

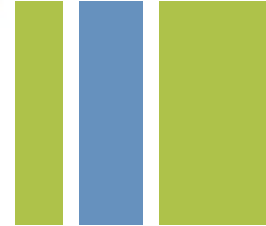
Bridging the Gap/Community Obesity Measures Project (BTG-COMP)



GIS Protocols

UIC Institute for
UNIVERSITY OF ILLINOIS Health Research and Policy
AT CHICAGO SCHOOL OF PUBLIC HEALTH

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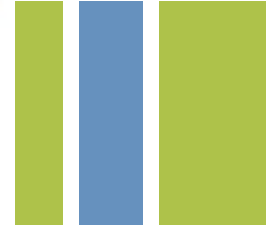
The BTG-COMP Project

- National Scope
 - 160+ different communities annually
 - Local level field research
- Funded by RWJF since 1997 with focus on adolescent alcohol, tobacco, and other drug use outcomes



BTG-COMP: Co-Studies

- NIDA-funded, Monitoring the Future (MTF)
 - Annual, nationally representative, school based survey of approx. 50,000 US students
 - Students surveyed in approx 420 secondary schools in US
 - Information collected on height, weight, dietary practices, physical activity, sedentary behaviors, and other obesity-related issues
- YES School Administrator Survey
 - Focus on soft drink contracts/availability, physical education, sports participation, physical fitness testing, measuring BMI



BTG-COMP Project Scope

- 2008-9: Methodological studies and pilots
- Data collection 2010-2012 (April – August)
- Assess:
 - Community food environment
 - Physical activity opportunities
 - Local policies
 - Other community factors potentially relevant to youth:
 - Healthy eating
 - Physical activity
 - Obesity
 - Also tobacco placement, pricing, and marketing



BTG-COMP Project Design

- Local Study Area: School enrollment zones
 - Based on teleconference focus groups with teens of various:
 - Urbanicity
 - Gender
 - Family SES
 - Pre/Post drivers age
 - Findings:
 - Teen travel primarily w/in 10-15 min walk/drive of home/school route
 - Low cost fast food encourages teen consumption
 - Perceived cost of organized sports reduces organized physical activity
- Policy data collection extended to county/municipality where students reside



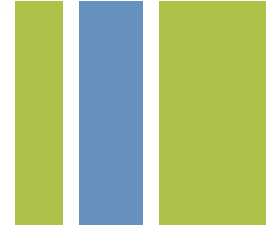
BTG-COMP Study Area: School Enrollment Zones

- Single School Districts
 - 44% of Study Areas
 - School District and Enrollment Boundary the Same:
 - Common in rural areas
 - Available at Census.gov
- MTF Privacy Requirement Prohibits BTG-COMP's Direct Contact with Local Schools/Districts
 - 162 Study Areas in 2010
 - Internet search for enrollment maps
 - Poor quality
 - Some not visual (block lists)
 - Not georeferenced



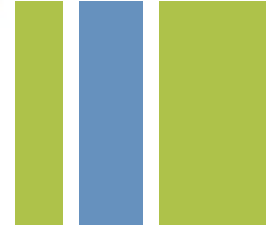
BTG-COMP Project Design

- Observational Data: Food Related
 - Food Stores:
 - Supermarkets
 - Grocery stores
 - Convenience stores
 - Gas Stations
 - Drug stores
 - Wholesale clubs
 - Target/Wal-Mart/Kmart
 - Fast Food Restaurants/Coffee Shops



BTG-COMP Project Design

- Observational Data: Physical Activity Related
 - Physical Activity Locations:
 - Fitness centers: YMCA, Boys & Girls Clubs, JCCs
 - Commercial fitness: LA Fitness, Lifetime, Gold's, Bally's, etc
 - Community recreation centers
 - Instructional schools: Karate, Dance, etc
 - Parks
 - Size
 - Amenities
 - Programming



BTG-COMP Project Design

- Observational Data: Infrastructure
 - Instrument Based on Previous Studies
 - Twin Cities Environment and Physical Activity GIS Protocols: June 2007
 - The development and testing of an audit for the pedestrian environment, Kelly Clifton, et al, Landscape and Urban Planning, March 2007
 - Rebecca Lee
 - Street Segments:
 - Lanes, traffic speed, intersection analysis
 - Bike lane availability
 - Sidewalk condition, proximity to street, walkability
 - Litter, physical disorder, safety
 - Adjacent land use
 - Public Transit



BTG-COMP Project Design

- Observational Data: Infrastructure

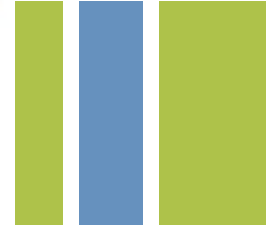




BTG-COMP Project Design

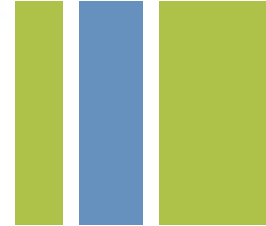
- Observational Data: Infrastructure





BTG-COMP Piloting (2008)

- Goals:
 - Instrument Testing
 - Data & Sample Testing
 - Operational Logistic Testing
- 3 Chicago Area Communities
 - Urban (urban grid)
 - Suburban (curvilinear street network)
 - Rural (single school district)
- Conclusions:
 - Businesses data not represented accurately
 - Street data not set up properly
 - Source of park data incomplete



BTG-COMP Method Studies & Pilots (2009)

- Validation Study
- Street Segment Reliability Study
- Food Marketing Study
- PA Setting Reliability Study
- Street Segment Census
- Park Grid Pilot
- Fast Food Reliability Study



BTG-COMP Validation Study (2009)

- Goal:
 - Establish Completeness:
 - Missing businesses that do exist in real world
 - Additional businesses that are not in real world
 - Establish Accuracy
 - Business classification type
 - Location
- Sources:
 - Dunn & Bradstreet
 - InfoUSA



BTG-COMP Validation Study

- Study Area:
 - Census Tract Level (425 tracts, 51,000 miles of street)
 - Chicago MSA
 - Tracts within 50 miles of Chicago MSA
 - Excluded: Other MSAs w/in the 50 mile buffer
- Categories:
 - Race: NHW, NHB, Hispanic
 - HH Income
 - Urban, Suburban, Rural



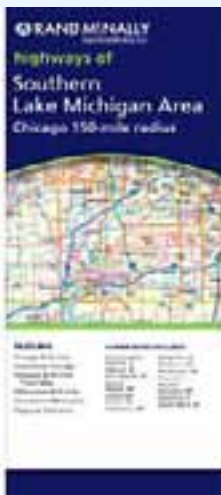
BTG-COMP Validation Study

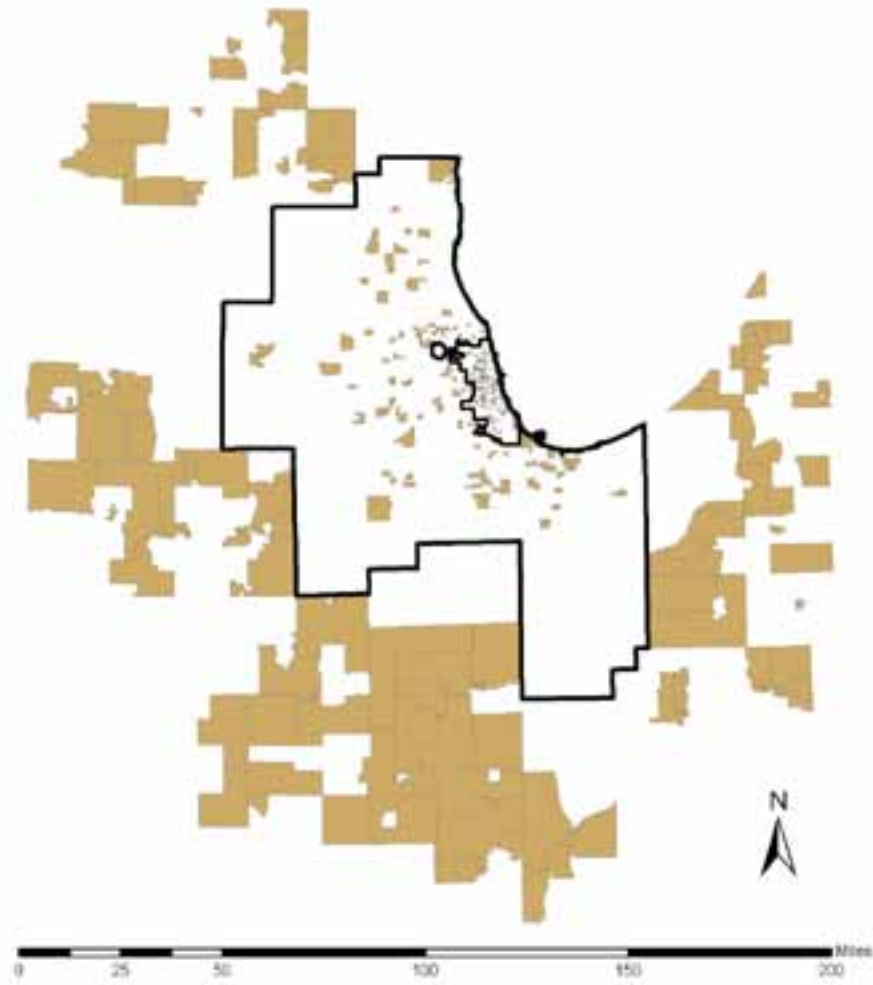
- Routing & Dispatching Logistics:
 - Teams of 2 persons dispatched to:
 - Tracts near their homes
 - To language specific areas
 - Tracts do not identify community
 - City/Zip identified through street centerline file during map production
 - Field staff used Google Maps, Mapquest to create daily tract itinerary



BTG-COMP Validation Study

- Equipment:
 - Tract map & data collection forms
 - Rand McNally S. Lake Michigan & Chicagoland maps
 - Silva Compass
 - Garmin Oregon 400t GPS





Census Tract 18017951300 (Logansport, IN 46947)



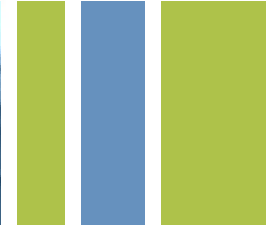
Census Tract 18017951300 (Logansport, IN 46947)





BTG-COMP Validation Study

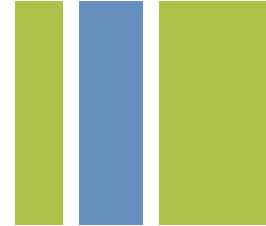
- Field Work Duties:
 - Drive each street in tract
 - Complete observation form for each:
 - Food business
 - Fitness business
 - Parks: Mark location on map and complete form
- Field Teams Blinded to Datasets
- Analysis:
 - Compare observed to each dataset to determine most accurate data to use for full field work sampling
 - Determine sampling methodology in low income/minority communities



BTG-COMP Validation Study

- Business Findings:
 - Ability to use Lat/Long limited
 - Many businesses located at zip code/zip+4 centroid
 - Geocoding using ArcGIS Services Online improved matching
 - Offset more accurate
 - Ability to match to US building rooftop
- Park Matching:
 - Many matching sources





BTG-COMP Validation Study: Parks

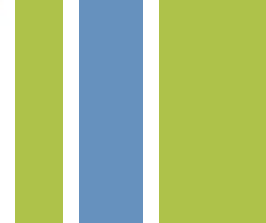
- Observed Parks Matched to Existing Park GIS Data
- Sources:
 - ESRI Parks
 - ESRI Parks dtl
 - TeleAtlas Park Poly
 - NAVTEQ Park Poly
 - NAVTEQ POI
 - USGS POI





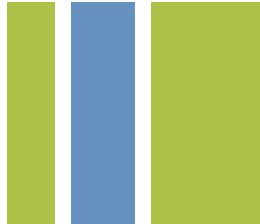
BTG-COMP Street Segment Reliability Study

- Goal:
 - Decide to conduct by:
 - Walking
 - Driving
 - Test inter-rater & inter-team reliability:
 - How different are segments rated between individuals
 - How different are segments rated between teams
- Data Sources
 - NAVTEQ Discover America Streets
 - TeleAtlas StreetMap basic
 - Tiger
- Locations: Same as 2008 Pilot



BTG-COMP Street Segment Reliability Study

- Conclusions:
 - Walk or Drive: Either is OK w/o sacrificing quality
 - Driving Takes 10% Less Time in Urban/Suburban and 20% less in Rural Areas
 - Field Staff Prefer Walking in Urban/Suburban Areas
 - Field Staff Prefer Driving in Rural Areas
- Second Reliability Study Winter 2010 with Instrument Revisions to Correct Issues with Certain Items

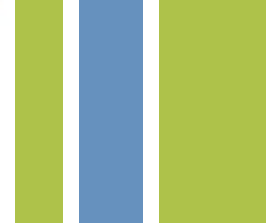


Grant Park





Name	Type	Totalct	5/20 Ratio	Seg Ratio	SumMiles	Mile Ratio	MeanMiles/Segment
Riverside Raw TeleAtlas		937		4.71		4.67	
	Art	164	32.8		10.79		0.07
	Res	773	38.65		50.38		0.07
Riverside NavTeq by Intersection		657		5.84		4.17	
	Art	96	4.8		11.20		0.12
	Res	561	112.2		46.73		0.08
Pilsen Raw TeleAtlas		832		2.14		2.82	
	Art	265	53		12.41		0.05
	Res	567	28.35		34.96		0.06
Pilsen NavTeq by Intersection		544		2.70		3.07	
	Art	147	7.35		11.23		0.08
	Res	397	19.85		34.51		0.09
Grant Park Raw TeleAtlas		622		5.48		6.42	
	Art	96	19.2		20.74		0.22
	Res	526	26.3		133.07		0.25
Grant Park NavTeq by Intersection		285		3.45		1.98	
	Art	64	12.8		48.82		0.76
	Res	221	11.05		96.85		0.44
Grant Park NavTeq by 1/4 Mile		663		2.35		1.98	
	Art	198	39.6		48.82		0.25
	Res	465	23.25		96.85		0.21



BTG-COMP Full Field Work (Halftime Report)

- 480+ Map .mxd documents
- 186,888 Street Segments, 5124 Sampled
- 63,154 Geocoded Businesses
- 232 airline tickets

- 4 Car Accidents
- 1 Stolen Sample Packet
- 1 Packet Left on Airplane



Equipment

- GPS:
 - Standard issue: 1 Garmin Nuvi 260w
 - Rural Assignments: 1 Garmin Oregon 400t GPS
- Maps:
 - 1 Overview
 - 1 Sample Map
 - 0-4 Sector Maps (Zoomed to show detail)



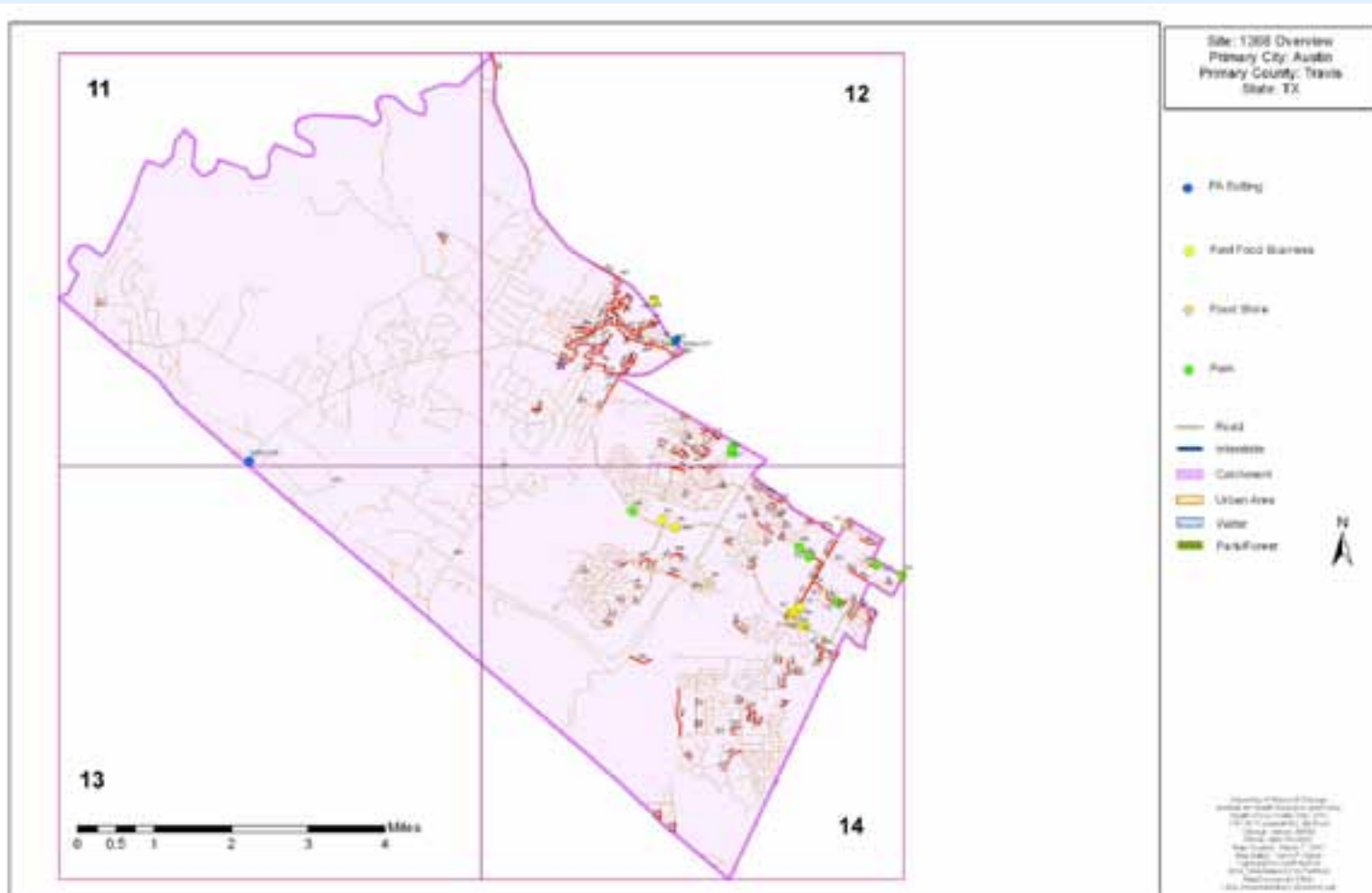
Maps

- Overview Map Shows:
 - Interstates, water, large parks, city, county, state limits



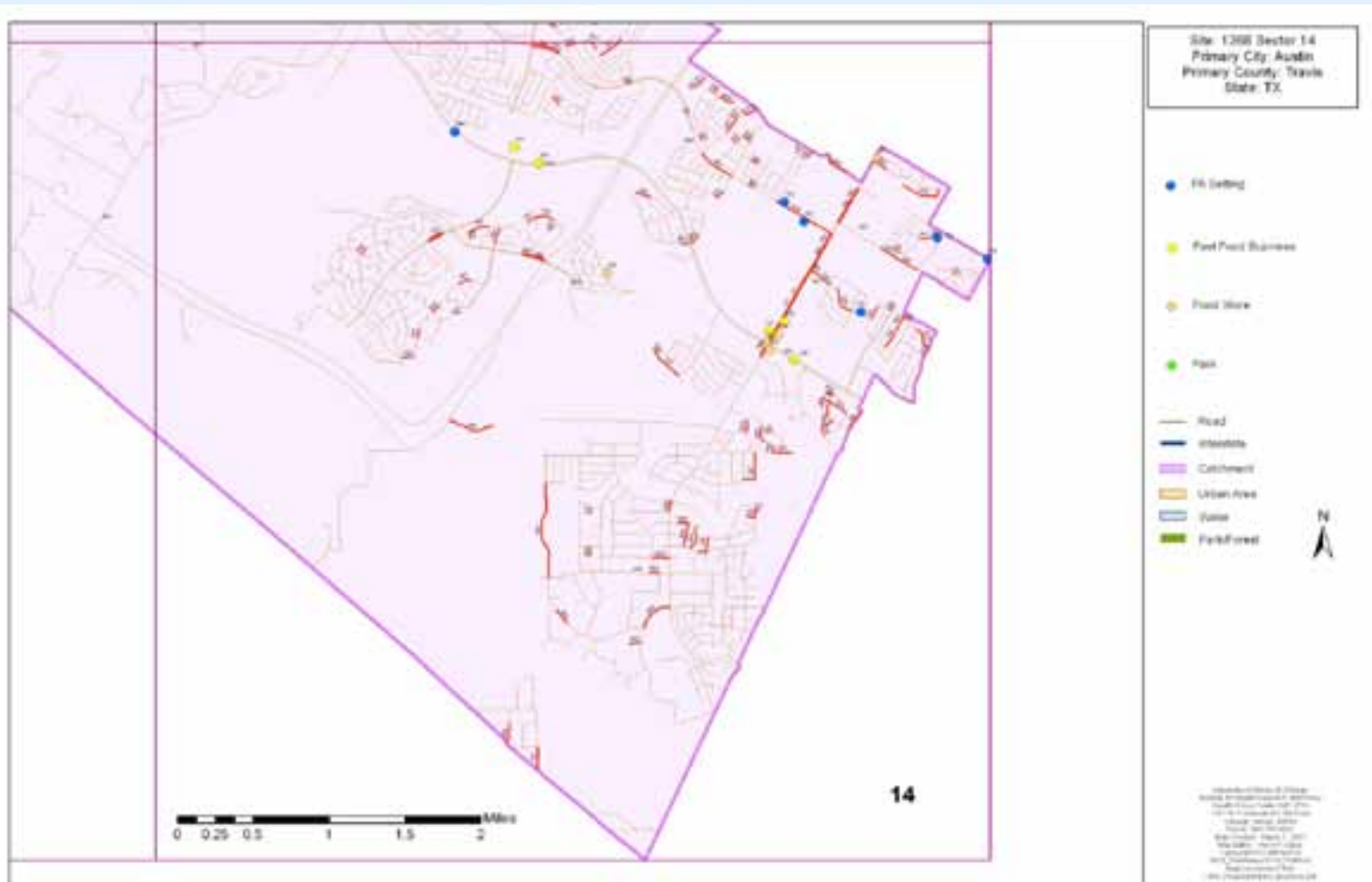
Maps

- Sample Map Shows:
 - Businesses and Parks you need to visit



Maps

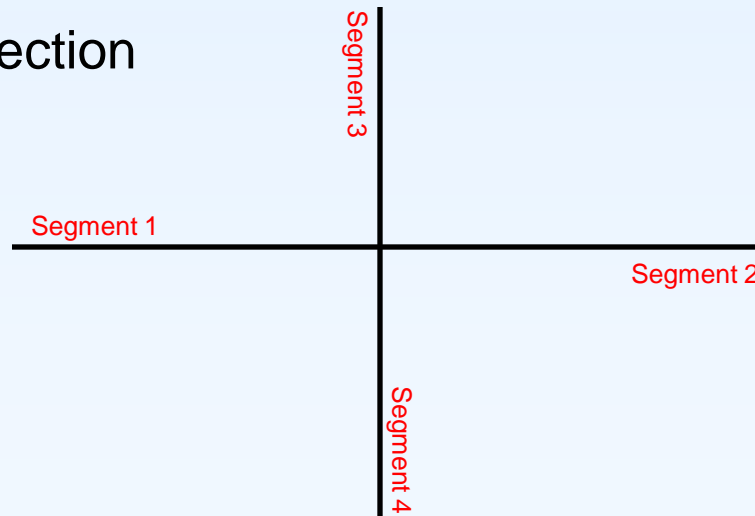
- Sector Map Shows:
 - Zoomed in to 1 of 4 areas with multiple observations



What is a segment

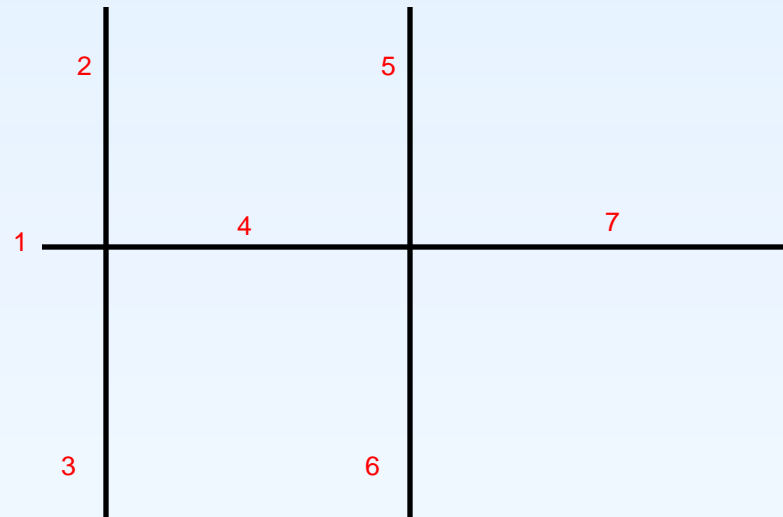
- Length of street from one intersection to the next and the features of that street on either side and at either end

4 Way Intersection



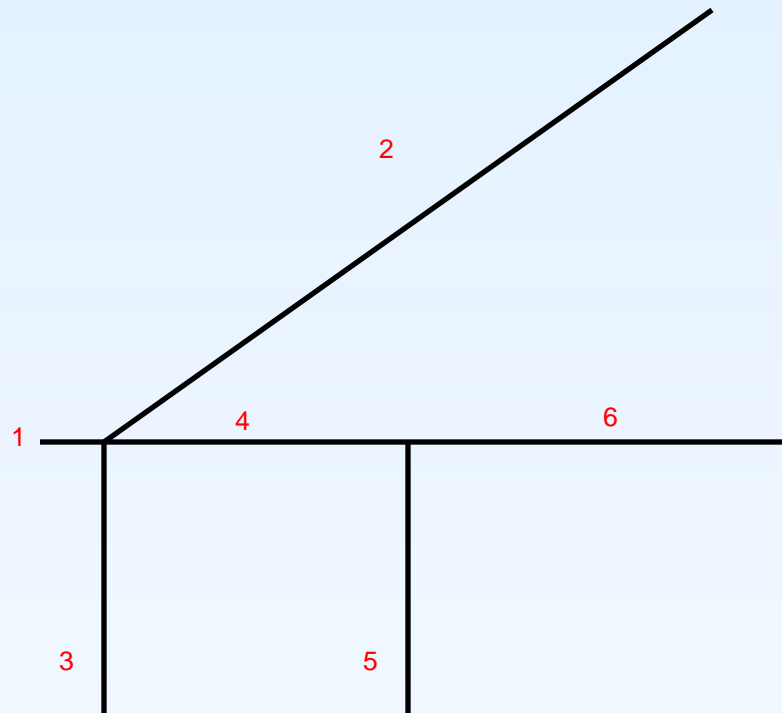
What is a segment

Multiple 4 Way Intersections



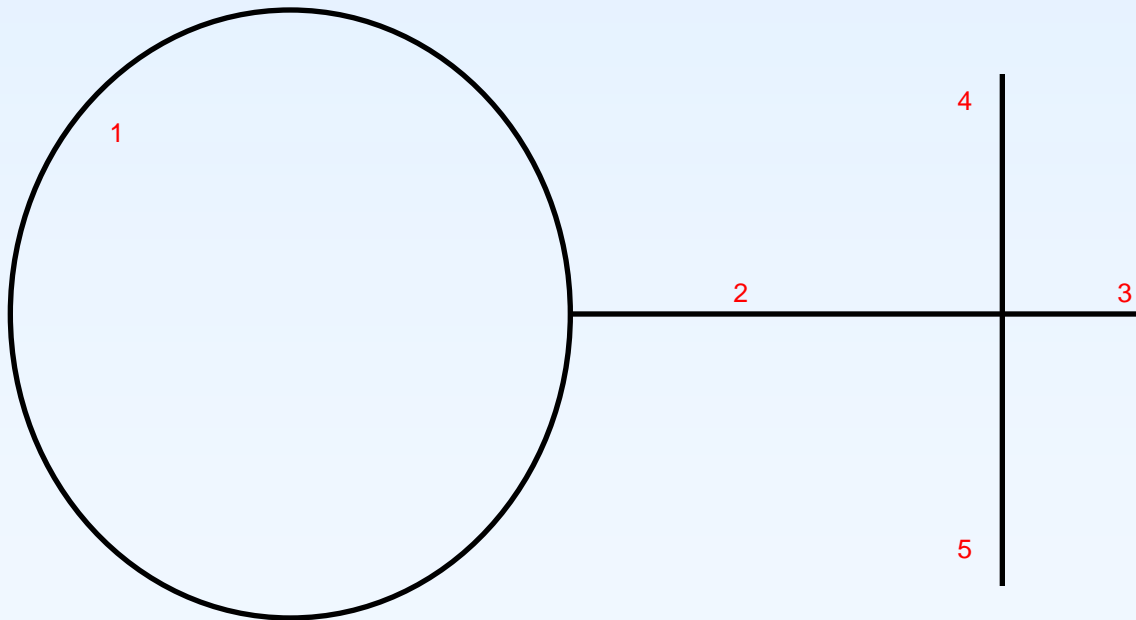
What is a segment

Radial Street Intersection



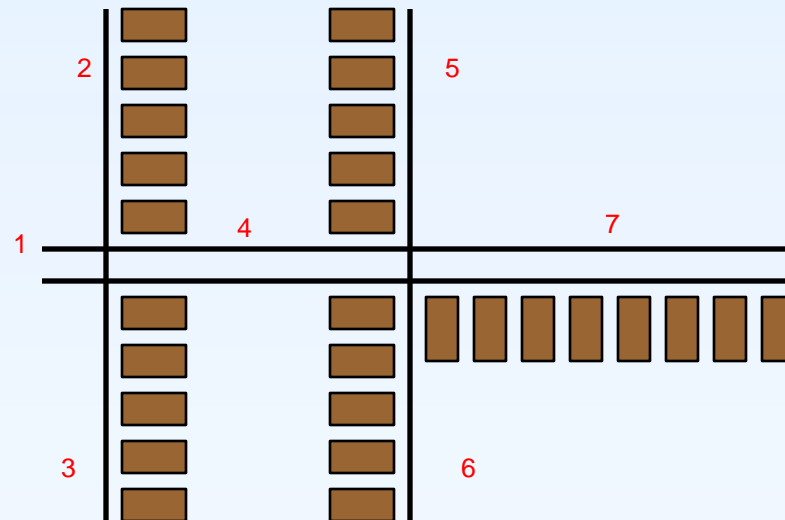
What is a segment

Cul-de-sac



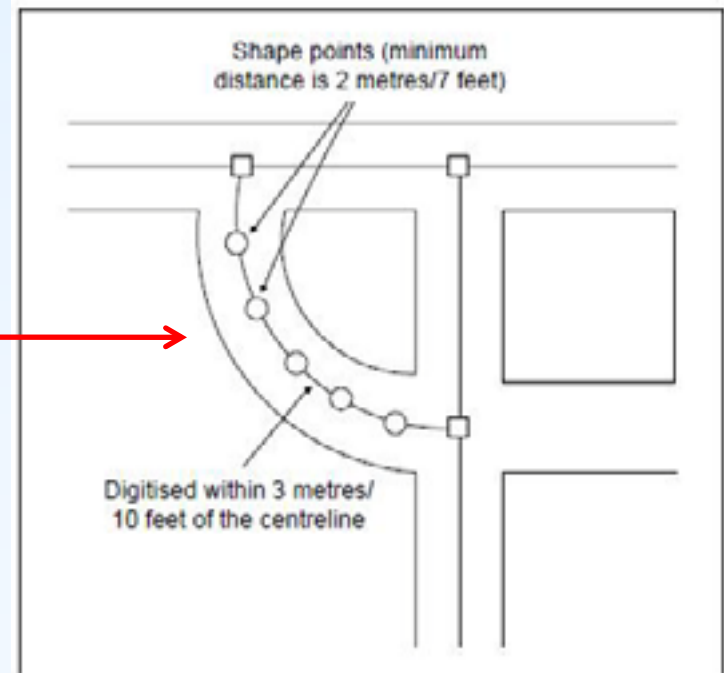
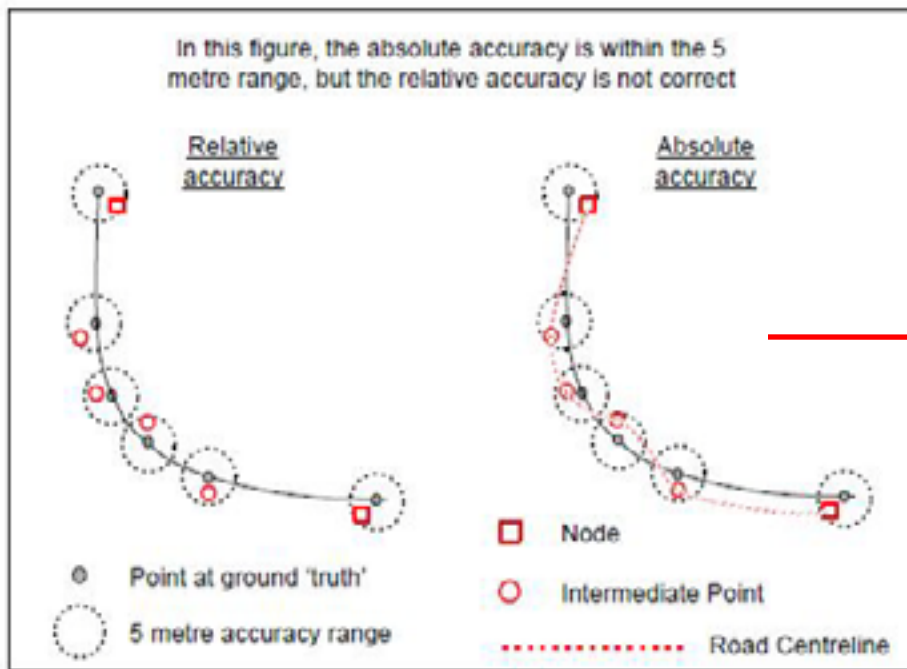
What is a segment

Divided Highway



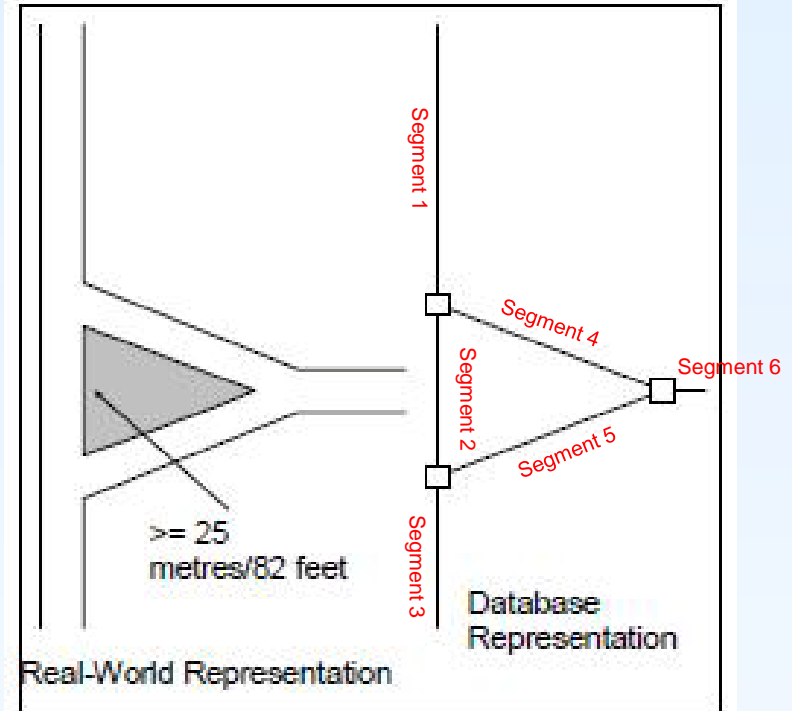
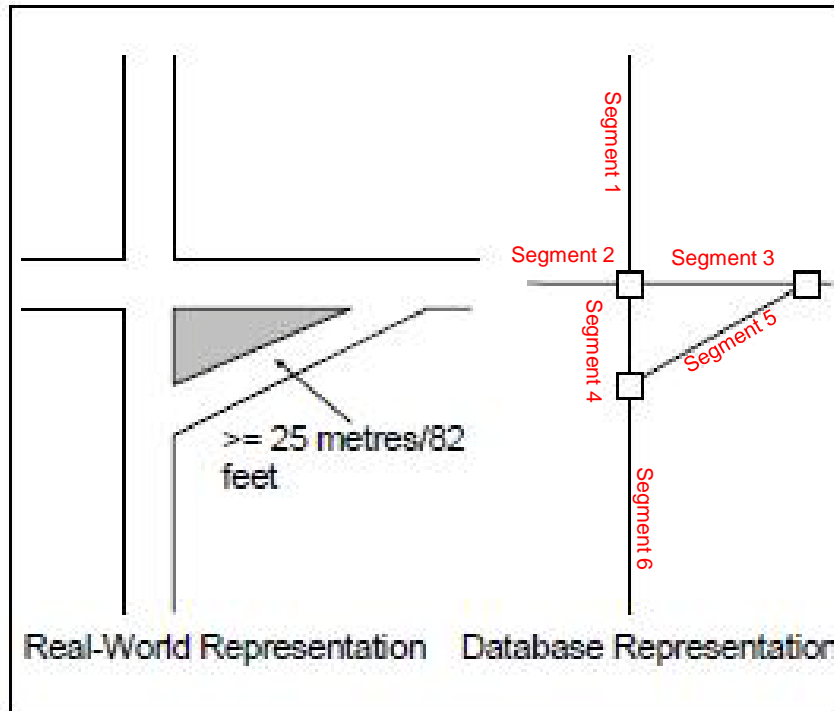
How it's done

- GPS captures locations while ground truth team drives route
- Dots are connected in a GIS later
- GPS accuracy, lane obstructions, etc affect eventual representation
- Accurate to 10 feet from mean centerline



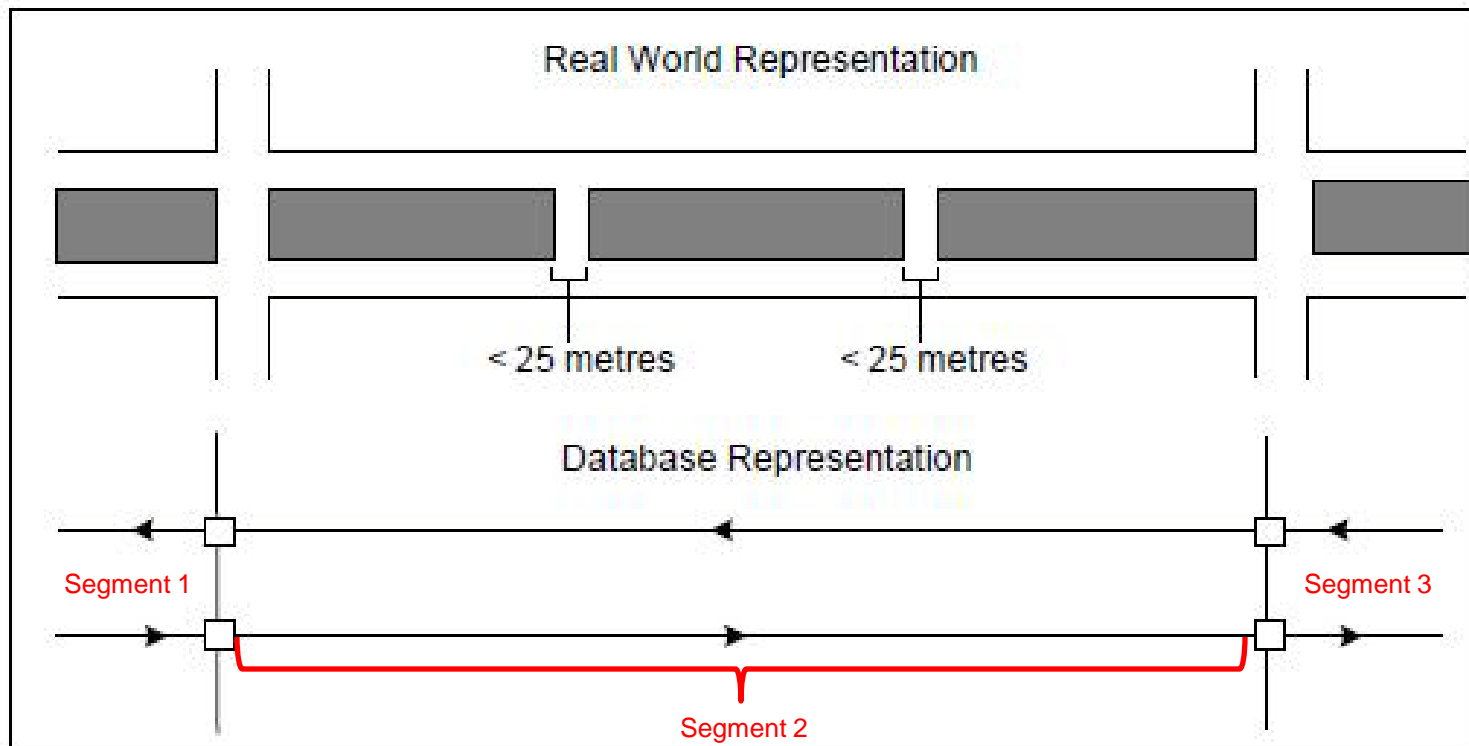
Complex feature representation

- Radial streets & triangle features



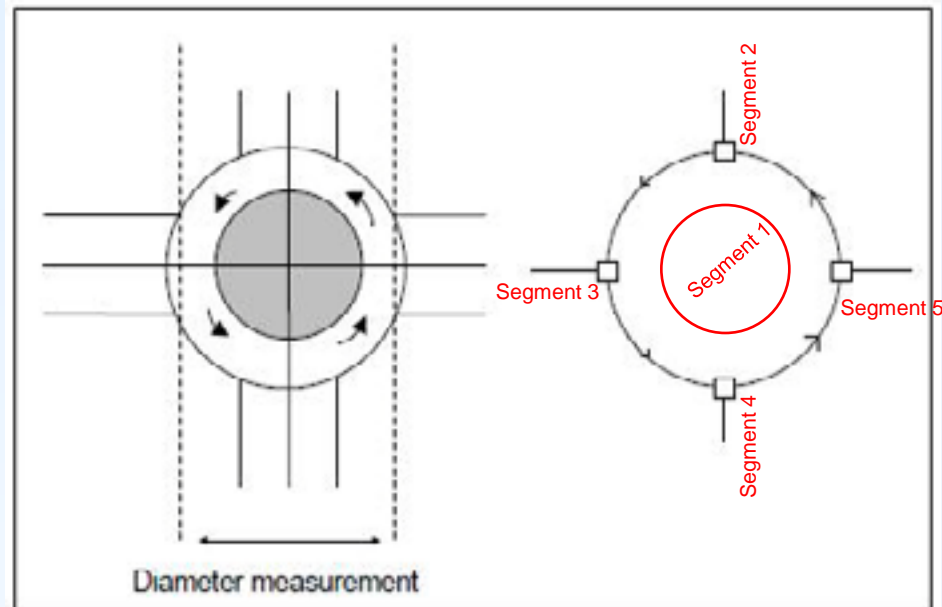
Complex feature representation

- Medians
 - Wider than 10ft
 - Longer than 131 ft
 - Breaks in median < 82 ft (25m) represented as below

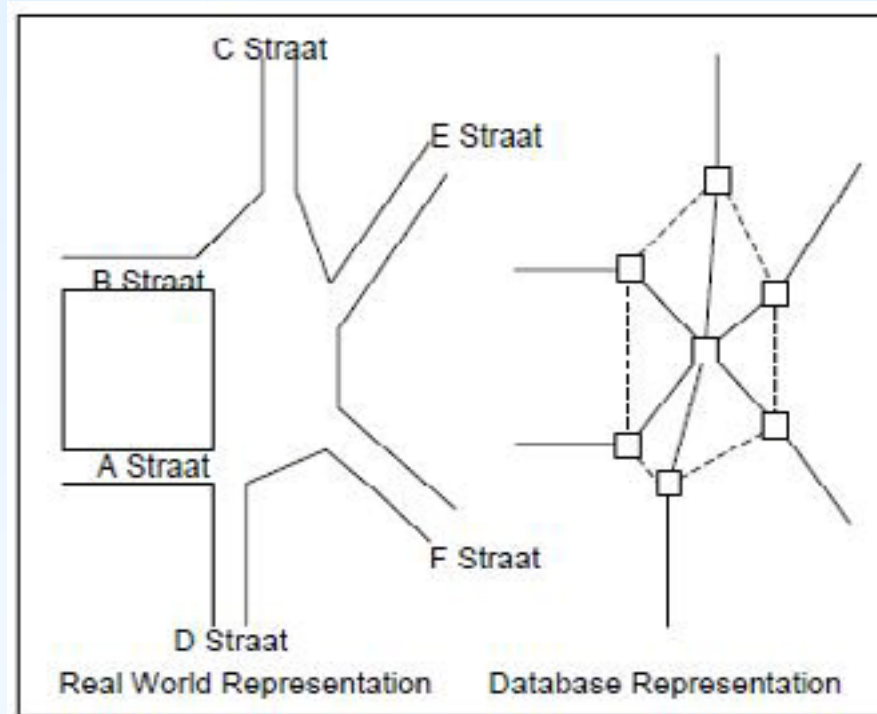


Complex feature representation

- Roundabouts & Turning Circles



Complex feature representation

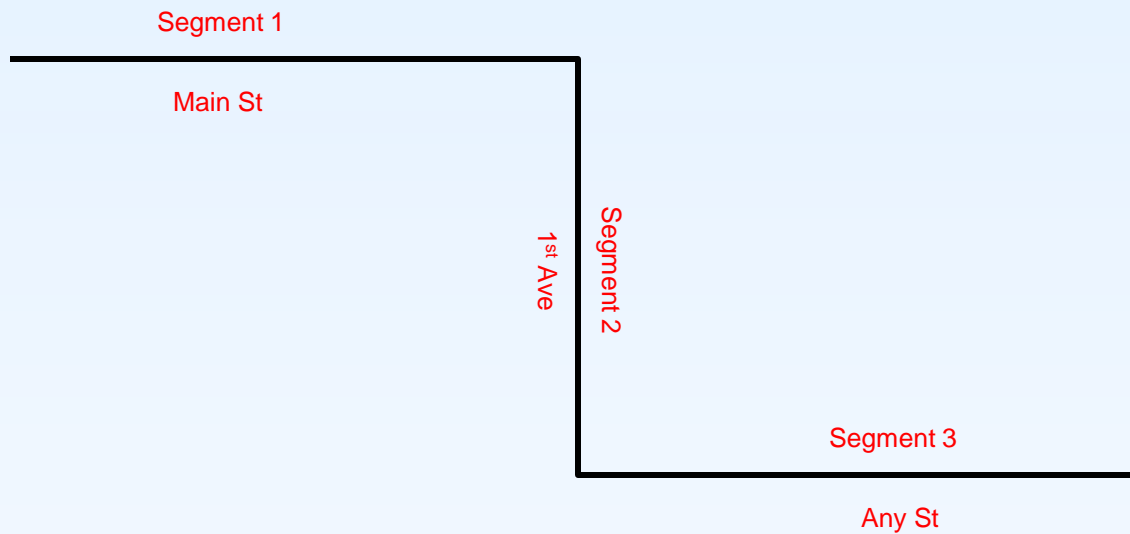


Elevated roadways



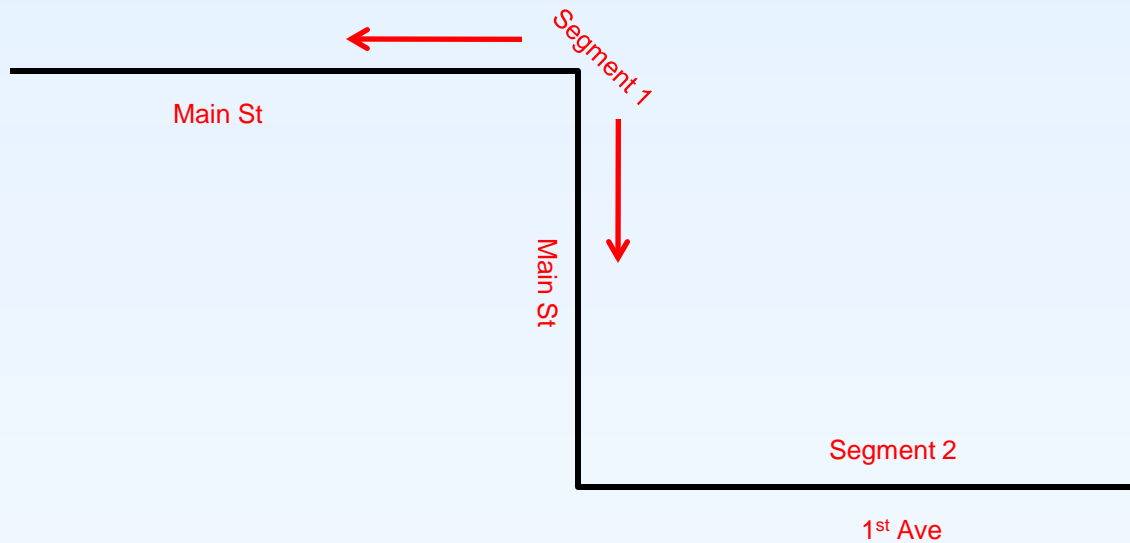
Bends in the Road

- May result in new segment...



Bends in the Road

- Or may not

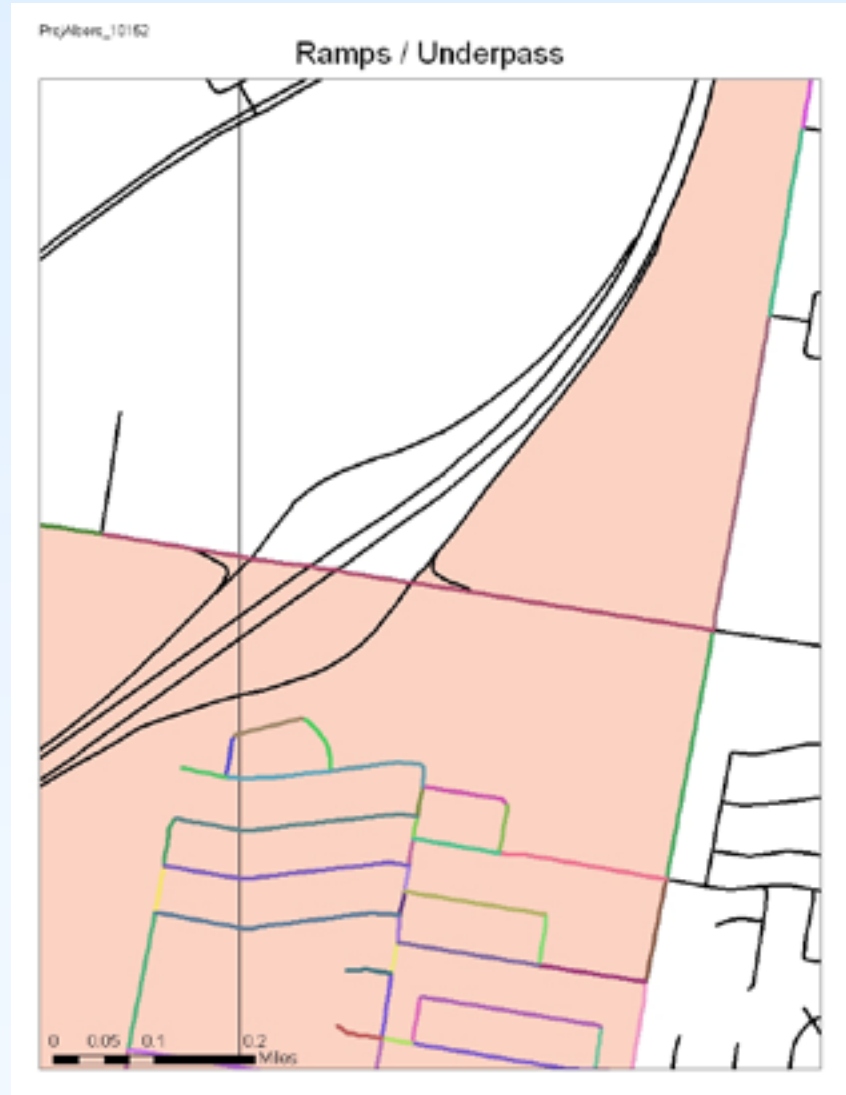


Non-qualified segments

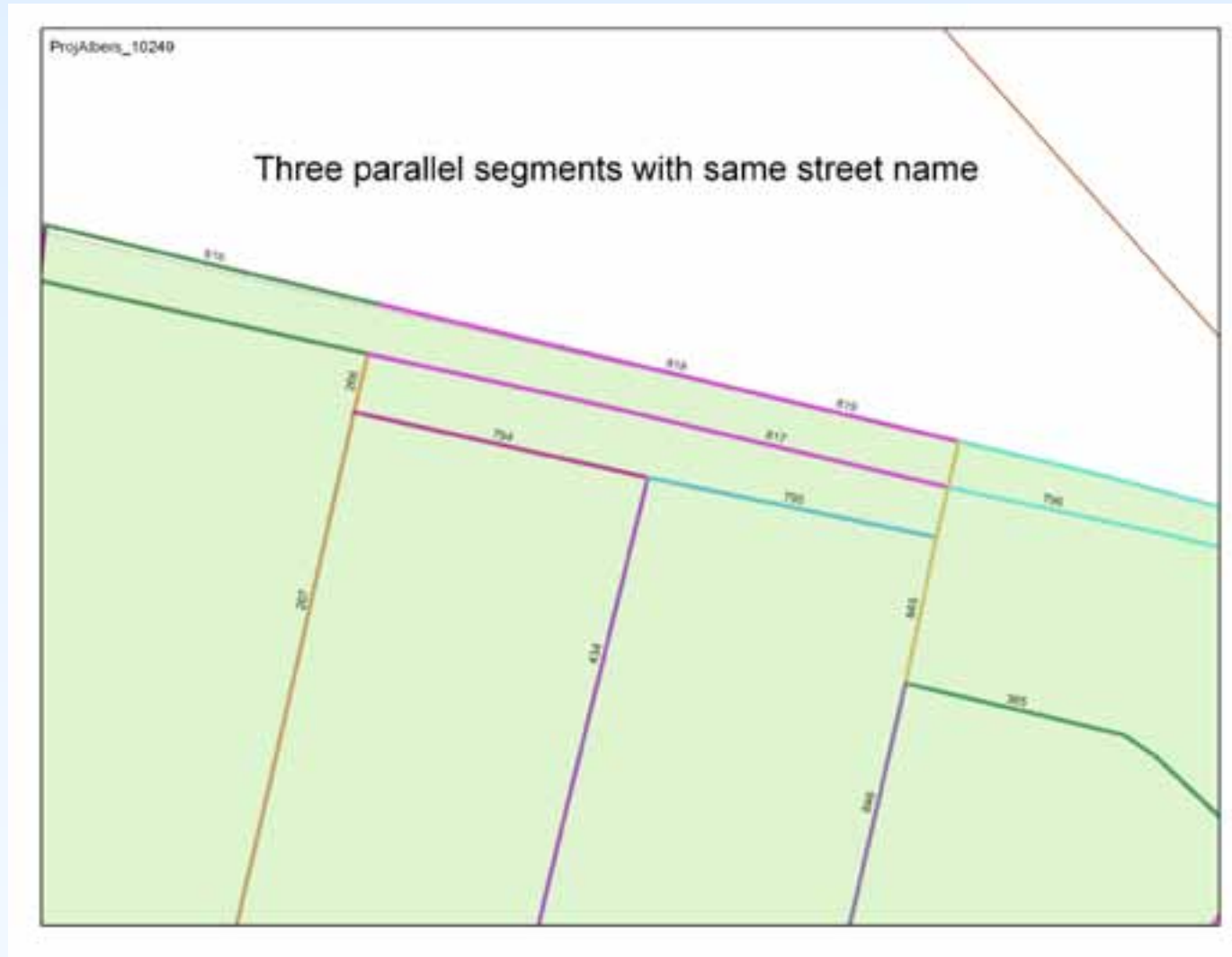
- Limited Access Roadways (Expressways/Tollways/Interstates)
- Ramps to Limited Access Roads
- These have been removed from the map view



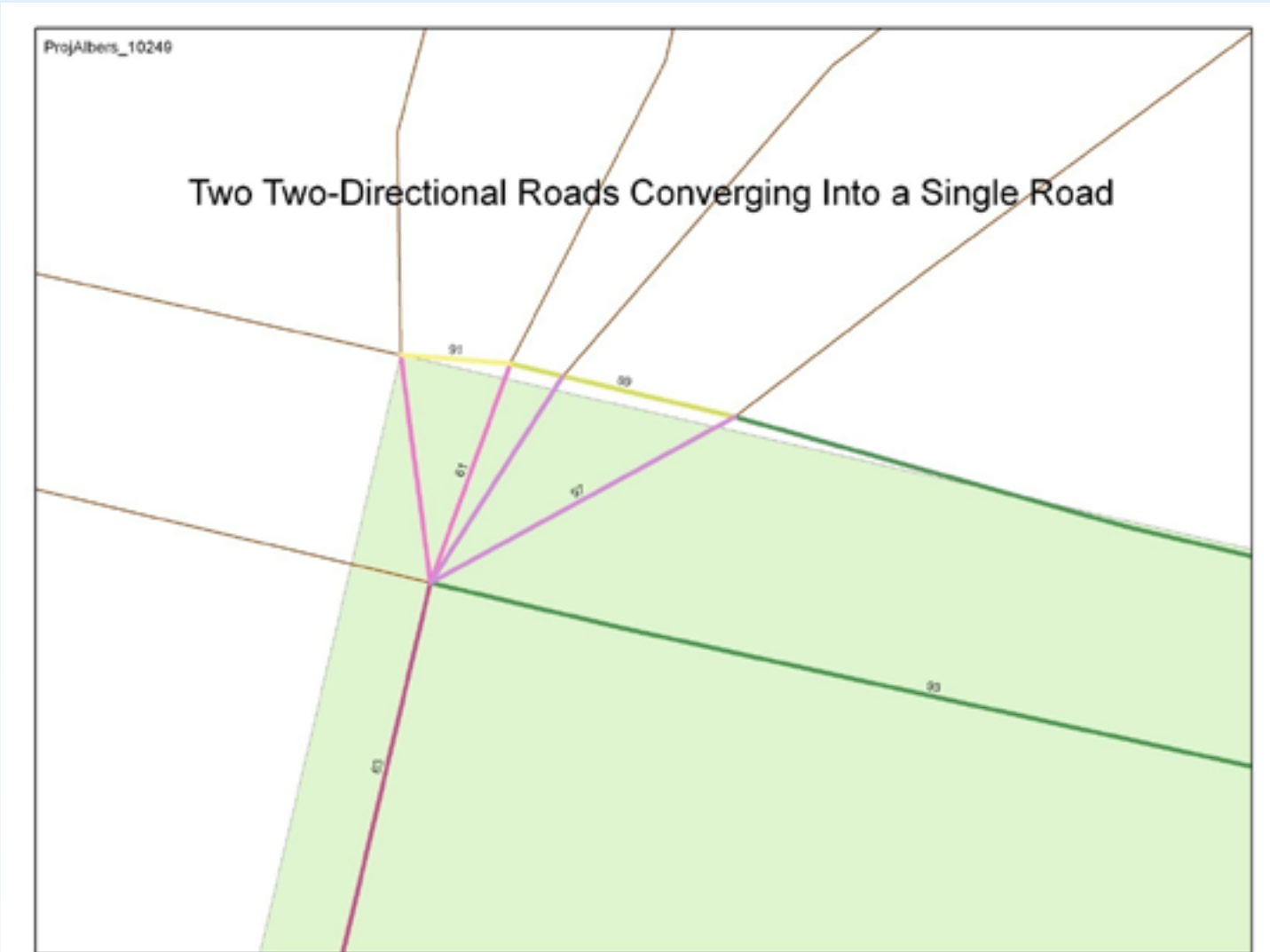
Map Samples



Map Samples

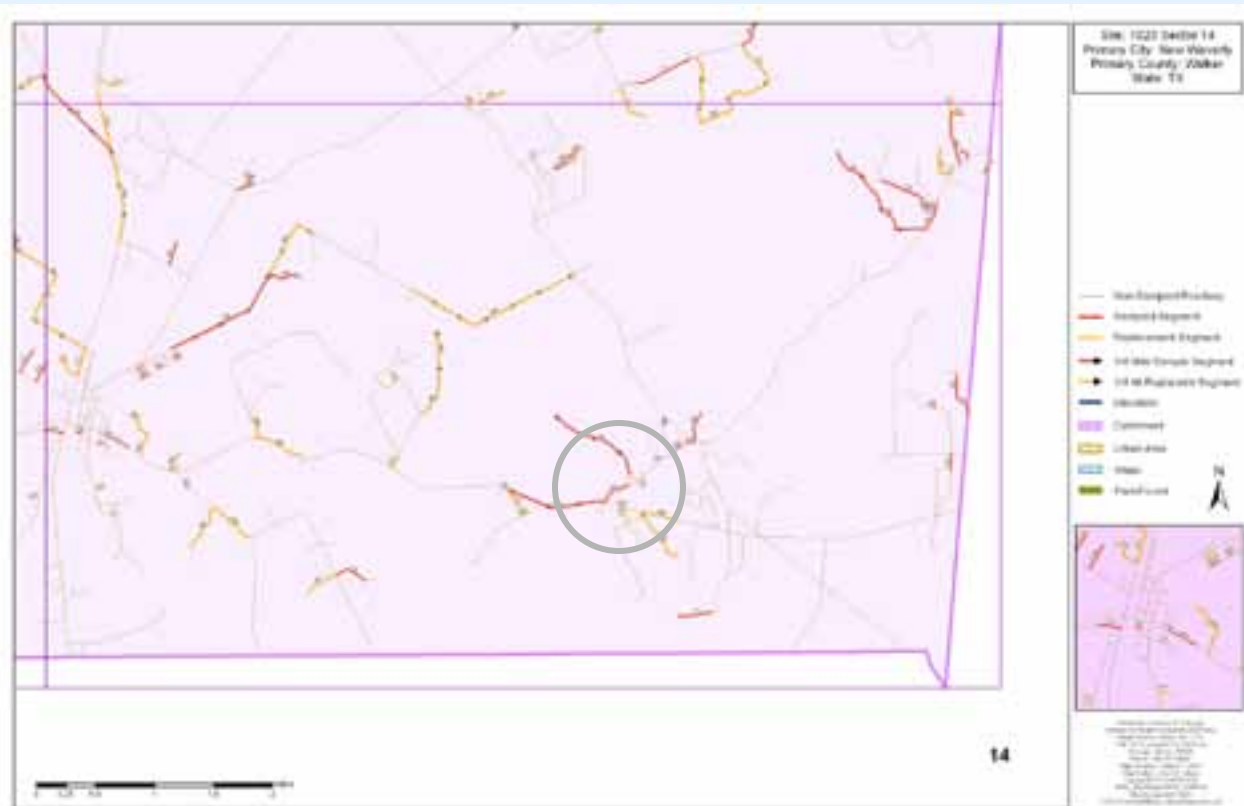


Map Samples

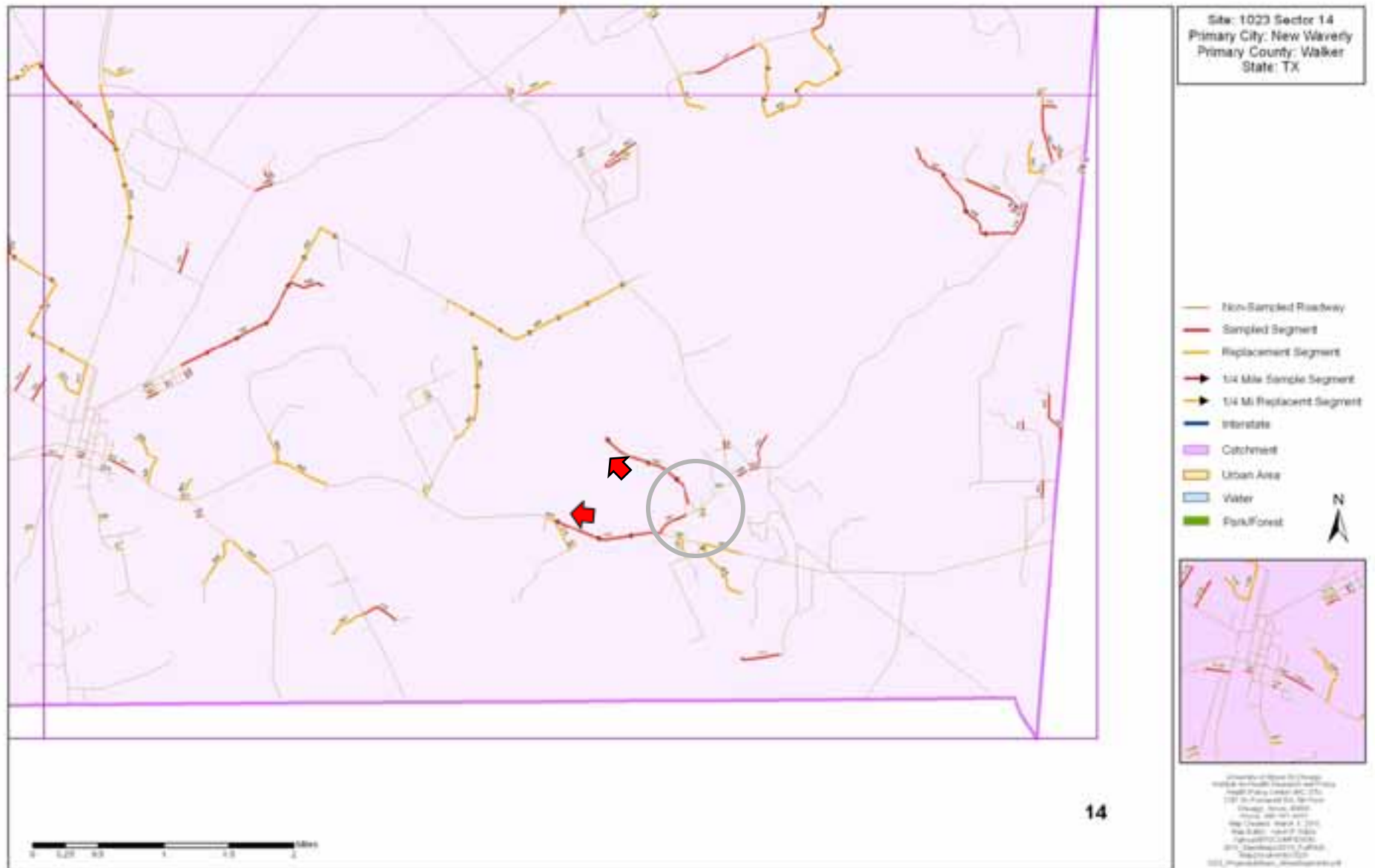


Rural ¼ mile segment rule

- Navigate to the major intersection on the sample segment's street
 - Start at the place where the arrows on the line point toward your target segment

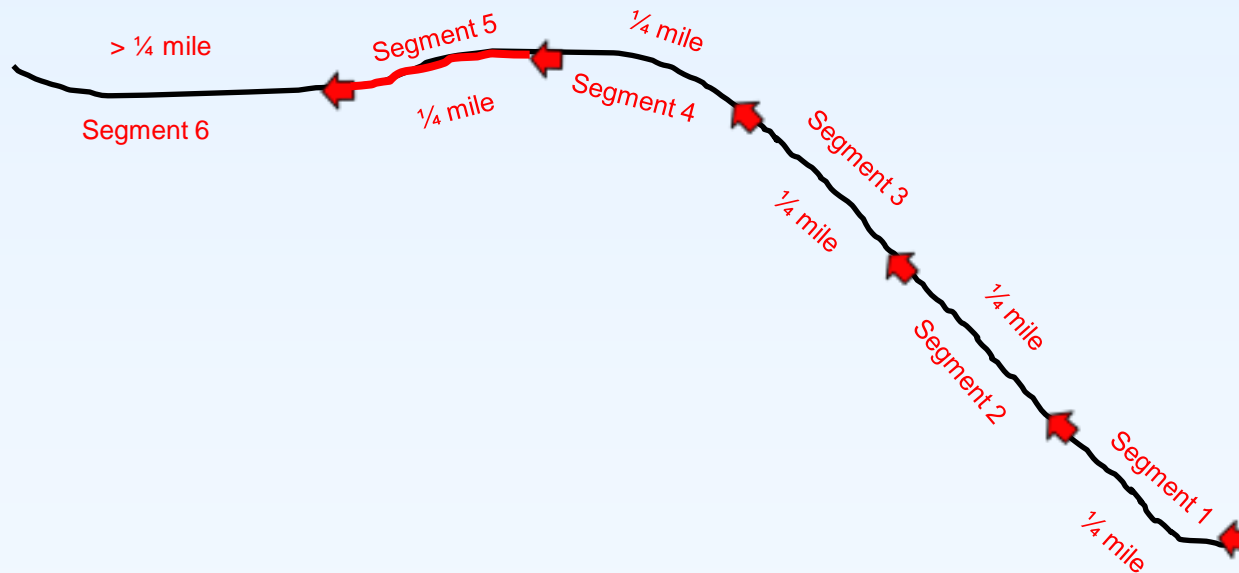


Rural 1/4 mile segment rule



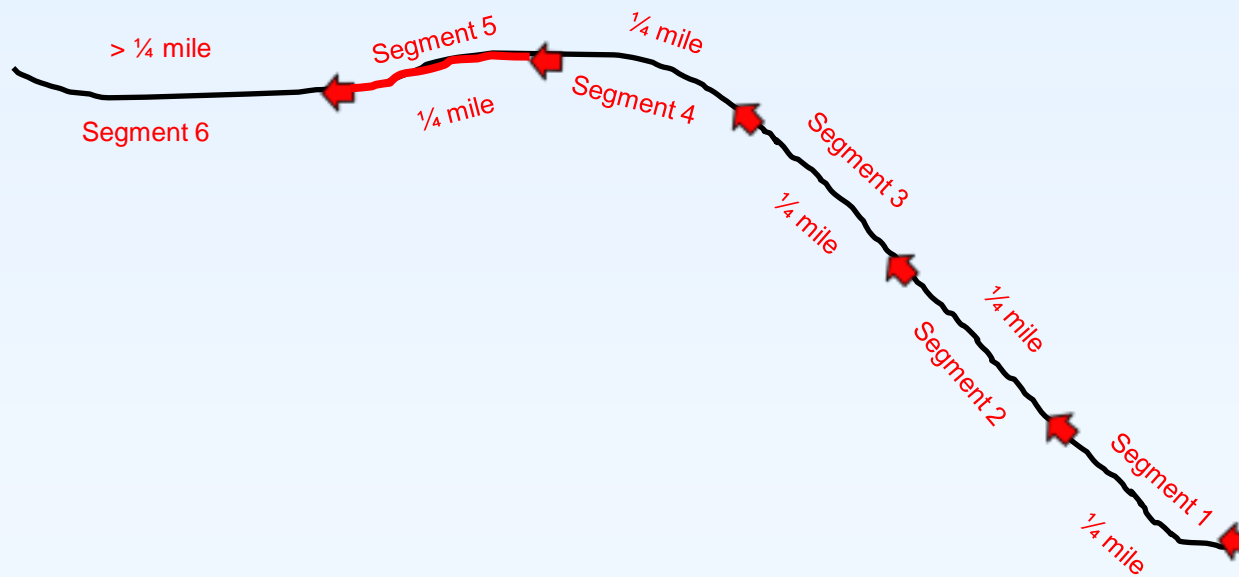
Rural $\frac{1}{4}$ mile segment rule

- Count the number of segments between the arrows to arrive at the target selected segment and check where the label is placed to ensure you located the sampled segment accurately



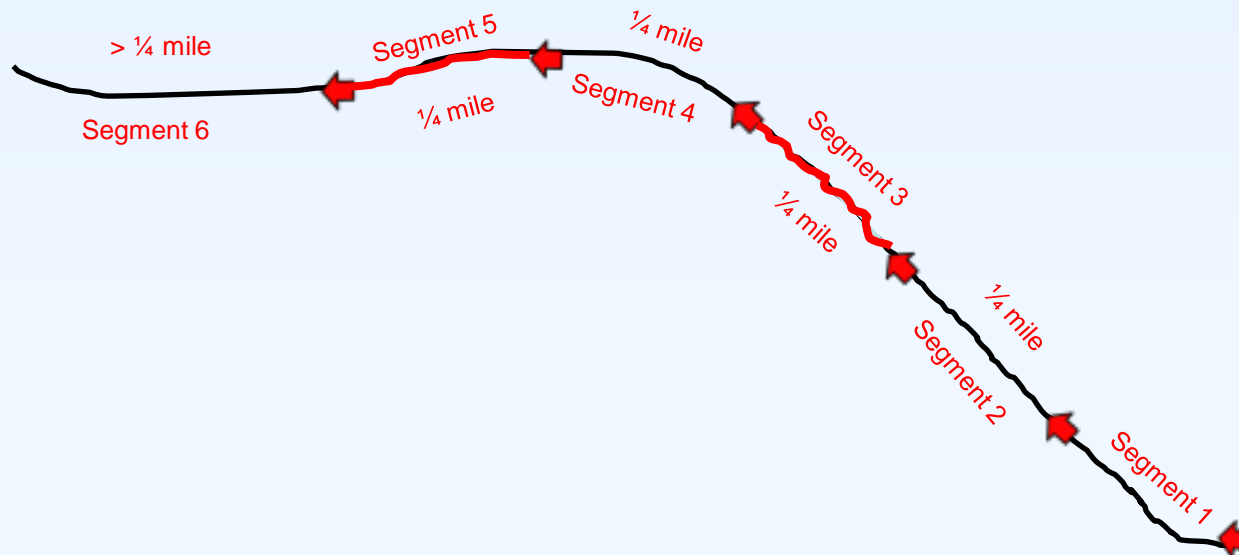
Rural $\frac{1}{4}$ mile segment rule

- At the sampled segment, reset the GPS odometer and begin the observation continuing until you reach a full $\frac{1}{4}$ mile.



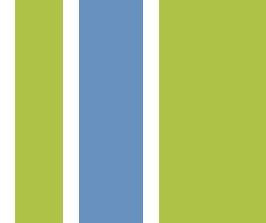
Rural $\frac{1}{4}$ mile segment rule

- You will need to make note of the end point if there are multiple $\frac{1}{4}$ mile segments along the road as this end point will be where you begin another tally of $\frac{1}{4}$ segments to reach the next sample.



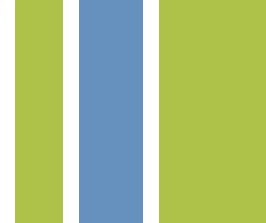
Mapping & Navigation Team

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