

ENTERPRISE GIS IN KENTUCKY TRANSPORTATION: *How Things Fit Together*

Will Holmes

GIS Support Services Branch, OIT
Kentucky Transportation Cabinet

We are seeking answers...



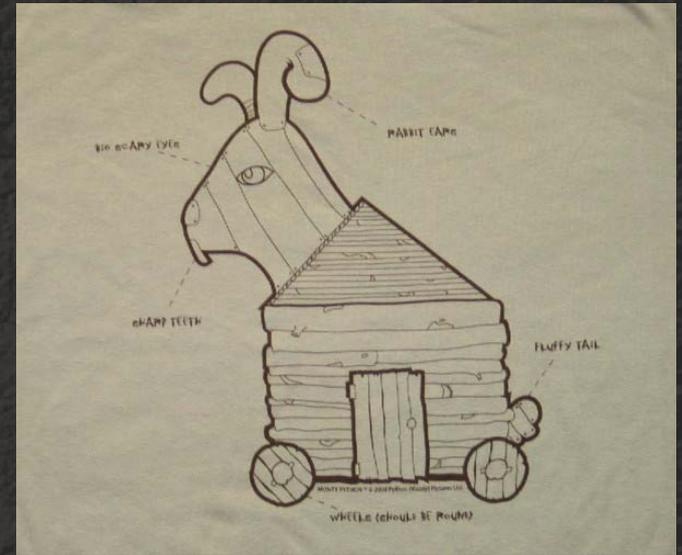
We face challenges...



We form committees & plan...



We use scientific methods and tools...



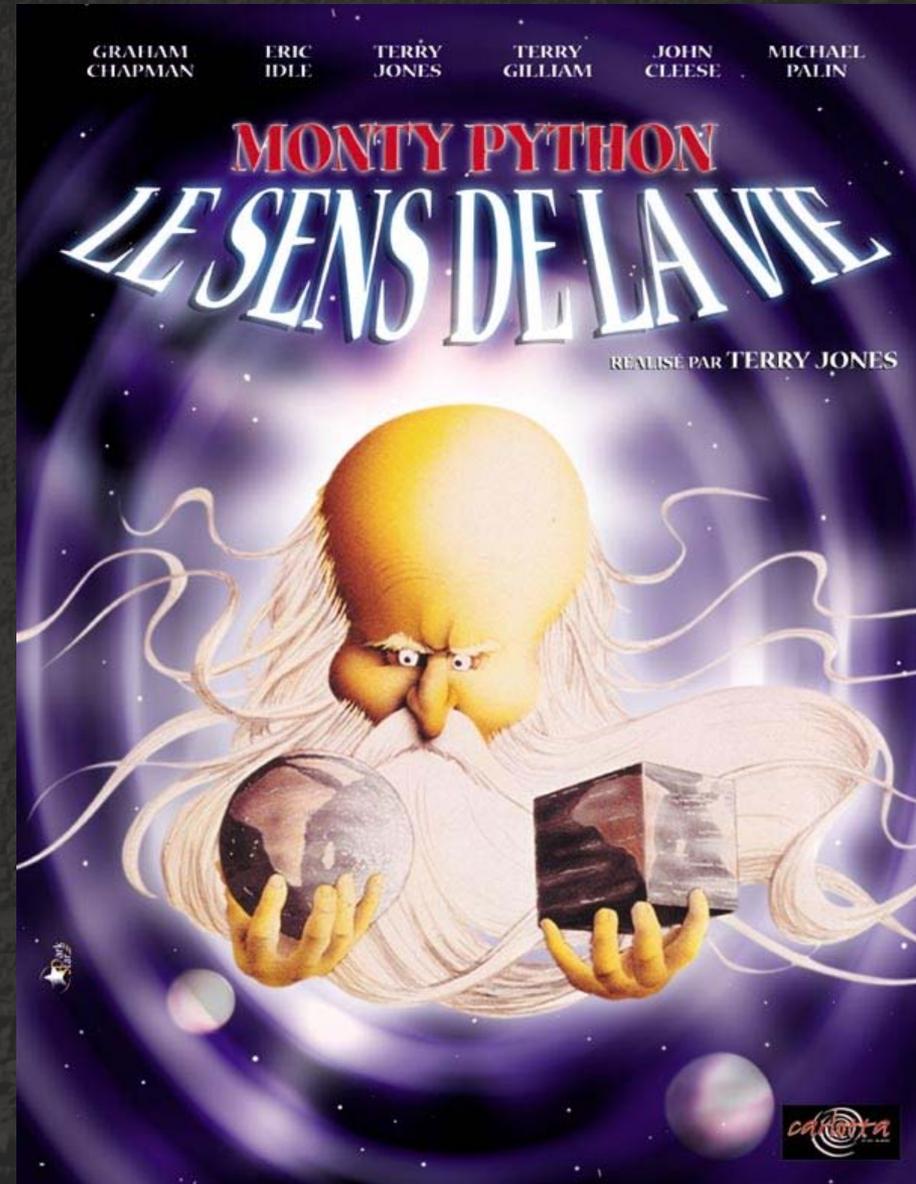
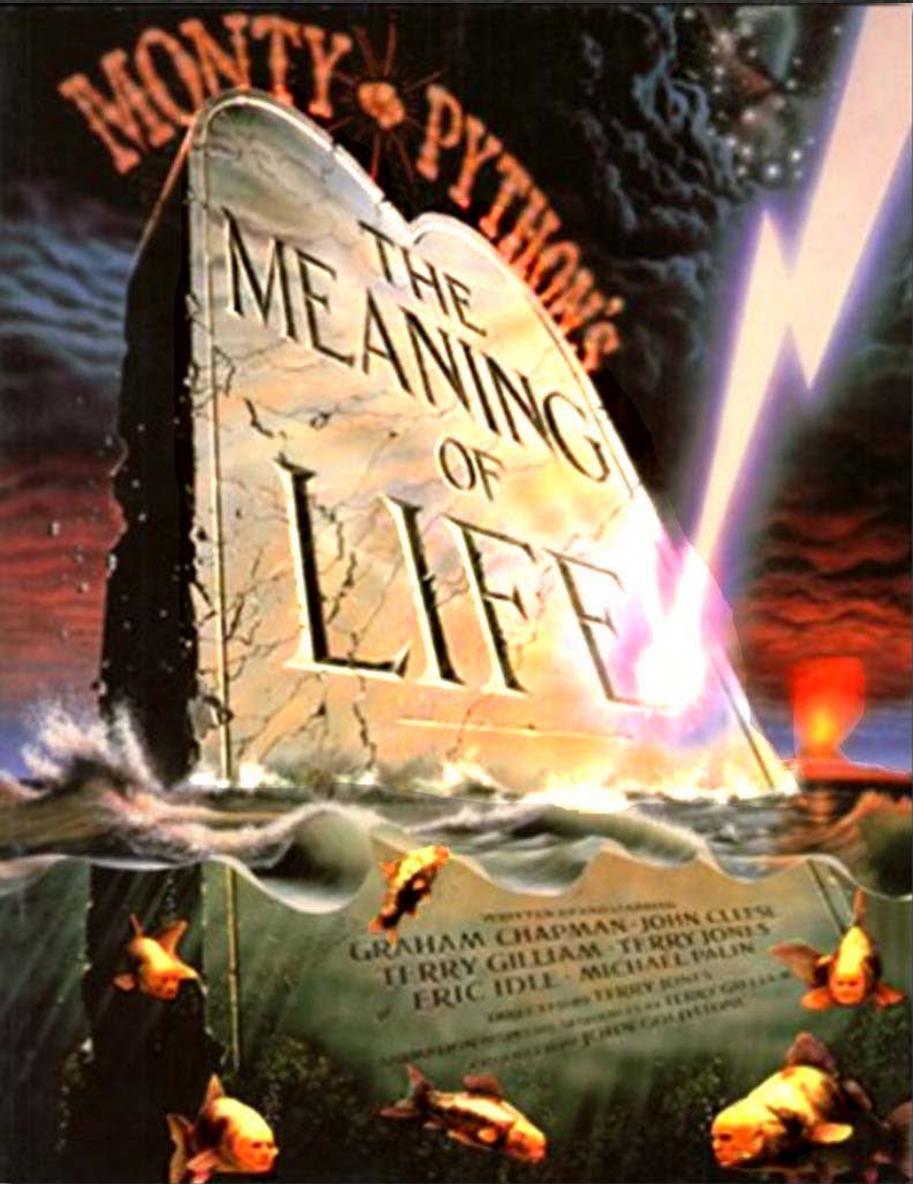
We search for purpose...



We seek for signs and patterns...



Why are we here...?



Why are we (GIS) here?

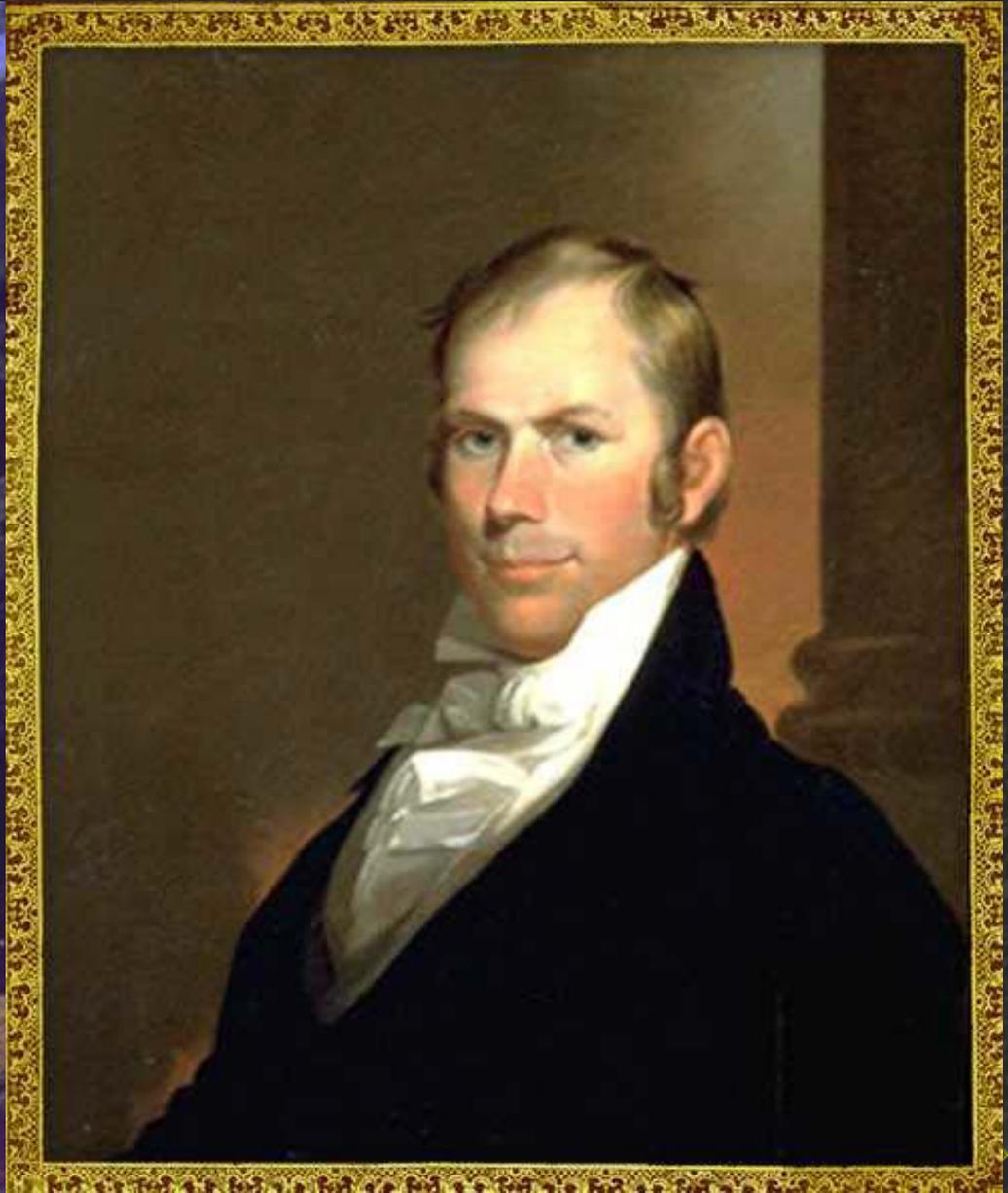
- ▣ *Using spatial technology, we help ...*
provide a safe, efficient, and environmentally sound and fiscally responsible transportation system that delivers economic opportunity and enhances the quality of life in Kentucky.



United We Stand...



GIS embraces both elements...





KYTC's National GIS Integration

- ▣ Feed feds information from variety of GIS-enabled sources.
- ▣ Standards
- ▣ State to State knowledge sharing



How does Transportation fit into the larger state GIS system?



Policy Level

- ▣ Geographic Information Advisory Council (GIAC) Membership
 - Executive Committee
 - Strategic Planning Committee
 - Standards Committee
 - Application Development Committee

- ▣ Kentucky Association of Mapping Professionals (KAMP) members



Policy Level...

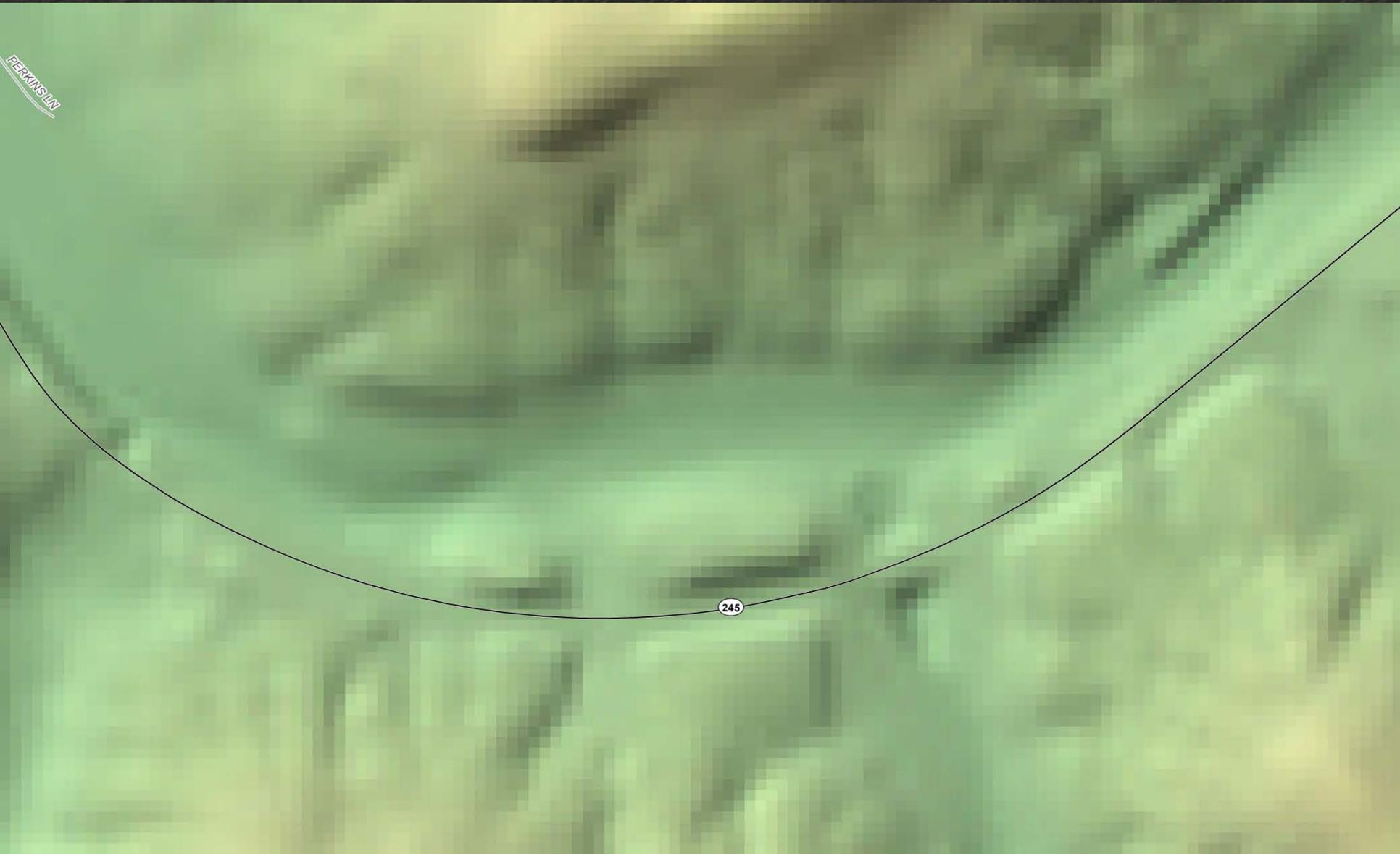
- ▣ Champion of Statewide Lidar and Photography program
 - Helped develop the technical specifications.
 - Will contribute \$\$ to acquisition effort.



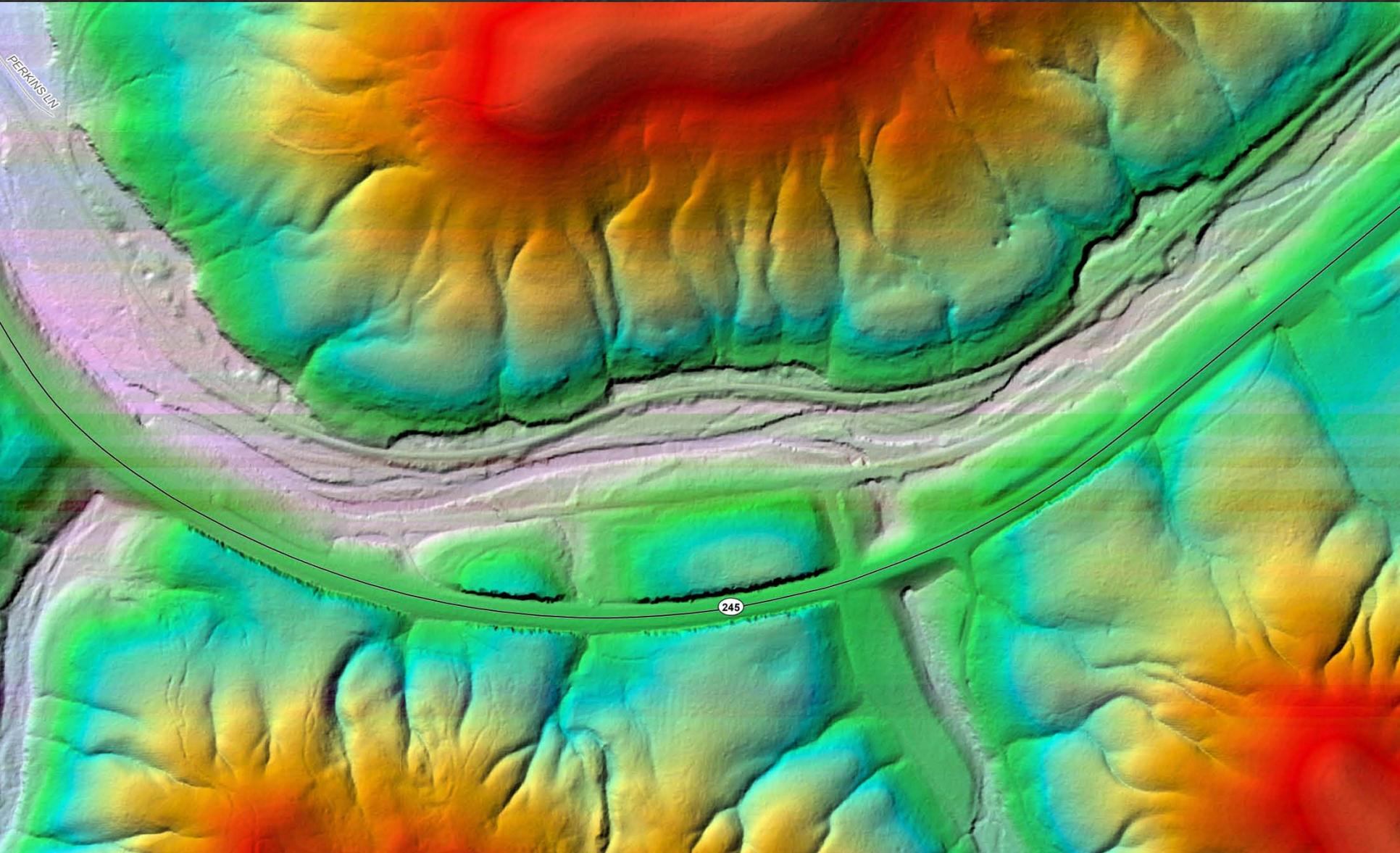
Lidar Example: Bullitt Co KY-245



Lidar Example: Bullitt Co KY-245



Lidar Example: Bullitt Co KY-245



Lidar Benefit...

- ▣ Phase I Design work
- ▣ Hydrologic Detail
 - Stream channels
 - Channel feet – important to DOW Permits
- ▣ Environmental
 - Old roads
 - Archaeological Sites
 - Historic Property Lines (ROW, Parcels...)



Cabinet Benefits for Policy Engagement

- ▣ Control your own destiny...
- ▣ Increase data access for KYTC staff
- ▣ Reduce business process costs
 - Acquiring data
 - Providing information/data to external customers



Business Level...



Contributing to State Enterprise

- ▣ Provide State Base Map Layers
 - Roads
 - Rails
 - (Airport footprints coming)
 - More coming...

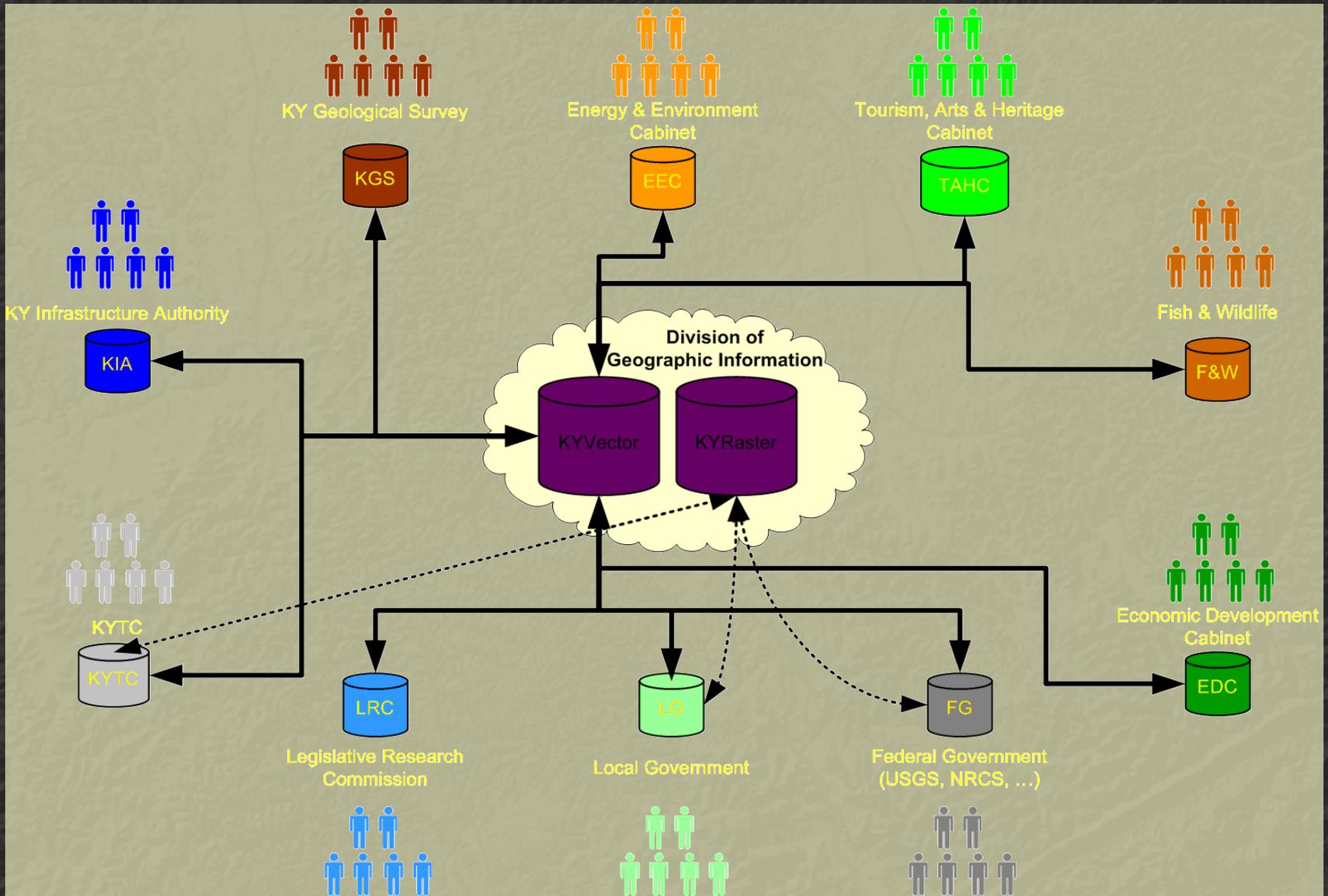


Consumer of State Enterprise Data

- ▣ Consumer of Enterprise data
 - Imagery
 - Boundaries (County, City, Tax Districts, ...)
 - Natural Resources
 - Economic Development
 - ...
- ▣ Benefit
 - Reduce duplication of data/effort
 - Save project time & taxpayers \$\$.



State Gov't Data Sharing...



Cabinet Level

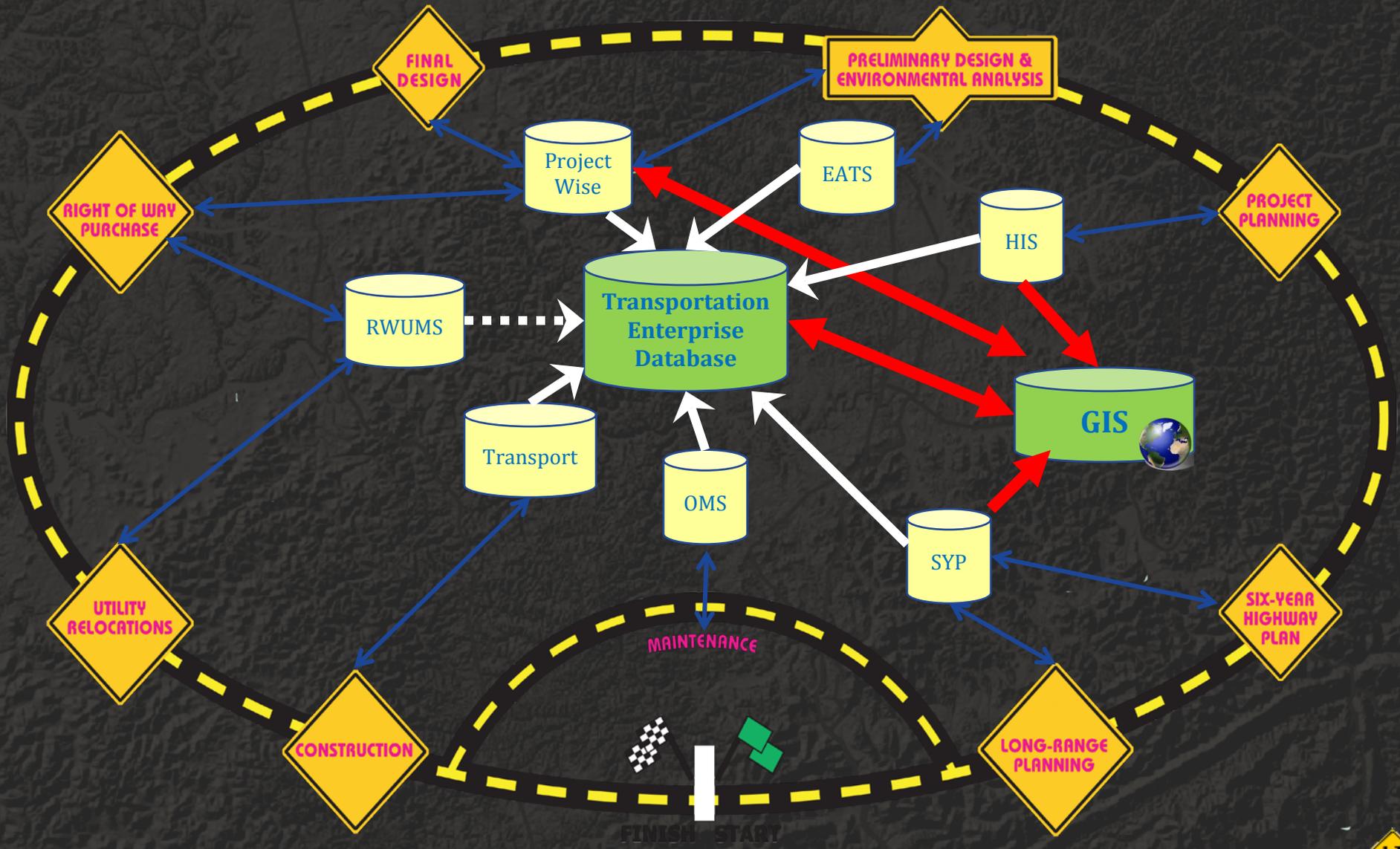
- ▣ GIS ties data to “where” in traditional databases.

- ▣ Being used across the enterprise.

- ▣ External Data Integration
 - Local Gov’t and Regional (ADDs) entities.
 - Private sector (Consultants & railroads).

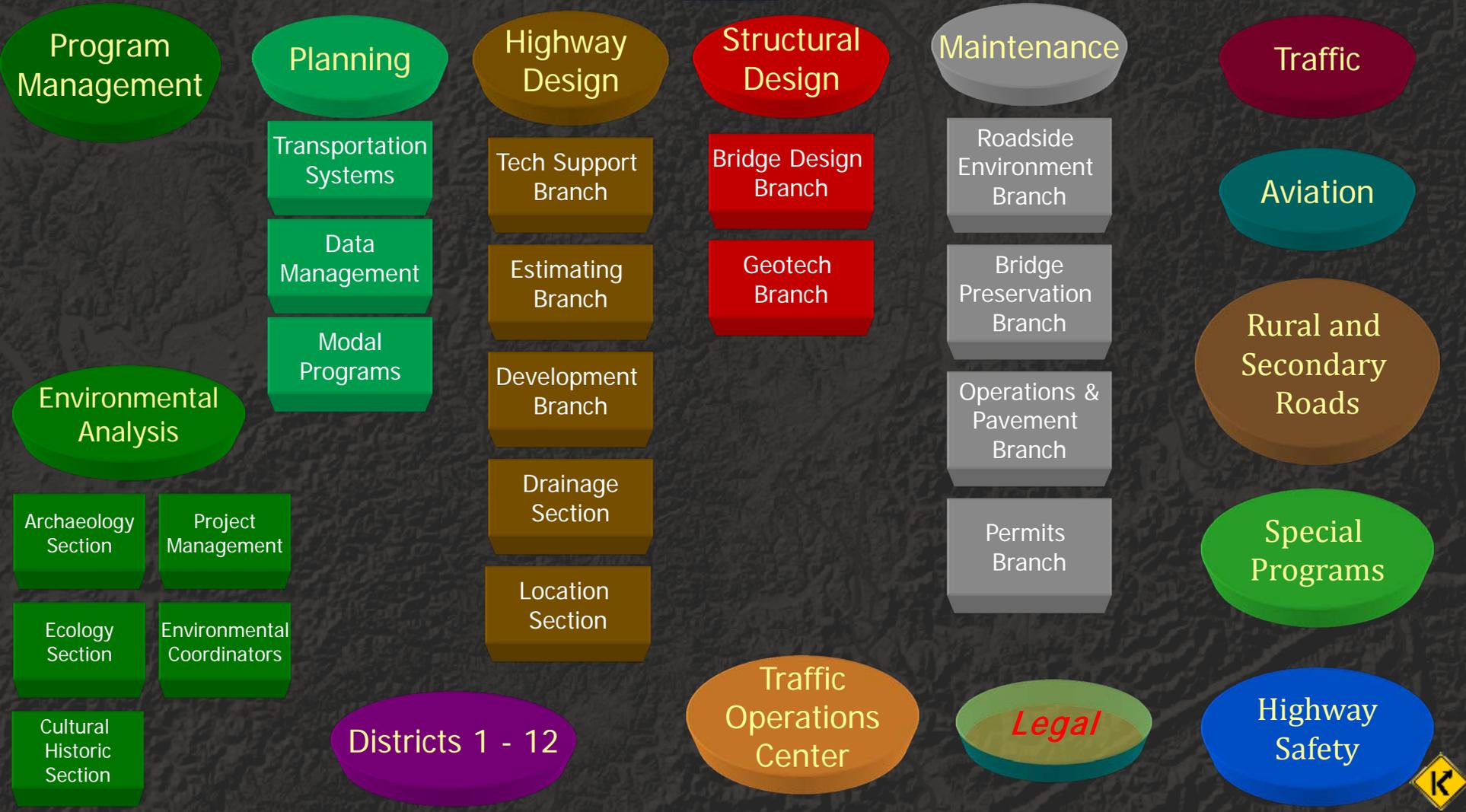


The Cabinet's Business Cycle



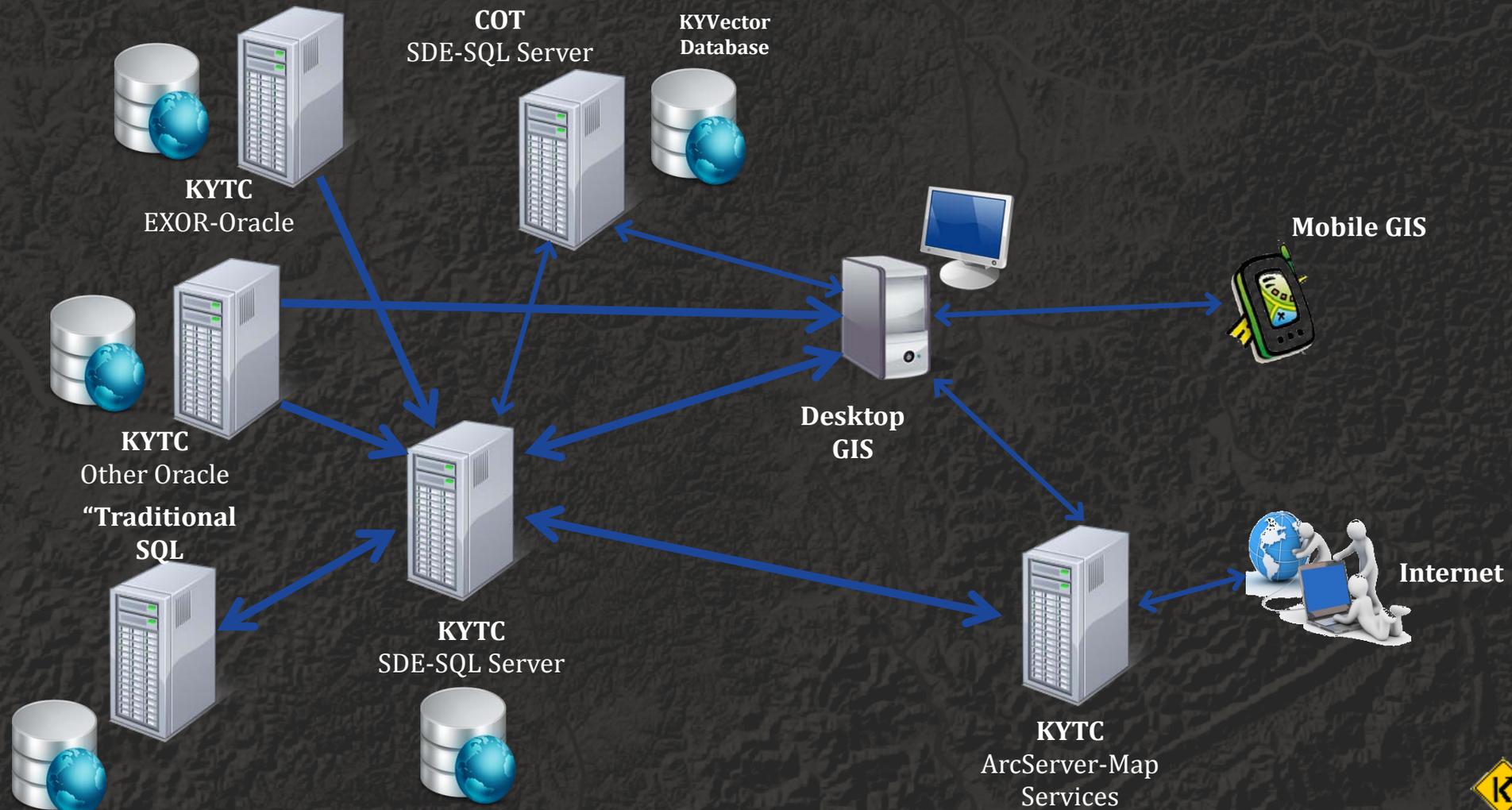
KYTC Agencies Using GIS

State Highway Engineer's Office



KYTC Enterprise Data Integration ...

▣ Tying spatial and non-spatial databases.



What has made us successful?



Culture Change & Adoption

- ▣ Must be “so easy... *anyone* can do it.”



Keys to KYTC GIS Success...

- ▣ Common Operating Picture (COP)
 - Shared data across traditional boundaries...
 - ▣ e.g. Road Milepoints

- ▣ Collaborative – Each area contributes to the larger enterprise.
 - Adjust to help one another.

- ▣ Business focused...



Desktop GIS

- ▣ Custom business focused projects
- ▣ Internal training classes
- ▣ Standard GIS “Templates”
 - Answers 80% of the questions
- ▣ 400+ ArcGIS Desktop Users (10 & 9.2)



Web (“Cloud”) GIS

- ▣ **Intra & Internet**
 - ArcServer 10
 - 3-tier (Development, Test, Production)

- ▣ **Legacy ArcIMS**
 - Migrating to ArcServer

- ▣ **Citrix Desktop GIS for District Personnel**
 - Superior performance for stretched networks/desktops.



Project Examples...



CADD/GIS Integration

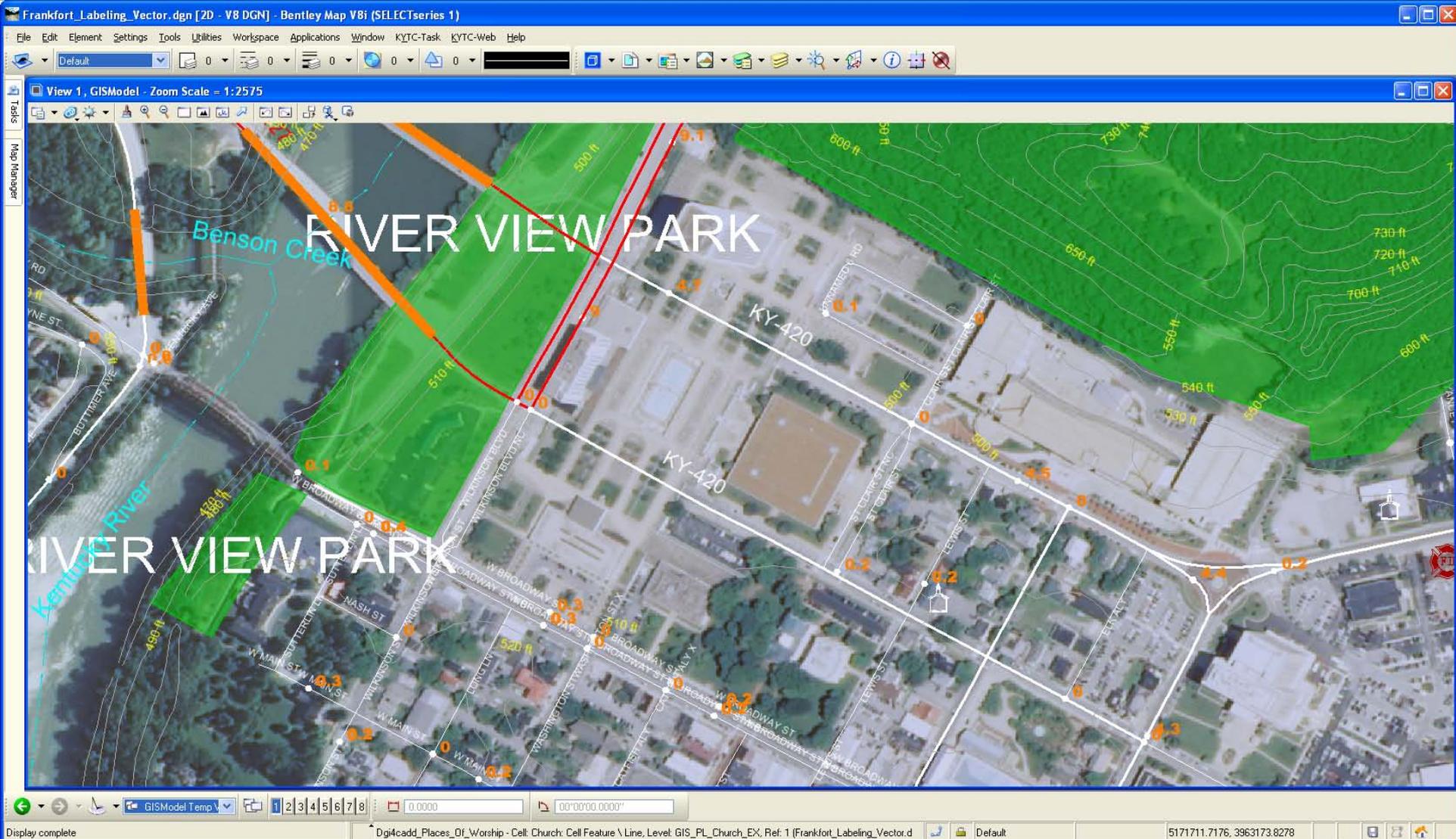
- ▣ CADD directly pulling GIS data into MicroStation.
 - Vector & Raster

- ▣ Future
 - Push CADD data into GIS target features.

- ▣ Challenge: Bentley & ESRI “Coopetition”



GIS Data in MicroStation

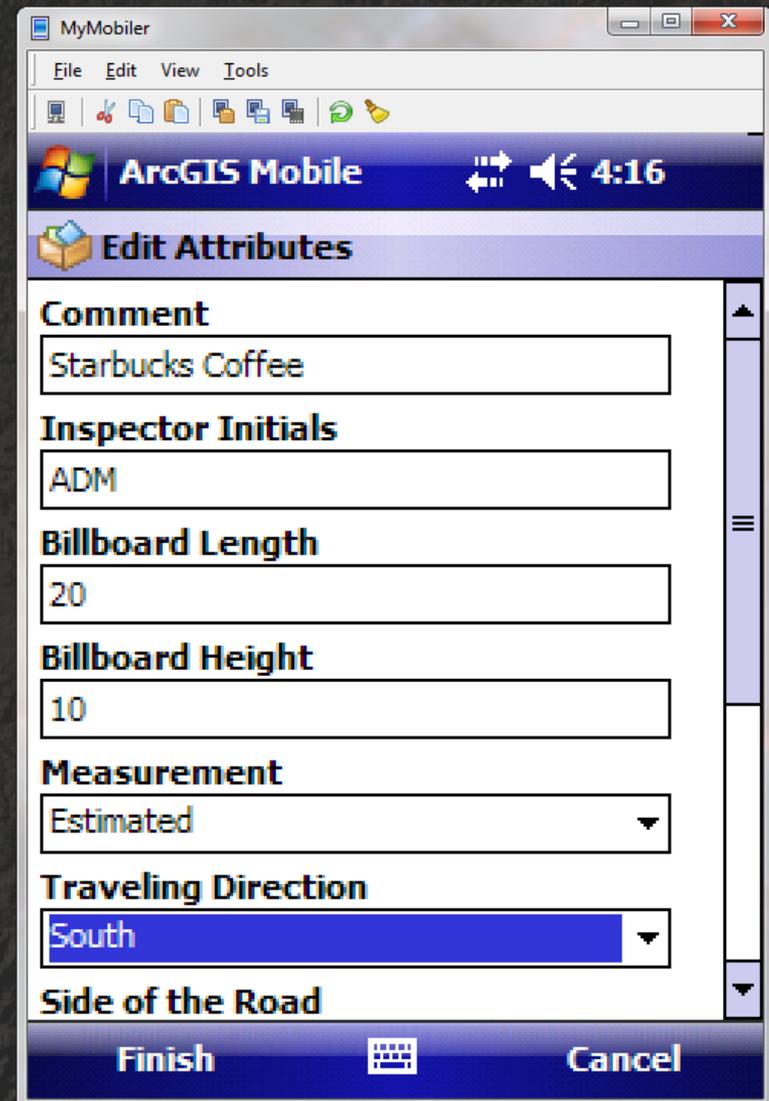
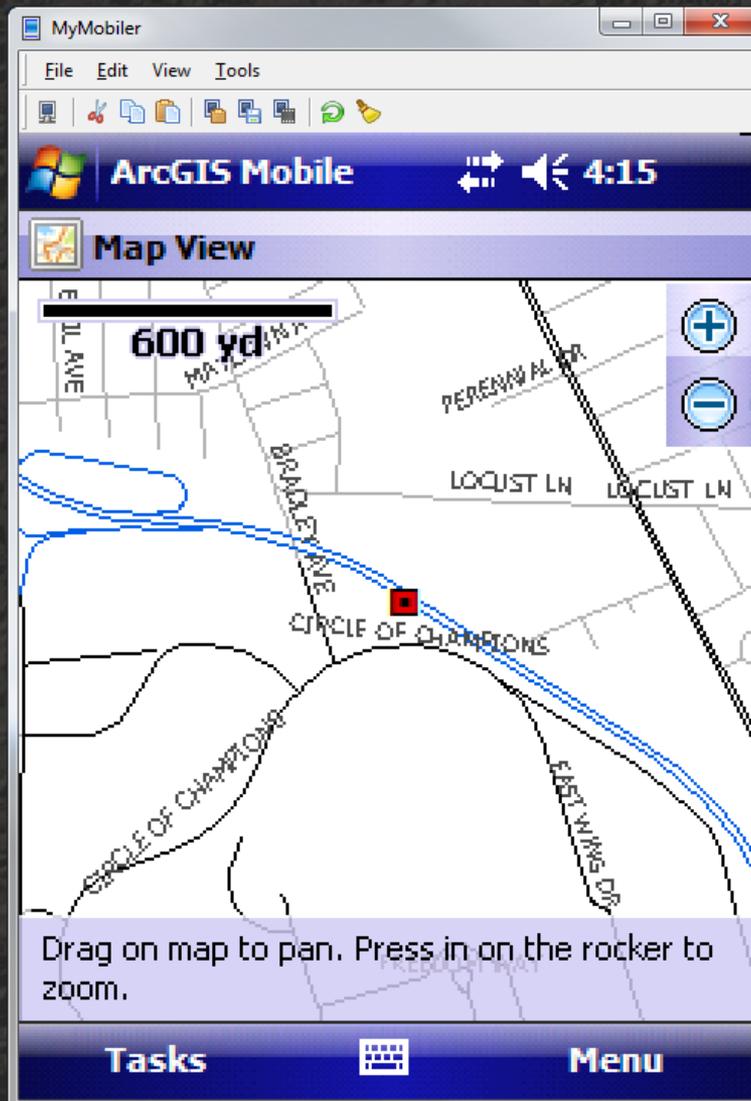


Mobile -- Billboards

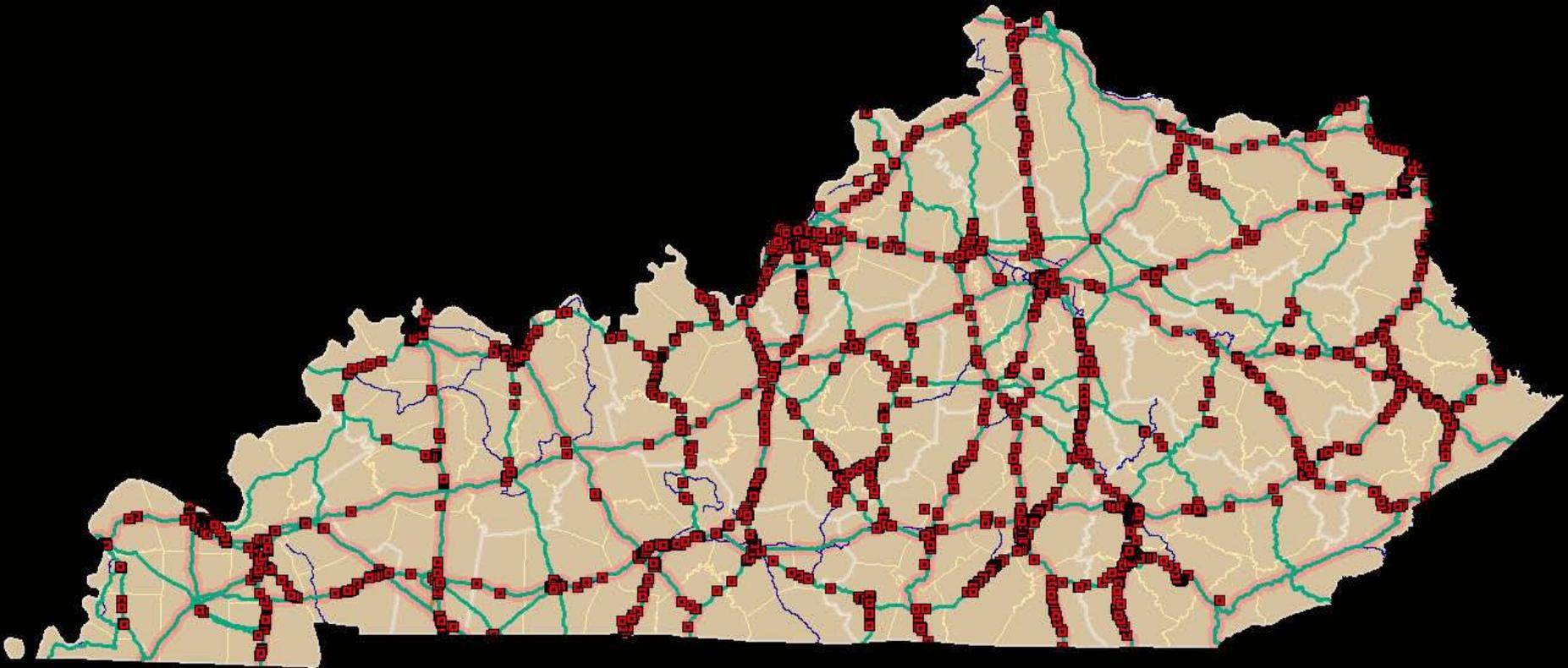
- ▣ FHWA wanted new inventory of Billboards, *ASAP*
- ▣ Timeline: ~ 1 year
- ▣ Staff: ~50 people
- ▣ External contract estimates: >\$200,000



Mobile -- Billboards



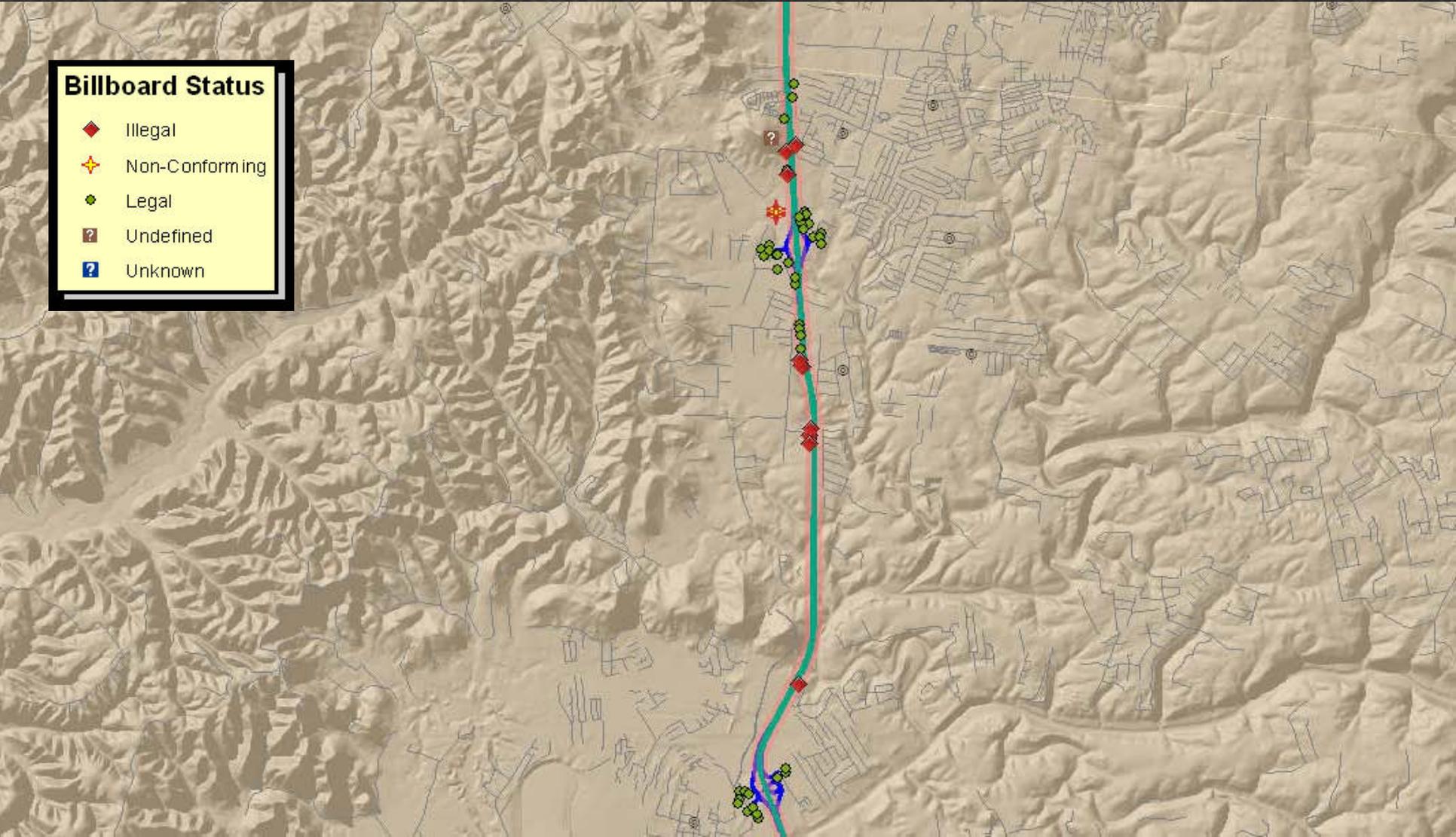
Billboards 3/24/2011



I-65 Bullitt County

Billboard Status

- ◆ Illegal
- ✦ Non-Conforming
- Legal
- Ⓜ Undefined
- Ⓜ Unknown



Evaluating Exit 121

Billboard Status

- ◆ Illegal
- ✦ Non-Conforming
- Legal
- Ⓜ Undefined
- Ⓜ Unknown



Unknown/Undefined Billboard
Inspected by: RBM
on 2/18/2011 10:39:22 AM

122.5 122.6



122.5 122.5

Illegal Choose One
Inspected by: RBM
on 2/18/2011 10:46:47 AM

Illegal Choose One
Inspected by: RBM
on 2/18/2011 10:53:32 AM

122.4 122.4



122.3 122.3

Illegal Choose One
Inspected by: RBM
on 2/18/2011 11:02:29 AM

122.2 122.2



Results

- ▣ Completed in 3 ½ months from deployment.
 - *8 ½ months early.*
- ▣ 3000+ Billboards
- ▣ Cost: \$50,000 + staff time.
- ▣ Maintained *internally.*



GIS in Transportation

A Newsletter from the Federal Highway Administration (FHWA)

www.gis.fhwa.dot.gov

A Look at the Kentucky Transportation Cabinet's (KYTC) Billboard Application

This edition's Q&A is with Andrew McKinney (Mobile GIS Lead), Chris Lambert (Transportation Engineering Tech II), and Will Holmes (Office of Information Technology's GIS Support Services Branch Manager), all of KYTC. They discuss developing a mobile billboard application.

Q. Why was the application developed? A. With reduced staffing and shrinking budgets, KYTC fell behind in reporting outdoor advertising devices to FHWA. FHWA asked KYTC to address this issue. KYTC agreed to inventory an estimated 4,000 devices by December 31, 2011.

KYTC's Division of Maintenance's Permits Branch partnered with the Office of Information Technology's GIS Support Services (OIT-GIS) Branch to create a mobile GIS solution. The resulting billboard application allows novice GIS users to efficiently capture location and feature information and easily integrate data into an enterprise database.

The billboard application uses Trimble Juno handheld devices and ESRI ArcGIS Mobile 9.3. It was developed within 1 month and then deployed to 40 staff in Kentucky's 12 highway districts. Initially, the inventory project was estimated to take 12 months to finish. However, using the mobile application, it was completed in 3 months with 3,432 billboards collected.

Q. How do people use the application? A. Each of Kentucky's highway districts has a District Outdoor Advertising Coordinator (DOAC) who assigns specific

routes to field inspectors. Inspectors use the mobile application to collect all billboards along a route. If a billboard is easily accessible, the inspector captures its exact location.

If it is located off the right-of-way, on private property, or is too difficult to access, inspectors collect an offset location and then add attribute information into a pre-built form.

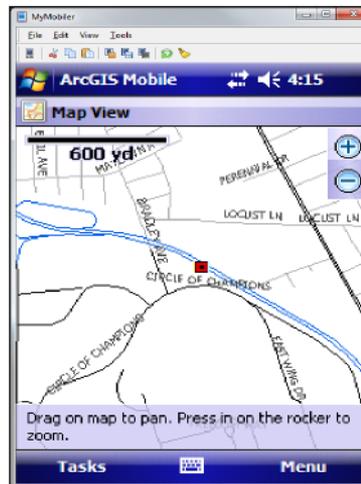


Figure 1. Collected Outdoor Advertising Device Point.

At day's end, the inspector brings the mobile unit to the DOAC, who then uploads data to the database. DOAC and Permits staff later use an ArcMap template to post-process billboard data, correct the offset located billboards, and update permit data. If a permit does not

Spring 2011

2

Upcoming
Events

4

Editorial from
Shawn
Blaesing-
Thompson,
Iowa DOT, and
Fred Judson,
Ohio DOT

5

Other News



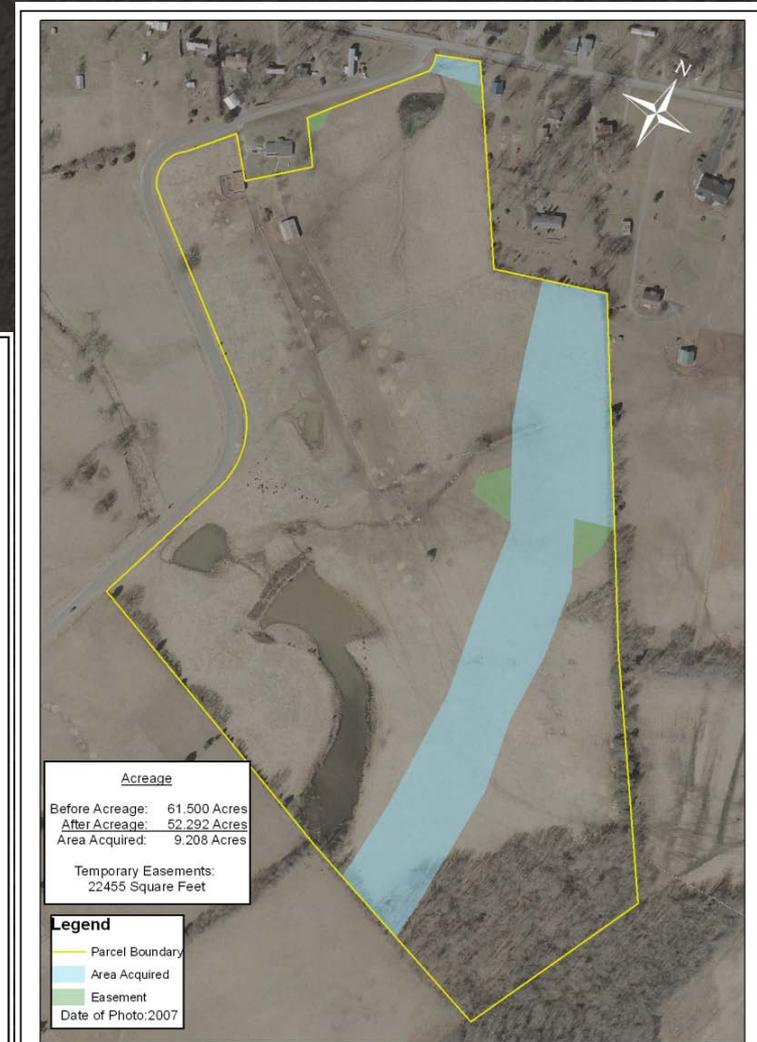
U.S. Department
Of Transportation

Federal Highway
Administration



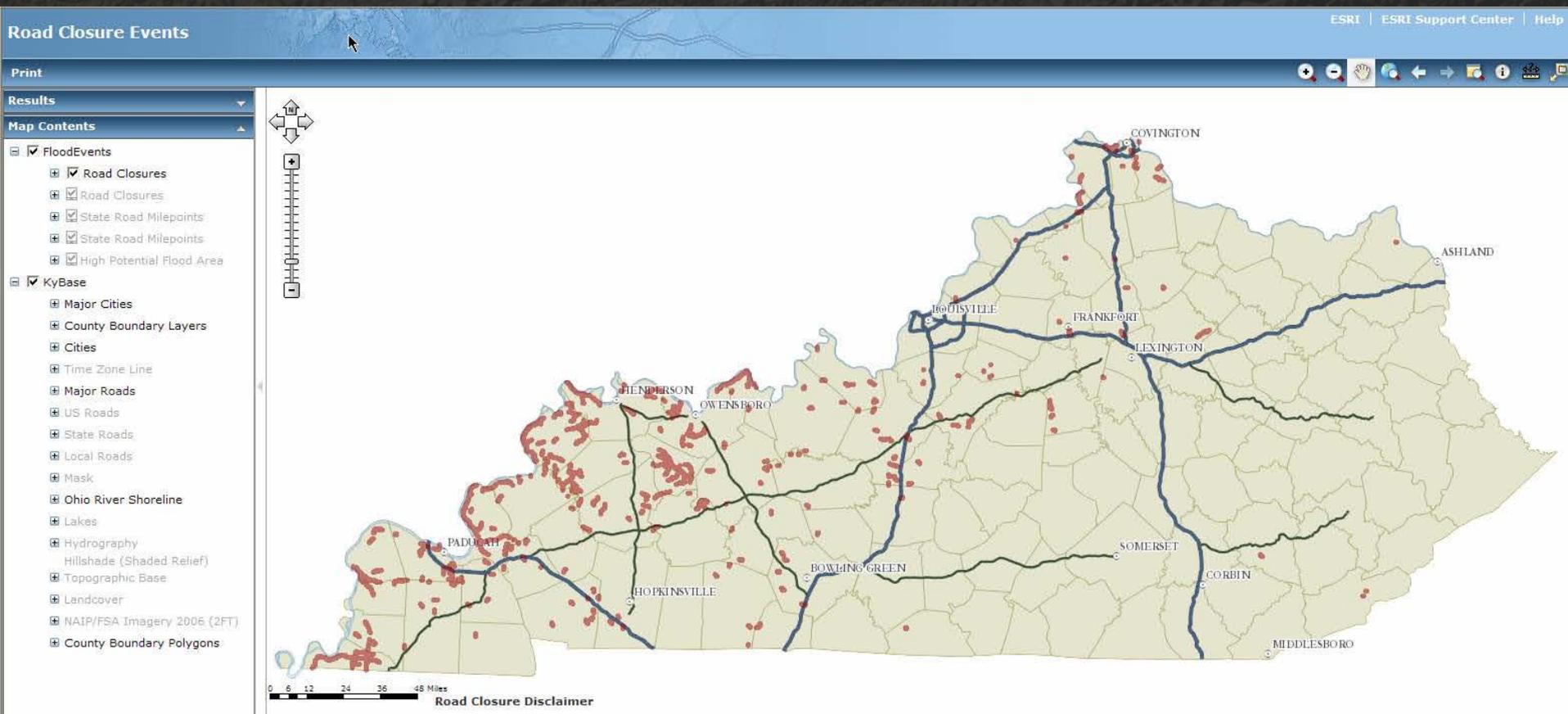
Legal: Presentation Boards

- ▣ Saves Cabinet \$100s per board.



Transportation Op Center Support...

▣ Flooding Emergency this Spring....



TOC Support...

Road Closure Events

ESRI | ESRI Support Center | Help

Print

Results

Map Contents

- FloodEvents
 - Road Closures
 - Road Closures
 - State Road Milepoints
 - ▲ 1 Mile Calculated Interval
 - State Road Milepoints
 - ▲ 1/10th Mile Calculated Int
 - High Potential Flood Area
- KyBase
 - Major Cities
 - County Boundary Layers
 - Cities
 - Time Zone Line
 - Major Roads
 - US Roads
 - State Roads
 - Local Roads
 - Mask
 - Ohio River Shoreline
 - Lakes
 - Hydrography
 - Hillshade (Shaded Relief)
 - Topographic Base
 - Landcover
 - NAIP/FSA Imagery 2006 (2FT)
 - County Boundary Polygons

0 16813362 6724 10056 13448 Feet

Road Closure Disclaimer

Home > Maps

Maps

Copyright information can be found [here](#).

Interactive Maps

Allows users to zoom in or zoom out (respectively meaning to increase or decrease the scale), turn on and off data layers (including both road data and aerial photography), view tabular data, share a link to the map, as well as print.



Active Six-Year Highway Plan
Displays current Six Year Highway Plan



County Rural Aid
Displays locally owned road information for road aid maintenance funding.



Emergency Relief Routes (FEMA)ER
Not for billboard regulation or non FEMA)ER funding purposes



Project Plan Archive (1909-Present)
Archive of scanned KYTC project plans from 1909 to the present.



Rural & Secondary Roads
Displays where rural & secondary road aid money has been applied.



Bike Routes
Official Kentucky bike routes.



Environmental Overview
Used to ensure environmental compliance in road maintenance & construction.



Highway Information Map of Kentucky (HIS)
Kentucky's road network.



Roadway Photo Viewer
Zoomable, searchable, drivable photo log of the Kentucky road system.



KYTC Traffic Counts
Display traffic count locations, most recent AADTs and functionally classified roads

Printable Maps

Downloadable, PDF versions of various road data. Check the different maps for their update frequency.

Contact Info

Kentucky Transportation Cabinet
200 Mero Street
Frankfort, KY 40622
Phone: (502) 564-4890
[Map it](#)

Available Maps

- [Active Highway Plan Maps \(SYP\)](#)
- [Active Six-Year Highway Plan](#)
- [Bike Routes](#)
- [Coal Haul](#)
- [County Rural Aid](#)
- [Emergency Relief Routes \(FEMA\)ER](#)
- [Environmental Overview](#)
- [Ferries](#)
- [FHWA Urbanized Areas](#)
- [Functional Classification Maps](#)
- [General County Maps \(SPRS\)](#)
- [Highway Information Map of Kentucky \(HIS\)](#)
- [Historic Maps](#)
- [KYTC Traffic Counts](#)
- [National Highway System \(NHS\)](#)
- [National Truck Network \(NTN\)](#)
- [Official Highway Map](#)
- [Project Plan Archive \(1909-Present\)](#)
- [Public Riverports](#)
- [Roadway Photo Viewer](#)
- [Rural & Secondary Roads](#)

Photo Log...



KYTC
KENTUCKY TRANSPORTATION CABINET



Kentucky Roadway Photo Log Viewer

Please select your area of interest

Search by:

Route

Select a county: Boone

Road Name

Route Prefix: US

County

Route Number: 0042

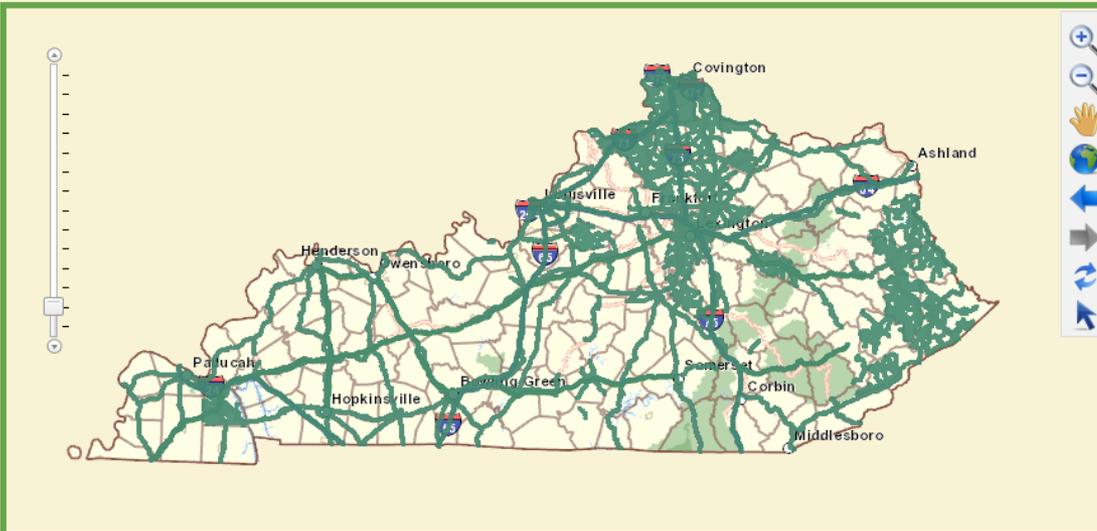
City

From Mile Point: 0.000 To Mile Point: 15.272

Zip Code

Direction: E

Submit



Map Scale: 1:3,500,000

 [Print](#)

 [Link](#)

 [Help](#)



Photo Log...



KYTC
KENTUCKY TRANSPORTATION CABINET



Kentucky Roadway Photo Log Viewer



Increment: Every Image - 26 ft

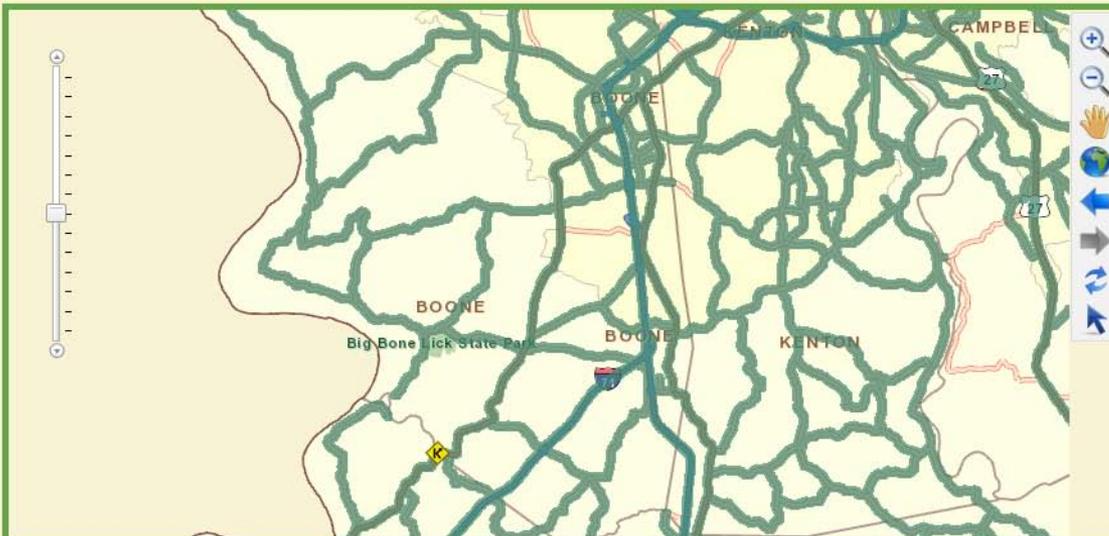


Speed: 0.4s



Continue on to next segment

[Change Route](#)



County:	Boone
Route Type:	US
Route Number:	0042
Direction:	E
RT_Unique:	008-US-0042-000
Mile Point:	0
Collection Date:	10-20-2009

Map Scale: 1:250,000



[Print](#)



[Link](#)



[Help](#)



Training...

- ▣ Integrating information across responsibility boundaries.
 - Builds a COP...

- ▣ Business-focused classes for specific business areas.
 - Environmental Coordinators
 - MRP
 - District

- ▣ KY Transportation GIS Conference
 - November, 2011
 - Free & open to all interested.



Where do we go from here?

- ▣ Fully integrating “spatial awareness” into all elements of Cabinet.
- ▣ Pushing more data to the state enterprise.
- ▣ Expanding Mobile projects ...
 - ArcLogistics...



Where do we go from here...?

- ▣ **Maturing Web GIS**
 - Retire ArcIMS
 - Expand ArcService sites/services
 - “Community sites”

- ▣ **Full integration of GIS with “traditional” applications**
 - Permits, Rail Crossings, Geotechnical...

- ▣ **Expand Web presence for customer service**



A successful tool is one that was
used to do something
undreamt of by its author.

--Stephen C. Johnson



Our Challenge...

To provide a safe, efficient, environmentally sound, and fiscally responsible transportation system that delivers economic opportunity and enhances the quality of life in Kentucky.



Remember Why We Work To Keep Roads Safe...



Will Holmes
Will.Holmes@KY.Gov
KYTC , OIT-GIS

