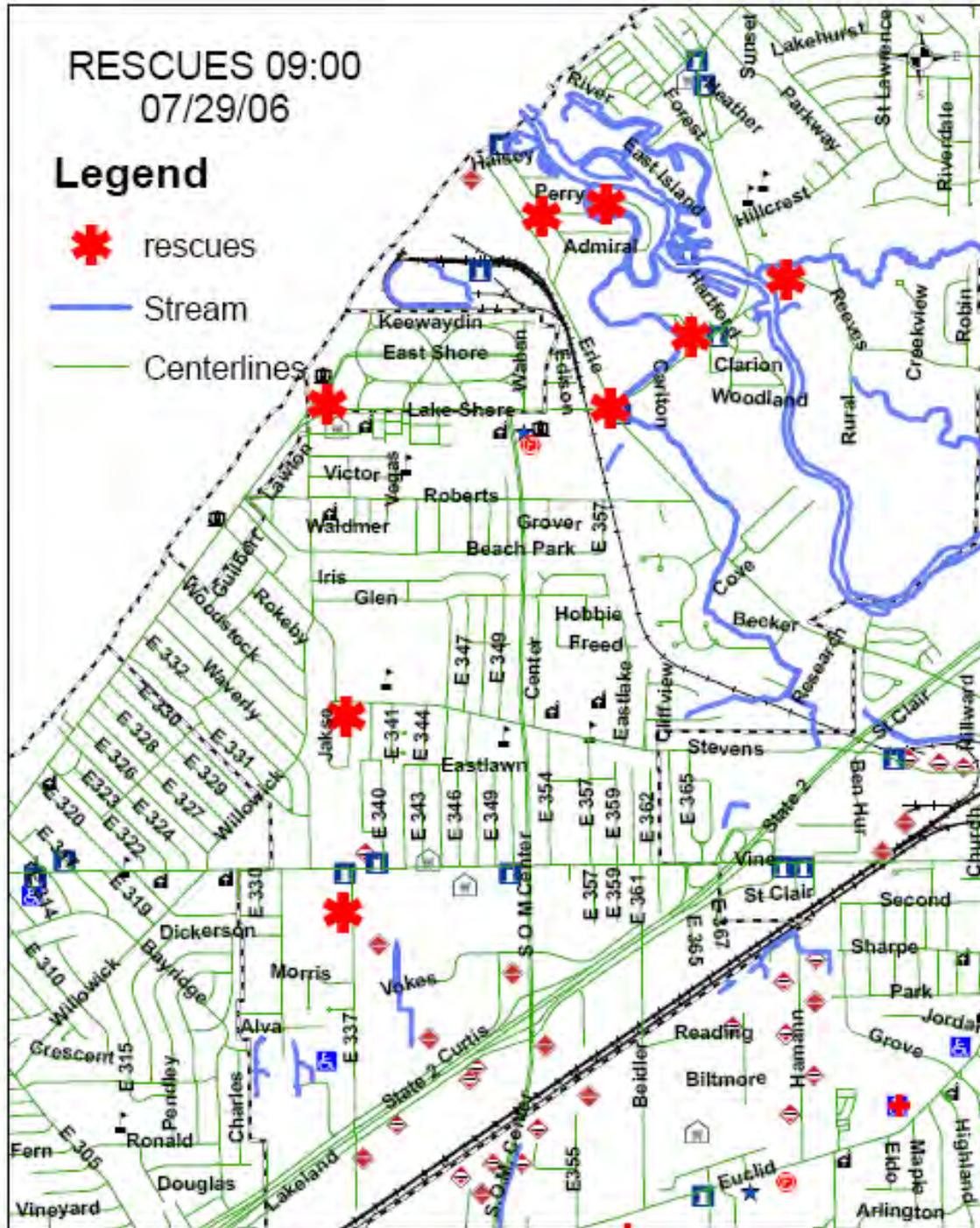


* This is not a complete list

RESCUES 09:00
07/29/06

Legend

-  rescues
-  Stream
-  Centerlines



Chronology highlights

Established GIS area in EOC control room with PC's, plotters and supplies by noon

Chronology highlights

Assisted as Technical Adviser for OEMA Damage Assessment and Site Information FEMA forms to all Townships and Municipalities; Resolved jurisdiction questions, interfacing with OEMA

Chronology highlights

Setup FTP site with OEMA for transfer of digital images for damaged infrastructure documentation

Provided critical infrastructure lists (attribute tables) with phone numbers for damage canvassing

Chronology highlights

Maps for elected officials, Dispatch, PIO, public info desks, Red Cross, Secret Service, White House staff, Engineers Office, law enforcement, fire, newspaper, others

Chronology highlights

We developed the Flood of 2006 Public Mapping Portal. Detours were posted to Internet within hours of determination of the routes. This has been updated constantly to reflect road closures for repairs so the traveling public and businesses can plan accordingly

Chronology highlights

Delivered on maps displaying damage, etc. and large banner requested by White House staff for Presidential visit requested at 18:00, due next morning

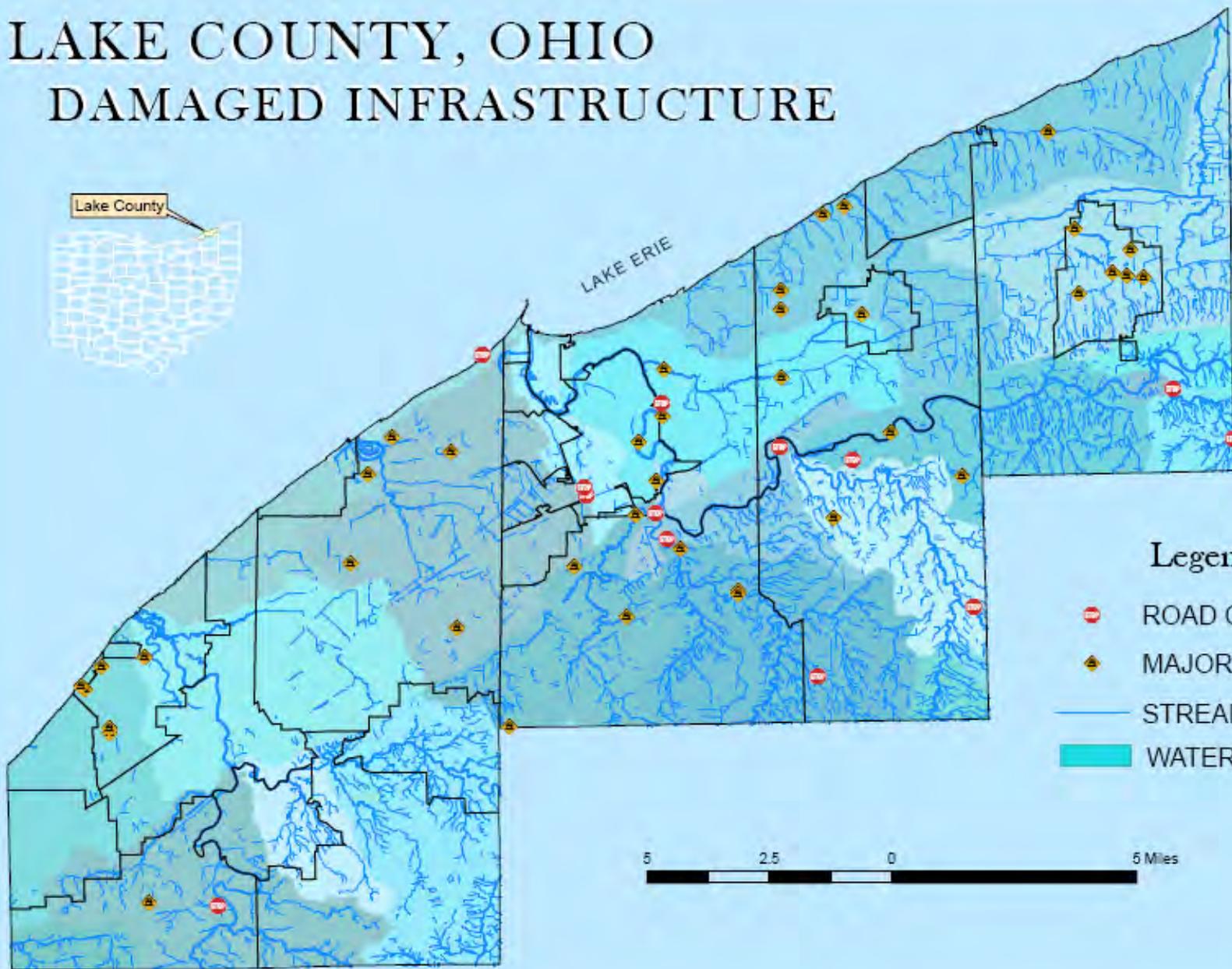
Presidential Visit

White House staff wanted at 8 AM:

- 8' x 5' backdrop appropriate for the President of the United States
- Large banner suitable for the President of the United States
- Two Presidential posters of maps/damage

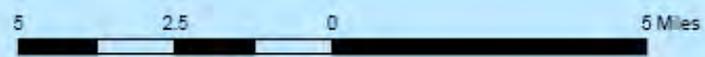
LAKE COUNTY, OHIO DAMAGED INFRASTRUCTURE

Lake County



Legend

-  ROAD CLOSED
-  MAJOR DAMAGE
-  STREAMS
-  WATERSHEDS



Presidential Visit

- Large banner suitable for the President of the United States



MISSION ACCOMPLISHED

Presidential Visit

- Two Presidential posters of maps/damage



The Flood of 2006

Lake County, Ohio

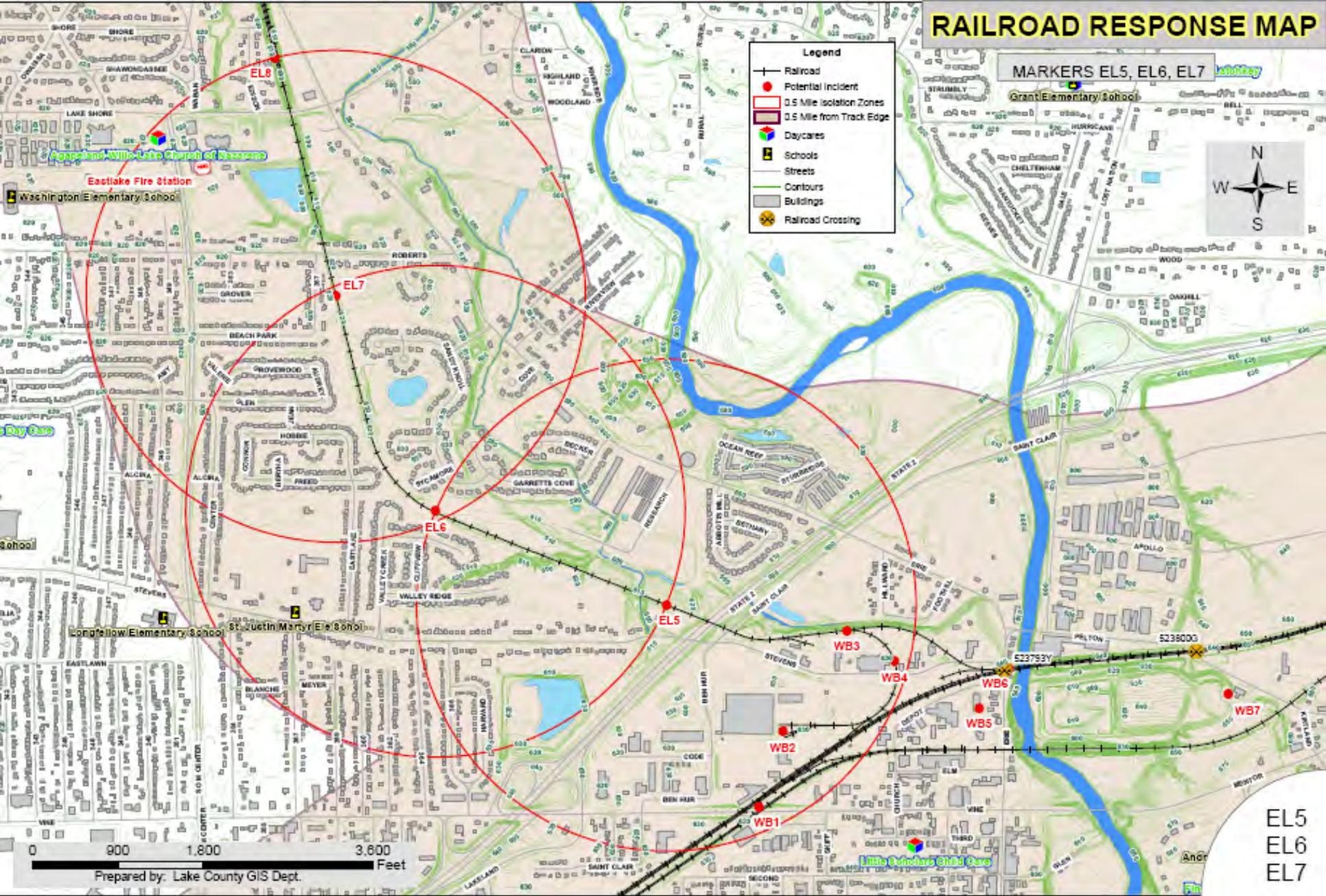


RAILROAD RESPONSE MAP

Legend

- Railroad
- Potential Incident
- 0.5 Mile Isolation Zones
- 0.5 Mile from Track Edge
- Daycares
- Schools
- Streets
- Contours
- Buildings
- Railroad Crossing

MARKERS EL5, EL6, EL7

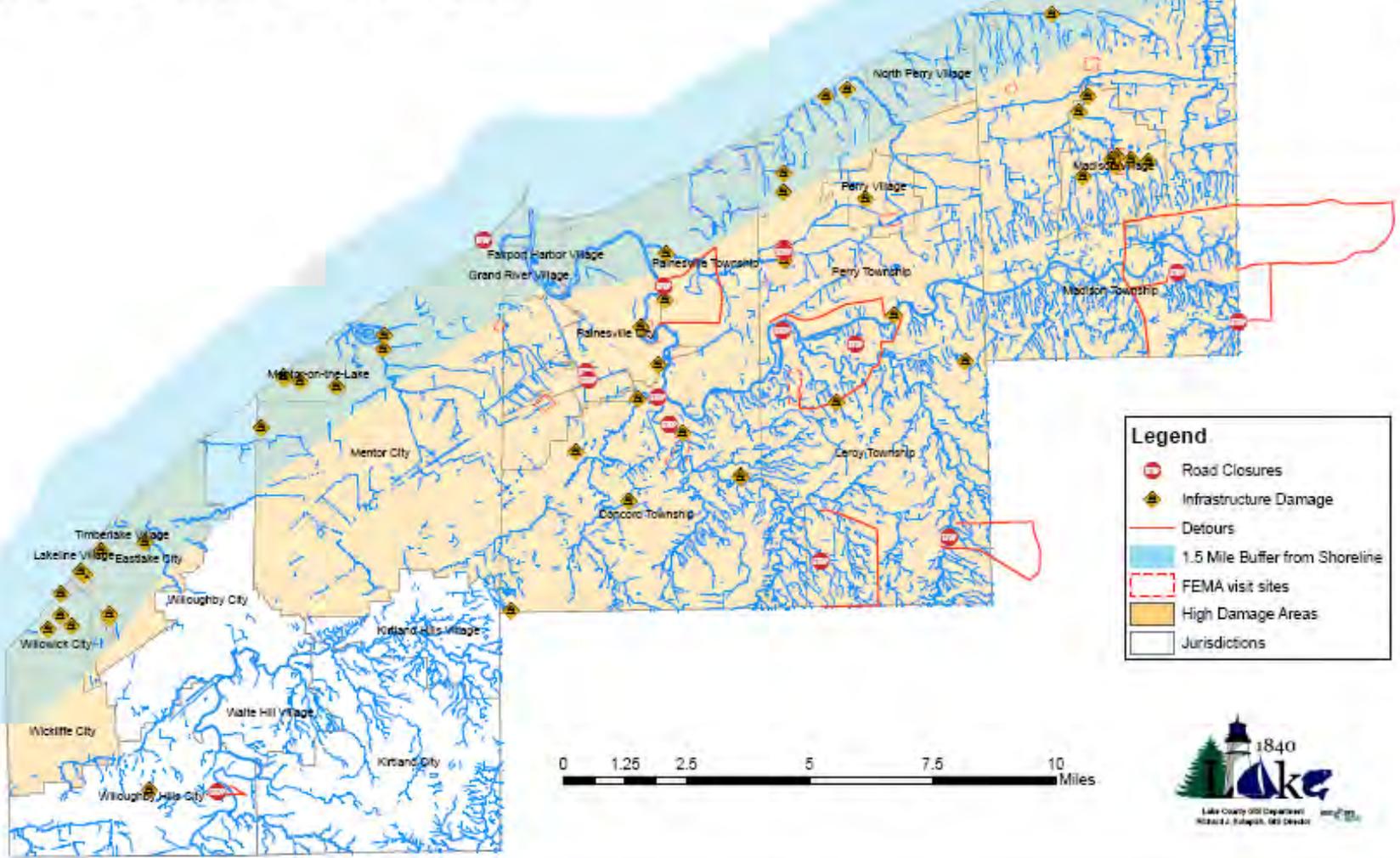


0 900 1,800 3,600 Feet

Prepared by: Lake County GIS Dept.

EL5
EL6
EL7

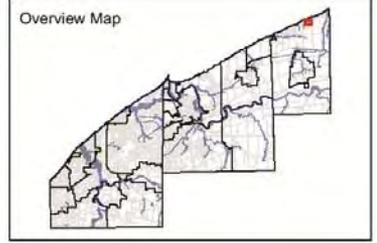
LAKE COUNTY, OHIO HIGH DAMAGE AREAS



Map books for all affected Jurisdictions were produced for the initial response phase for the County Engineer and Building Departments, OEMA and FEMA. The 100 yr. Flood Plains were highlighted with structure footprints and addresses. Allowed for an organized, systematic approach to make sure no citizens were missed.

More detailed maps for all affected Jurisdictions were produced for the response phase for the County Engineer and Building Departments, OEMA and FEMA. Structures data needed by FEMA was listed as well as pre-1981 structures – grandfathered properties.

LAKE COUNTY
**FLOOD DAMAGE
STRUCTURE INVENTORY**
PRE-1981 HOUSES WITHIN
100 YEAR FLOODPLAIN



LEGEND

- Pre-1981 Structures (Current 100YR Floodplain)
- Railroads
- 20' Contours
- Interstate Highway
- Divided Highway
- US Highway
- State Highway
- County Road
- Township Road
- City/Village Road
- Private Drive
- Paper Street
- Streams
- Jurisdiction Boundary
- Lakes
- Buildings
- 100 Year Flood Zone
- Parcels

ID	PIN	OWNER	OWNER ADDRESS	CLASS	PROP ADDRESS	JURIS	YR BUILT	EXT TYPE	BSMT TYPE	HOUSE VALUE
160	01B098ED01090	HOWES BENEDICT W JR	6968 ROE BLVD	510	6968 ROE BV	MA	1978	I	1	82280
183	01B098G000100	WHITE C FRANK	1451 DAVISTA AV	510	1451 DAVISTA	MA	1962	E	2	51170
175	01B098G000070	ARTCRAFT HOMES INC	6214 NORTH RIDGE W	510	1437 DAVISTA	MA	1972	J	1	61200
188	01B098H000010	CRAFT JEFFREY	6214 NORTH RIDGE RD	510	1455 DAVISTA	MA	1962	J	1	48310
176	01B098G000080	BUBNER THOMAS R	1441 DAVISTA AV	510	1441 DAVISTA	MA	1963	J	1	53440
158	01B098ED01130	EPPELE PAUL M	6940 ROE BLVD	510	6940 ROE BL	MA	1954	I	1	57180
159	01B098ED01110	TOWNSEND CHERY G	6952 ROE BLVD	510	6952 ROE BL	MA	1962	I	1	62690

EXT WALL TYPES

A - ALUMINUM & STUCCO	J - ALUMINUM/VINYL SIDING
B - MASONRY & STUCCO	K - BRICK
C - WOOD SIDING & STUCCO	L - STONE
D - WOOD SIDING & ALUMINUM	M - STUCCO
E - WOOD SIDING & BRICK	N - ASBESTOS
F - WOOD SIDING & STONE	P - BLOCK
G - ALUMINUM & BRICK	Q - ALUMINUM & STONE
H - ALUMINUM & WOOD SIDING	R - VINYL & BRICK
I - WOOD SIDING	

BSMT TYPES

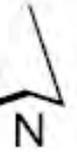
1 - NONE	3 - PART
2 - CRAWL	4 - FULL




Map produced by the Lake County GIS Department. Lake County assumes no legal responsibility for the information contained on this map.

Map created/updated: August 24th, 2006

ODNR Floodway Structure Analysis

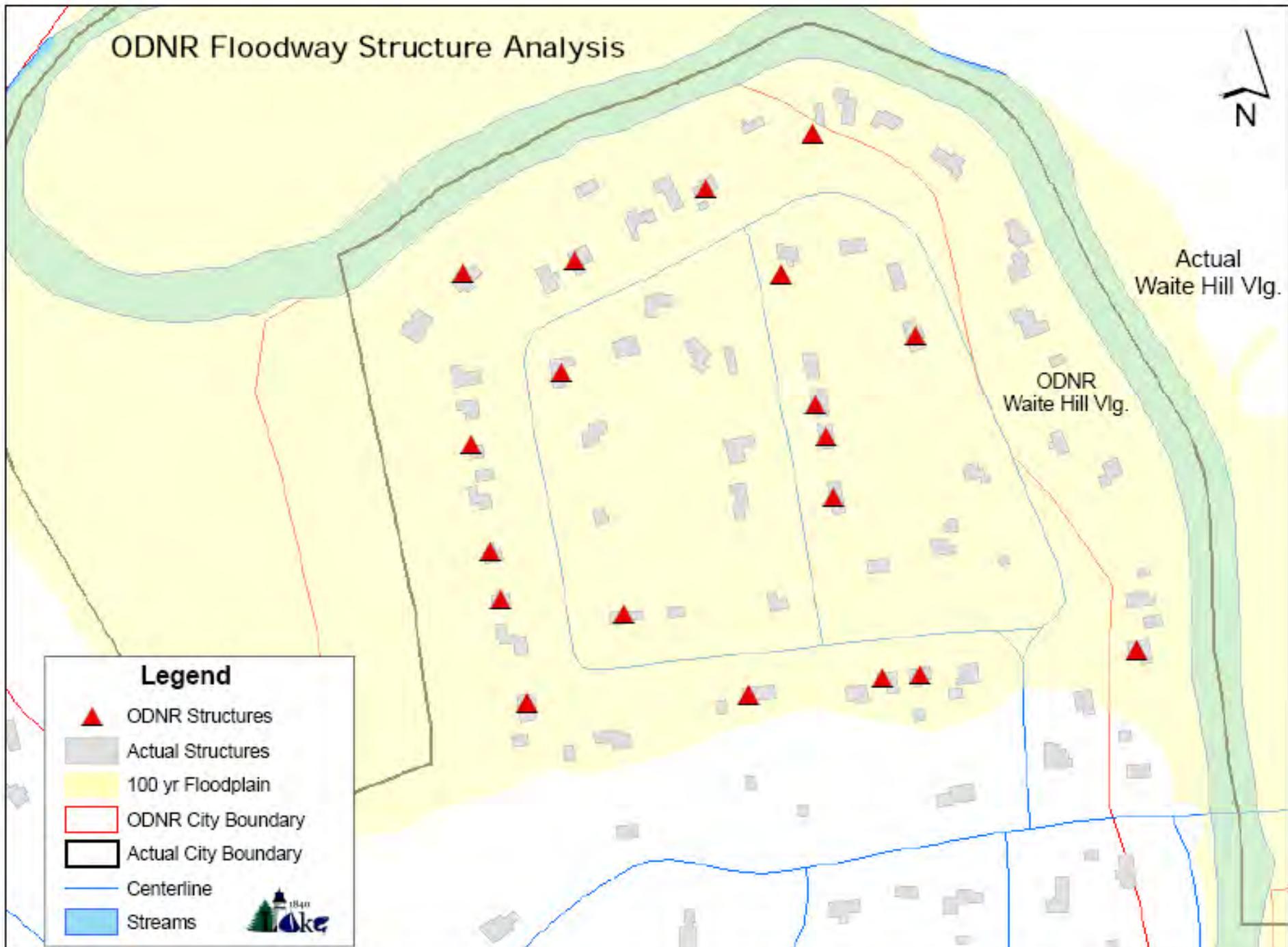


Actual Waite Hill Vlg.

ODNR Waite Hill Vlg.

Legend

-  ODNR Structures
-  Actual Structures
-  100 yr Floodplain
-  ODNR City Boundary
-  Actual City Boundary
-  Centerline
-  Streams



Data resource search

- Radiometric
- Multi-spectral
- Pan Sharpened Digital Globe
- NOAA
- Landsat
- Pictometry
- Accuweather

Data resource search

Negotiated Pictometry flyovers, providing:

- irrefutable documentation for claims validating
- give us the ability to further develop an “affected properties” layer, modeling damage
- high water marks for 3-D inundation layer

Data resource search

Pictometry flyovers

- save gasoline and time going into the field to resolve questions and issues.
- The imagery will then be available for all the myriad uses currently used by 350+ users.

Lessons Learned

- Order data first
- Support dispatch is highest priority
- Have data resident at EOC
- Exercise and pre-plan
- Presidential visit will disrupt operations
- Disaster will convert non-believers

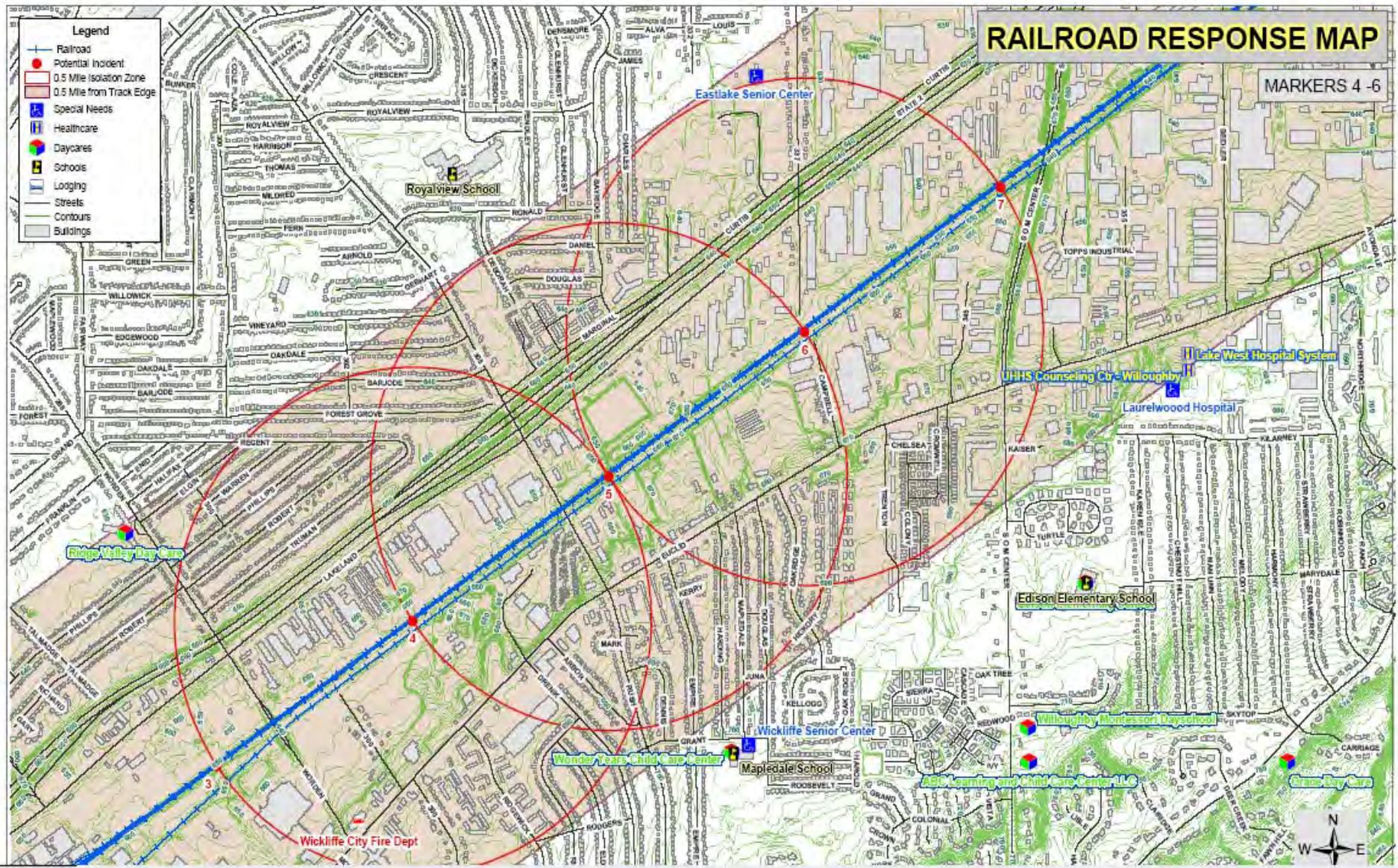
Pre-distribute CI mapping

- Critical infrastructure, at risk populations mapped in 11x17 books provided to all Fire Departments

RAILROAD RESPONSE MAP

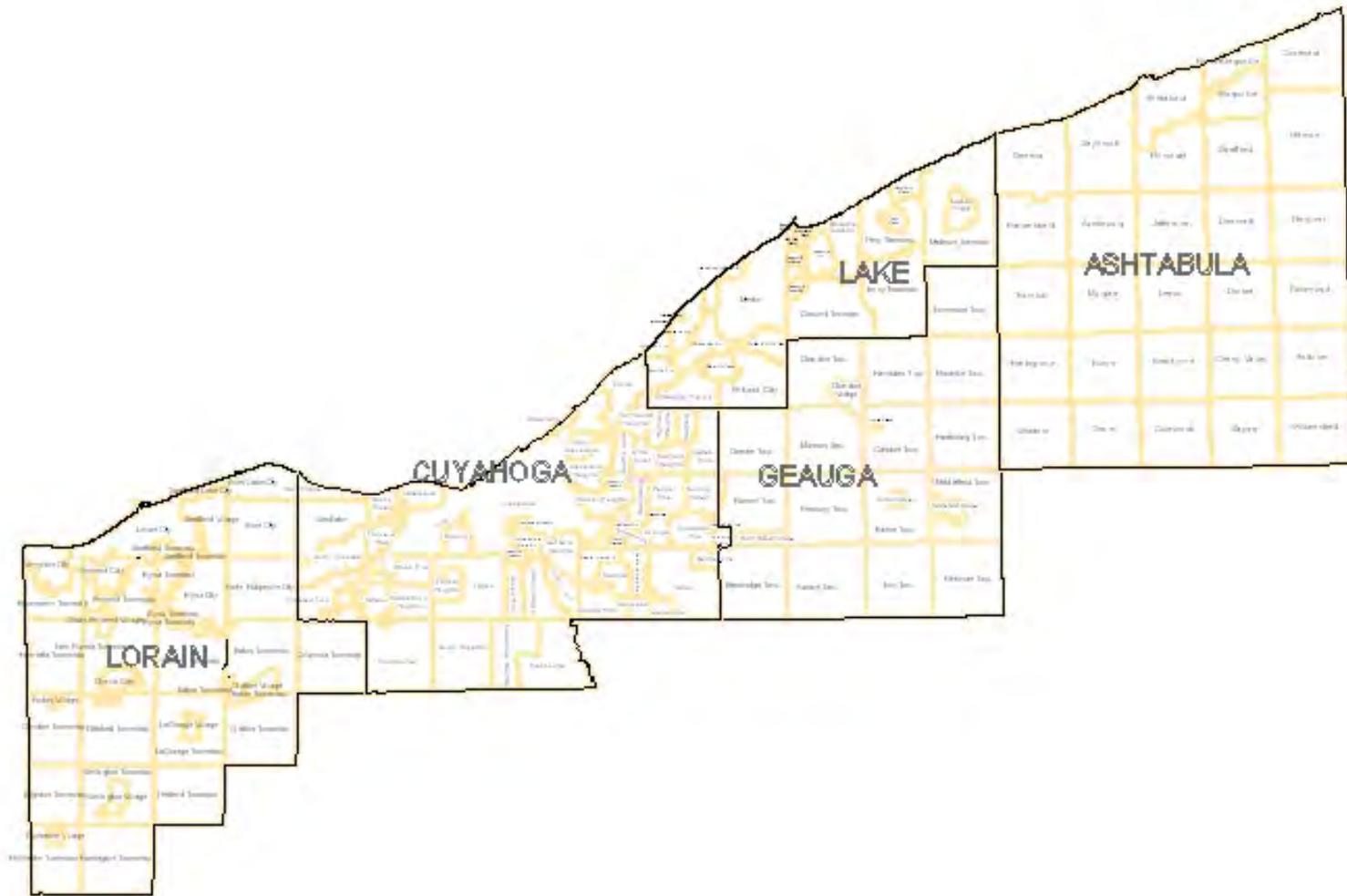
MARKERS 4-6

- Legend**
- Railroad
 - Potential Incident
 - 0.5 Mile Isolation Zone
 - 0.5 Mile from Track Edge
 - Special Needs
 - Healthcare
 - Daycares
 - Schools
 - Logging
 - Streets
 - Contours
 - Buildings



7 x 11 in

H.S. Region 2 support



H.S. Region 2 support

- Hard drives supplied with region-wide data set, ArcReader
- Secure website

Pictometry Electronic Field Study Software (EFS) Image Warehouse Storage Options

**Iomega® HDD 250GB USB 2.0/FireWire External
Desktop Hard Drive Approx. price: \$250**



Coordinated mapping

The screenshot displays the ArcReader interface for a project named "Painesville_Fire_arcreader_setup". The map shows aerial imagery of Painesville, Ohio, with several layers overlaid. The "Layers" panel on the left includes:

- Painesville City Fire
 - Curbs
 - Painesville City Hydrants
- Sanitary Lines
- Sanitary_Manholes
- Sewer Lines
- Storm Inlets
- Water Valves
- Painesville Township Fire
- Willoughby City Hydrants
- Emergency Management Agency
 - Pickup Points
 - EHS Hazardous Sites
- SARAH Hazardous Sites
- Evacuation routes
- Institutions
- Cadastral
 - Census Tracts
 - Condominiums
 - Original Lots
 - Original Tracts
 - Parcels
 - School Districts
 - Subdivisions
 - Township/Range Boundaries
 - Zip Codes
- Planimetrics
- Natural Resources
 - Lakes
 - Lake County Metroparks
 - Soils
 - Streams
- Aerial Photographs

The map features several red fire hydrant icons and red triangles representing hazardous sites. Labels on the map include "Huntington Elementary School, Painesville City", "Painesville Twp.", "Florence Avenue and Route 283, Painesville Twp.", "Avery Dennison #5 Bldg. 7", and "Avery Dennison #3 Bldg. 5". The status bar at the bottom shows coordinates "2304091.82 757633.15 Feet" and the time "8:42 AM".

Region 2 Multi-County Emergency Mapping Database using ArcReader

OHIO - REGION 2 LAKE COUNTY
EMERGENCY MANAGEMENT AGENCY
DISASTER RESPONSE SUPPORT
Information & Planning



LAYERS **PARCEL SEARCH**

- Transportation
 - Bridges
 - Centerlines
 - Pavement Edges
 - Railroads
- Geodetic Control
- Elevation
- Hydrography
- Cadastral
 - Parcels
 - Parcel Labels
 - Old Parcel Lines
 - Lots
 - Tracts
 - Subdivisions
 - Sublot Numbers
 - Lot Dimensions
- Utilities
- Governmental
- Environmental
- Emergency Oper.
- Structures
- Aerial Photography

Refresh Map

Auto Refresh



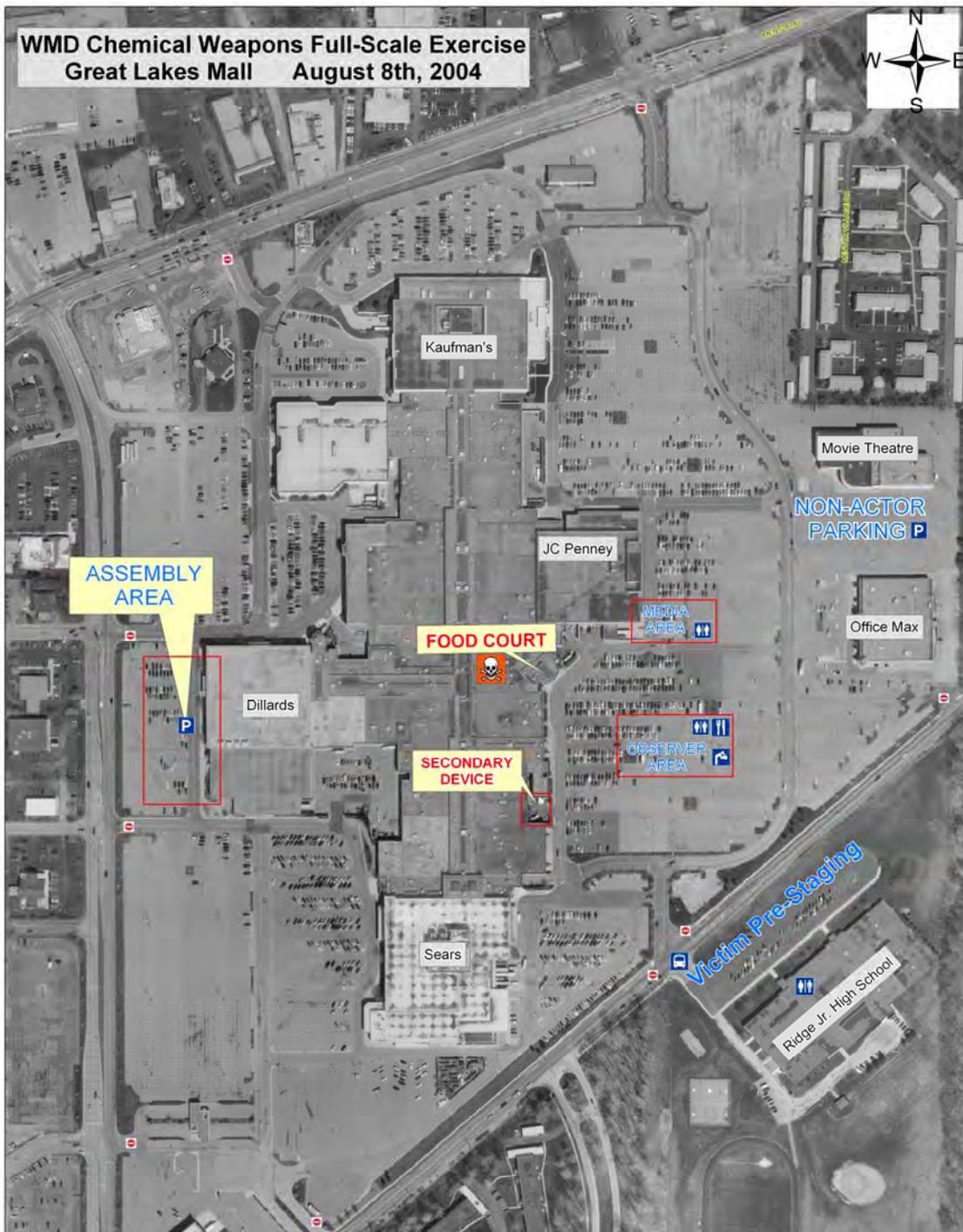
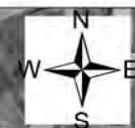
Emergency Preparation

✓ Response and Recovery

These activities assist victims, stabilize the situation and limit secondary damage. The graphic presentation and data integration provided by GIS let responders quickly grasp the situation and make more informed decisions.



**WMD Chemical Weapons Full-Scale Exercise
Great Lakes Mall August 8th, 2004**



**ASSEMBLY
AREA**

FOOD COURT

**MEDIA
AREA**

**NON-ACTOR
PARKING P**

Office Max

Dillard's

**SECONDARY
DEVICE**

**OBSERVER
AREA**

Sears

Victim Pre-Staging

Ridge Jr. High School

Kaufman's

Movie Theatre

JC Penney

Census 2000 Blocks - Population Density

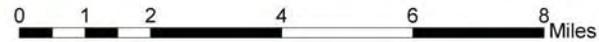
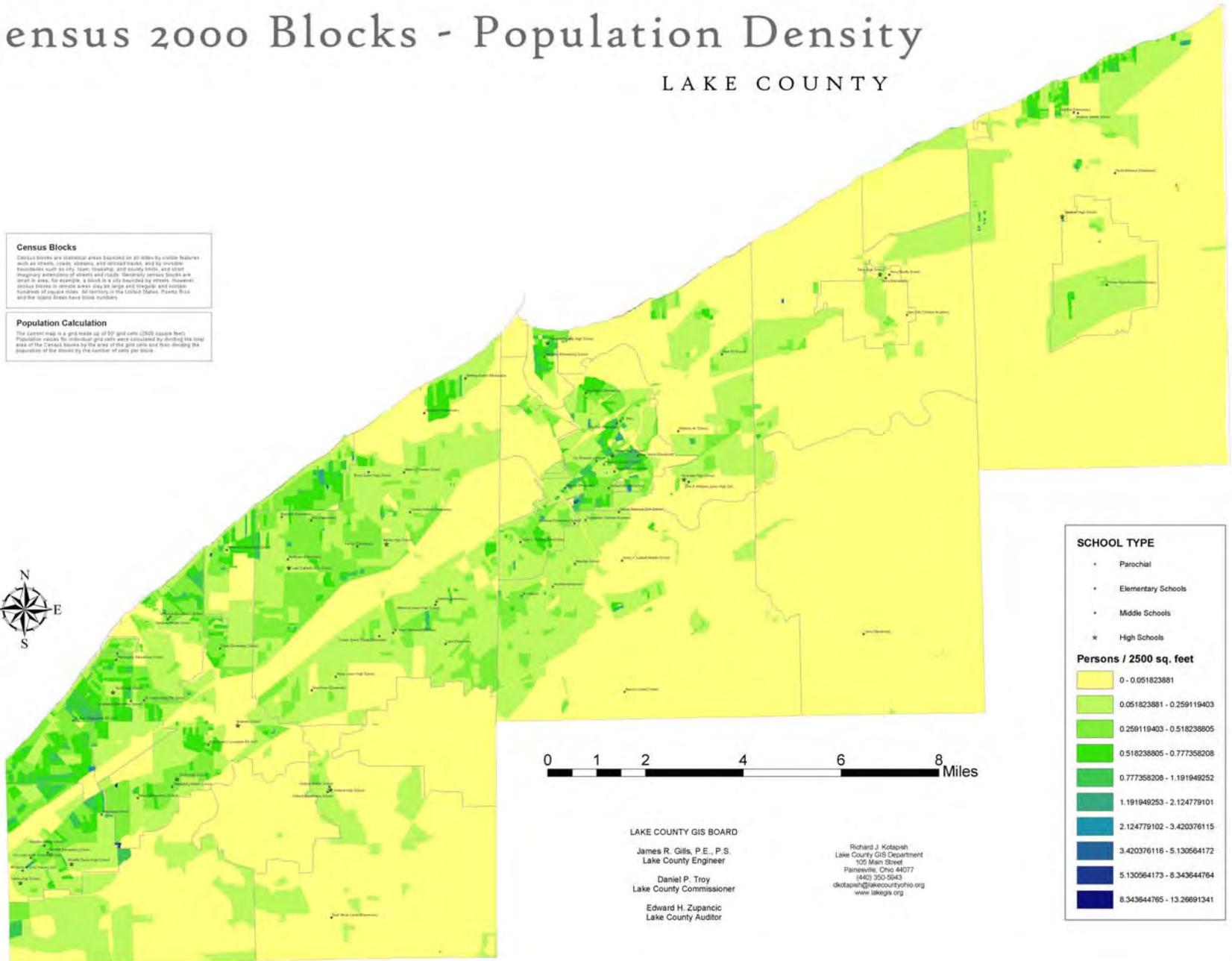
LAKE COUNTY

Census Blocks

Census blocks are statistical areas bounded on all sides by visible features such as streets, roads, streams, and railroad tracks, and by invisible boundaries such as city, town, township, and county lines, and great imaginary extensions of streets and roads. Generally census blocks are about 1/4 mile. For example, a block is a city bounded by streets. However, census blocks in remote areas may be large and irregular, and contain hundreds of square miles. All entries in the United States, Puerto Rico, and the Virgin Islands have block numbers.

Population Calculation

The current map is a grid made up of 50' grid cells (2500 square feet). Population values for individual grid cells were calculated by dividing the total area of the Census blocks by the area of the grid cells and then dividing the population of the blocks by the number of cells per block.



SCHOOL TYPE

- Parochial
- Elementary Schools
- Middle Schools
- ★ High Schools

Persons / 2500 sq. feet

Yellow	0 - 0.051823881
Light Green	0.051823881 - 0.259119403
Green	0.259119403 - 0.518238805
Dark Green	0.518238805 - 0.777358208
Teal	0.777358208 - 1.191949252
Blue-Teal	1.191949252 - 2.124779101
Blue	2.124779102 - 3.420376115
Dark Blue	3.420376116 - 5.13064172
Very Dark Blue	5.13064173 - 8.34364764
Black	8.34364765 - 13.26691341

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 105 Main Street
 Painesville, Ohio 44077
 (440) 350-5943
 rjkotapich@lakecountyohio.org
 www.lakegis.org

Census 2000 - Population Density

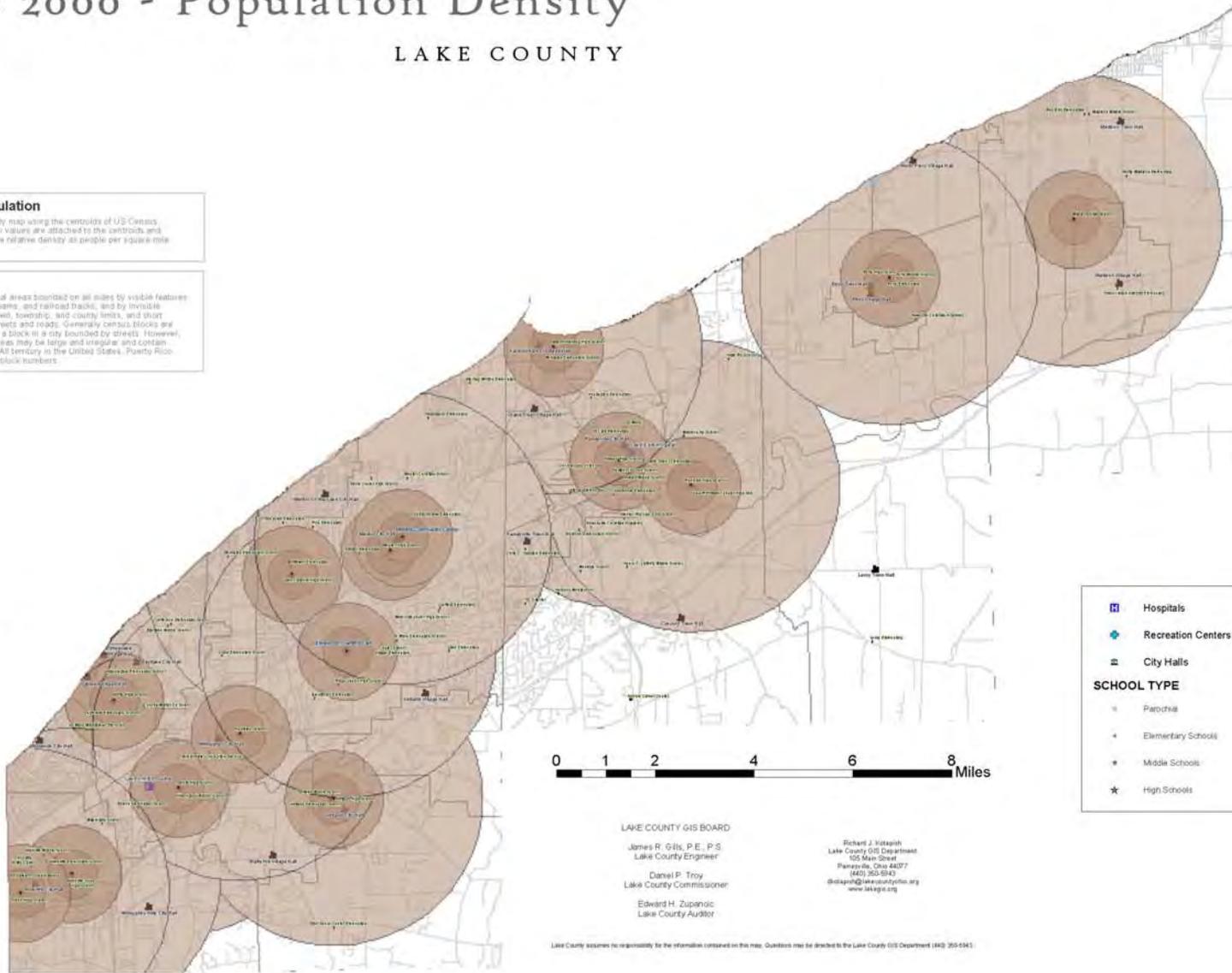
LAKE COUNTY

Population Calculation

The current map is a density map using the centroids of US Census blocks as input. Population values are attached to the centroids, and the resulting map shows the relative density at people per square mile.

Census Blocks

Census blocks are statistical areas bounded on all sides by visible features such as streets, roads, streams, and railroad tracks, and by invisible boundaries such as city, town, township, and county limits, and short imaginary extensions of streets and roads. Generally census blocks are small in size, for example, a block in a city bounded by streets. However, census blocks in remote areas may be large and irregular and contain hundreds of square miles. All territory in the United States, Puerto Rico, and the Island Areas have block numbers.



-  Hospitals
 -  Recreation Centers
 -  City Halls
- SCHOOL TYPE**
-  Parochial
 -  Elementary Schools
 -  Middle Schools
 -  High Schools



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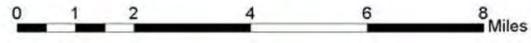
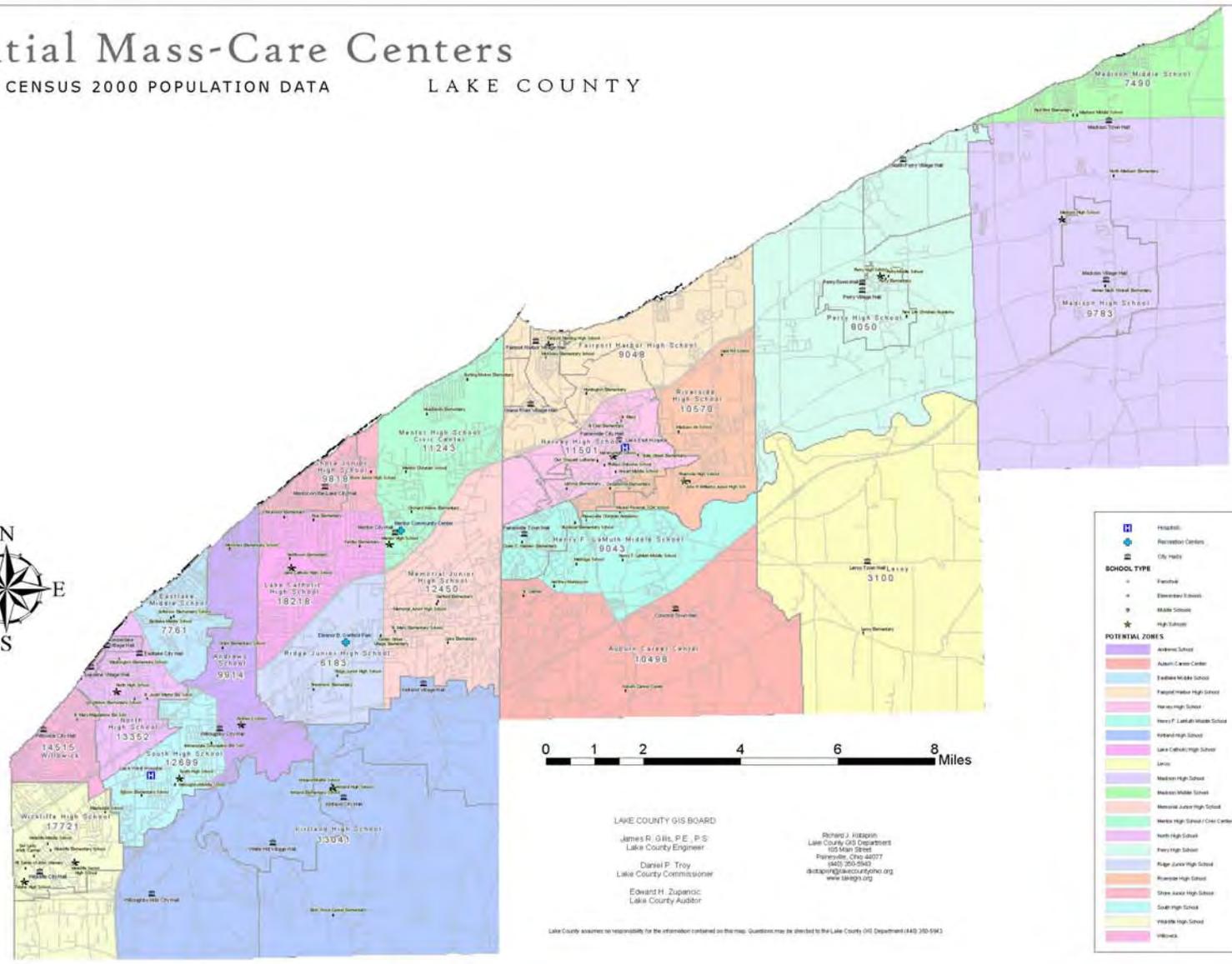
Richard J. Kitearsch
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 505 Main Street
 Painesville, Ohio 44077
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 rkitearsch@lake-county-ohio.org
 www.lakegis.org

Lake County assumes no responsibility for the information contained on this map. Questions may be directed to the Lake County GIS Department (440) 353-5943.

Potential Mass-Care Centers

BASED ON CENSUS 2000 POPULATION DATA

LAKE COUNTY



LAKE COUNTY GIS BOARD

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rhitzpich@lakecountyohio.org
www.lakeco.org

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SCHOOL TYPE

- Hospital
- Recreation Center
- City Hall
- Firehall
- Elementary School
- Middle School
- High School

POTENTIAL ZONES

- Academic School
- Adult Center
- Postable Middle School
- Potential Junior High School
- Paris High School
- Henry F. Lamuta Middle School
- Wainwright High School
- Lake Catholic High School
- Lakes
- Madison High School
- Madison Middle School
- Memorial Junior High School
- Newco High School / Civic Center
- North High School
- Paris High School
- Ridge Junior High School
- Riverside High School
- Shore Junior High School
- South High School
- Wainwright High School
- Wickliffe



OHLAKE005019NeighObliq95N

OHLAKE005019NeighObliq76S

OHLAKE005019NeighObliq75S

OHLAKE005019NeighObliq96N

OHLAKE005019NeighObliq63N

Navigation and tool icons including arrows, zoom, and selection tools.

Lake County Action



- ArcIMS web site for PNPP take shelter/evacuation notification
- Developed pickup locations, care centers point coverages including Ashtabula and Geauga Counties
- Created PNPP evacuation routes, emergency planning zones



Lake County Action



Updating of Special Needs Facilities

- SARAH facilities
- Daycare centers
- Care Centers
- Mass Immunization Centers
- Nursing/rehab homes
- Assisted Living
- Senior Centers
- Lodging
- Schools
- Libraries





Lake County Action



- EHS and SARA hazmat facilities layers
- Pre-planning with Lake Emergency Planning Committee
- Pre-planning with local Fire Dept's – ArcReader and Pictometry
- PNPP Traffic Control Points
- Healthcare facilities layer – Hospitals, urgent care, surgery clinics, mental health, specialty



“Reverse 911”



GeoNotify™ sends a recorded message through high speed callout technology to alert and inform others of an emergency situation

Dispatcher initiates call out



High-speed calling



Reverse 911

GeoNotify adds fast, easy geographical selection of targeted notification areas, e.g. plumes, flood plains, neighborhoods, etc.

Displays digital, street-level maps for defining call-out locations

Accommodates selection of any size or shape call-out zone(s)

Interfaces with other critical response tools, such as plume modeling applications

Processes GIS data at up to 18,000 names/phone numbers per minute



Reverse 911



From initiating severe weather warnings, alerting local residents of HAZMAT incidents to evacuating entire communities -

Terrorist Threats

Chemical Releases

Mass Casualty Incidents

Flood Plain Notices

Shelter-in-Place Notifications

Public Announcements

Natural Disasters

Missing persons

On Sept. 11th, 115 client systems made more than 20,000 Notifications. Another 11,000 calls as back-up support were handled by the company's headquarters after 5 on-site operations were destroyed in the attack



Destruction pictures































Flood website demo

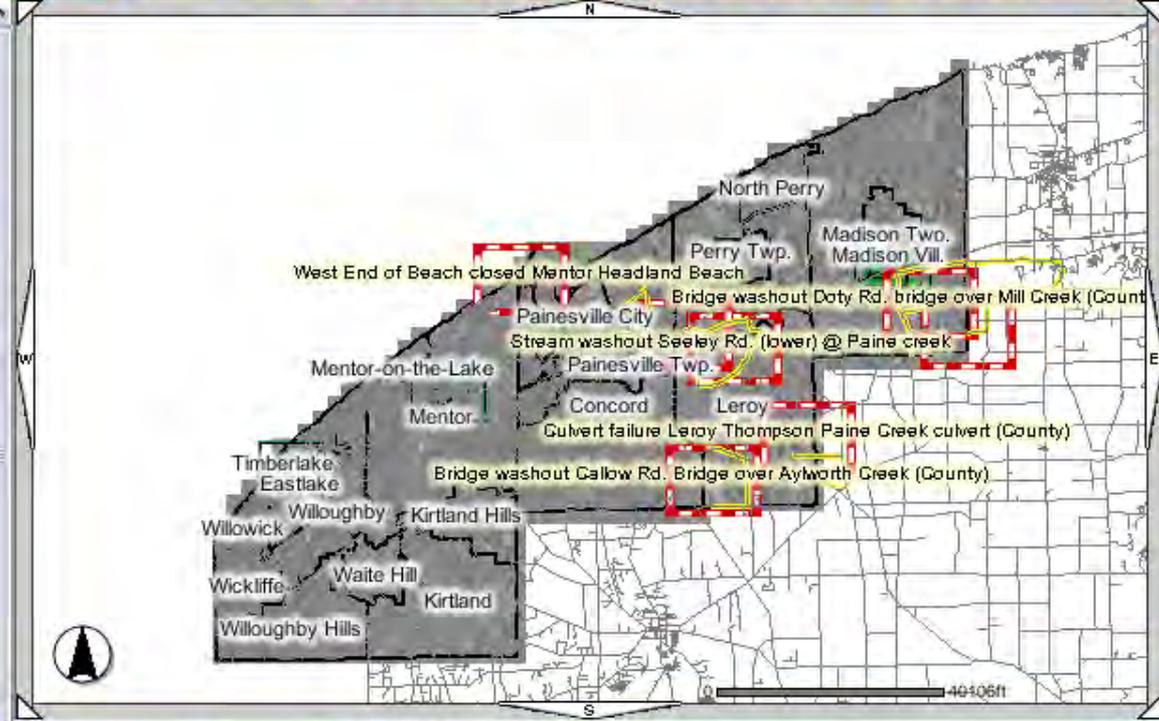
LAKENAVIGATOR - LAKE COUNTY, OH
2006 FLOOD INFO

LAYERS PARCEL SEARCH

- Emergency Oper.
- Road Closures
- Infrastructure Damage
- Detours
- Loan Assistance Centers
- Flood Rescues
- Nuclear Emergency Plans
- Transportation
- Bridges
- Centerlines
- Geauga Roads
- Ashtabula Roads
- Pavement Edges
- Railroads
- Geodetic Control
- Elevation
- Hydrography
- Streams
- Lakes
- USGS Watersheds
- Cadastral
- Utilities
- Governmental
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Refresh Map

Auto Refresh



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Zoom to Scale - 1 inch = 31820 ft. **Go**

2006 Flood Information

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- [Flood Information](#)
- [Lake County Engineer](#)
- [Road Closings](#)
- [Lake County EMA](#)
- [Job & Family Services](#)
- Phone: (440) 350-4000

[Red Cross](#)

Map Resources

- [Infrastructure Damage Key](#)

Use the Hyperlink tool to view pictures of Infrastructure Damage (make sure layer is active & you have Adobe Acrobat

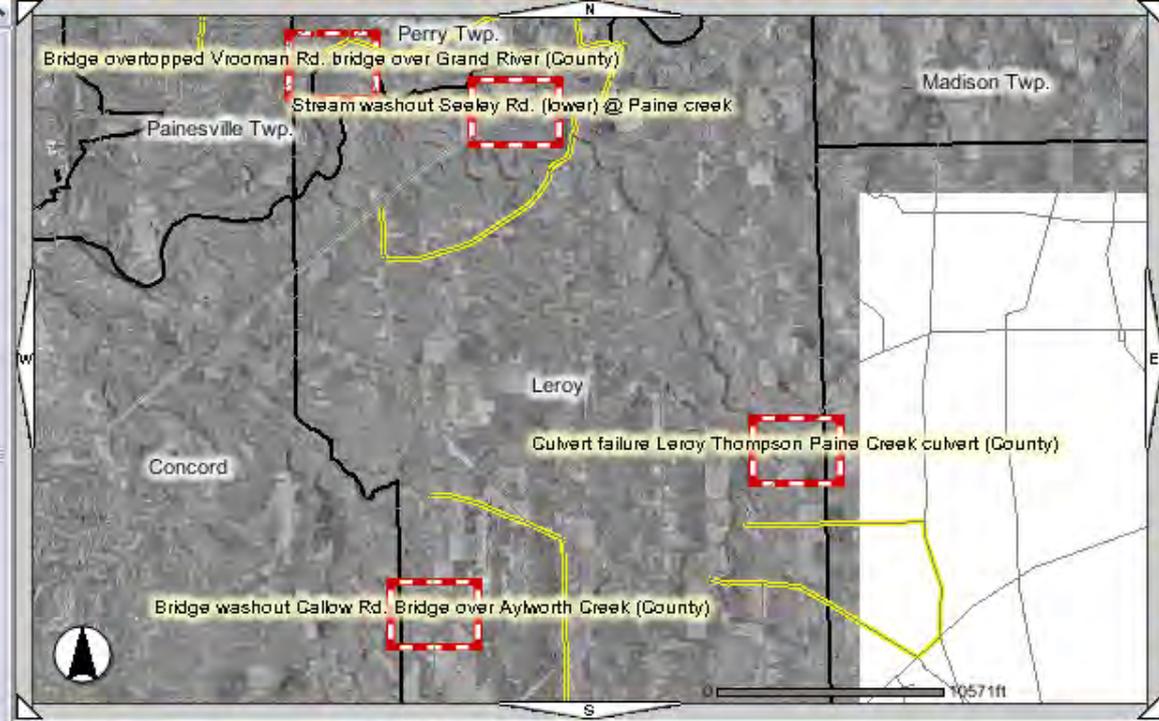
LAKENAVIGATOR - LAKE COUNTY, OH
2006 FLOOD INFO

LAYERS PARCEL SEARCH

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Refresh Map

Auto Refresh



ZOOM IN SCANNED DOCUMENT VIEWERS PLATS TAX MAPS

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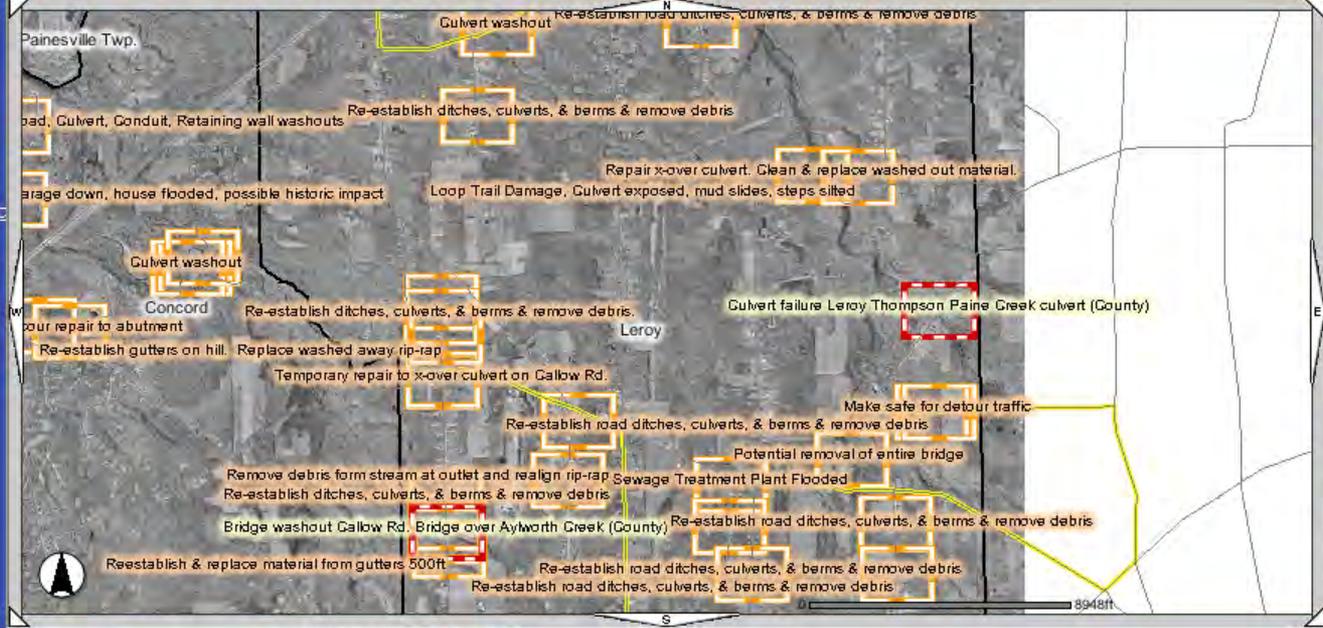
Map Resources

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Use the Hyperlink tool to view pictures of Infrastructure Damage (make sure layer is active & you have Adobe Acrobat

LAKE NAVIGATOR - LAKE COUNTY, OH
2006 FLOOD INFO

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Map Resources

[Infrastructure Damage Key](#)

Use the Hyperlink tool to view pictures of Infrastructure Damage (make sure layer is active & you have Adobe Acrobat Reader)

ZOOM IN **SCANNED DOCUMENT VIEWERS**
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Refresh Map

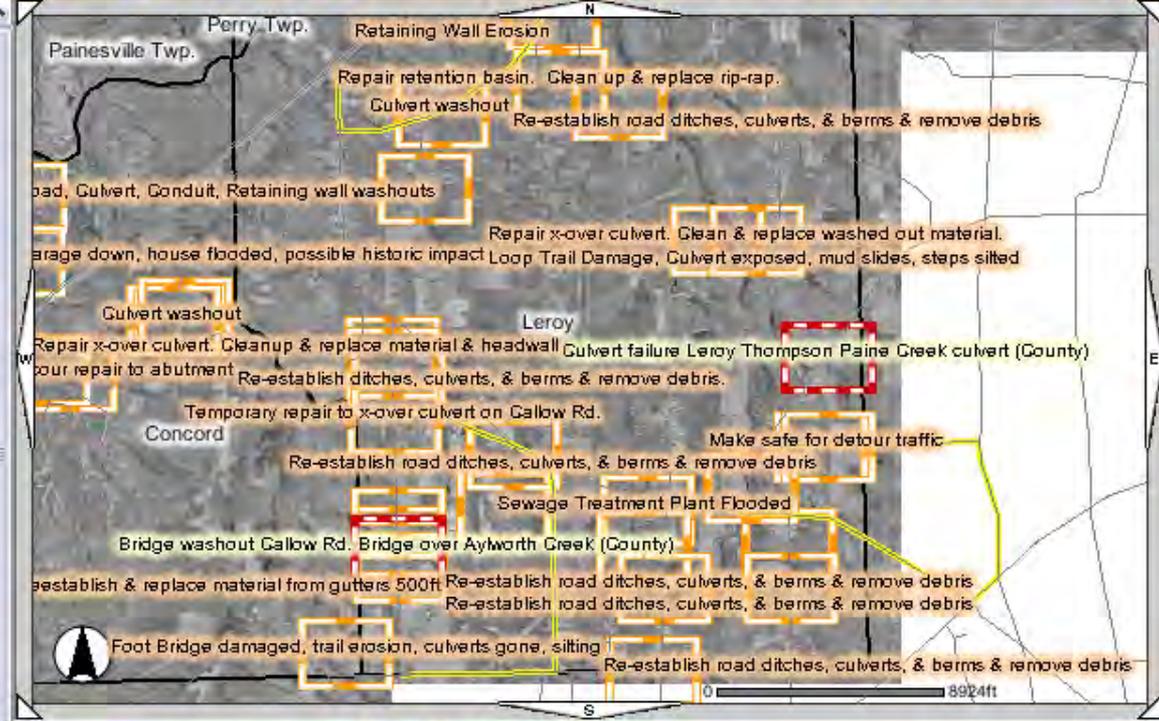
Auto Refresh

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Internet

LAKENAVIGATOR - LAKE COUNTY, OH
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- Auto Refresh



Infrastructure Damage Key

- Fully operational/open
- Operational, but filled to capacity or otherwise closed
- Operational, but partially damaged or partially incapacitated
- Destroyed or Totally incapacitated

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Disclaimer
 Every effort is made to update the data on this site but Lake County makes no guarantees and assumes no legal responsibility for the information contained on these pages.

HYPERLINK SCANNED DOCUMENT VIEWERS PLATS TAX MAPS
 Zoom to Scale - 1 inch = 7080 ft. ft.

Infrastructure Damage
 No hyperlink defined for at click location

Pages



Attachments

Comments