

Atlanta Region Streets (ARstreets)

Introduction and Background:

In 1999, the Georgia Department of Transportation (GDOT) and the Atlanta Regional Commission (ARC) originally joined forces to merge our respective streetbases, DLGF and ARCmap to create a reconciled database which included address information for the first time in GDOT's history. In 2004, GDOT and ARC worked together on the first update of a newly enhanced Atlanta Region Streets database (ARstreets) within the context of GDOT's state-wide update program for our 10-county area (Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry and Rockdale).

ARstreets represents a significant cooperative effort between GDOT, with their contractor ITOS, and ARC, with our constituent county governments. Task orders written in 2003 between GDOT and ITOS (Information Technology Outreach Services) covered the addition of "new" street segments and names captured by GDOT's field crew using GPS (Global Positioning System), but they did not cover the addition of address attributes which are critical to many of ARC's key planning functions. The most important of these is our annual population and employment estimates, which depend on an accurate streetbase for geocoding building permits and employer locations. To get this address information, ARC worked closely with our county governments to acquire local GIS (Geographic Information Systems) and CAD (Computer Aided Design) data. Working directly with our counties' GIS Coordinators, ARC's GIS Division (ARC/GIS) was able to "harvest" both street centerline data and/or parcel data which contained the missing address attributes.

Phase One:

Given the scope of this project and the urgency to produce an updated streetbase for our Planning staff, ARC/GIS decided to break the update process into distinct phases. Phase One was originally designed to get the "biggest bang for the buck" by concentrating on two key elements: A) the address attributing of new street segments captured by GDOT and incorporated into the DLGF streetbase by ITOS, and B) the addition of ARC local county street segments and attributes missing from GDOT's GPS data collection effort. We intentionally avoided fixing "old" segments for known problems with attributes or geography, and we purposely held off digitizing any additional road features visible on our 2003 orthophotography (digital aerial photography) since there were no attribute data left to attach to these "future" features anyway. The reason we chose this approach was based on our primary focus: geocoding new building permits for our Population and Housing (P&H) data which is the basis for our annual population estimates. We have since come back in 2005 to improve many of those old segments through a Step "C" – the attributing of existing street segments for missing road names from local county databases and other various sources.

Getting to the current ARstreets (Phase 1C) effort required the talents and cooperation of many key people. At GDOT: Jane Smith (State Transportation Data Administrator); at ITOS: Eric McRae (Program Coordinator); and at ARC: Art Kalinski (GIS Manager), Jim Bohn (GIS Supervisor), Wei Wang (Principal GIS Analyst), Paul DiGirolamo, Tim Maguire, and David Giguere (GIS Analysts), and Ryan Barrett (GIS Technician). ARC's local county governments were particularly helpful with

their professional attitude, technical expertise and high quality data. The following paragraphs identify these key County players and document our work in their counties, in the general order of our production.

In Gwinnett County we worked with Barry Puckett (Information Technology Services Manager) and Sharon Stevenson (Senior GIS Application Systems Analyst). All things considered, we felt that Gwinnett County's streetbase was the best place for us to start developing our methodology for the updates and maintenance work. The good positional accuracy of Gwinnett's features and the high quality of their street name and address attributes, made it the perfect "training ground" for our staff. All members of our production team worked on Gwinnett, one of the largest counties with the highest growth rate. Although GDOT had captured 750 street segments via GPS, Gwinnett's local streetbase contained considerably more arcs which were incorporated into the DLGF streetbase along with their names and addresses.

In Rockdale County we worked with Kent Asher (GIS Manager) who manages a much smaller county with considerably less growth than Gwinnett. Kent's intimate familiarity with Rockdale County and their streetbase made this another optimal place for us to begin our update work. Although there were far fewer street segments to add from Rockdale's streetbase to the DLGF streetbase, none of GDOT's GPS-collected arcs had address attributes and many lacked street names. Rockdale's streetbase had very accurate street name and address attributes, though the addresses ranges were often "compressed" based on an existing instead of built out scenario.

In DeKalb County we worked with Denise Finley (GIS Manager) and Lynn Santure (GIS Technical Coordinator). DeKalb's streetbase was generally of very good quality, though it was the first county we encountered that had "schematic" arcs - streets digitized without the benefit of GPS, coordinate geometry (COGO) or current aerial photography. As a result, it was the first county where our staff could not just "copy/paste" street segments from a local streetbase to the DLGF streetbase; we had to do our own photo-interpretation and heads-up digitizing from the 2003 digital orthophotography and then transfer attributes.

In Cobb County we worked with Ed Biggs (GIS Manager) and Lynn Biggs (Transportation Analyst/GIS). For a large and growing county, GDOT had captured relatively few street segments in Cobb County based on the dataset we received from ITOS. However, Cobb DOT had captured many more arcs in their "LandTrac" streetbase which we eventually incorporated into the DLGF streetbase during our Phase One "B" step. Earlier in our update for Cobb, we decided to focus on just Phase One "A," the addressing of the newly added GDOT / ITOS street segments. This initial separation of tasks with Cobb was due mostly to the positional inaccuracy of the historical LandTrac database (similar to ARC's old ARCmap streetbase) which required considerably greater concentration and more time for digitizing features. Fortunately the name and address attributes in LandTrac, along with the currency of the street segments was excellent. Although Cobb County also gave us their positionally accurate "Cobb Roads" dataset, we elected not to use it as it was not as current as the DLGF streetbase and carried no address attributes.

In Clayton County we worked with Bruce Taylor (Engineering Services Supervisor, Clayton County Water Authority). Clayton was the first county we encountered without address ranges in their streetbase, and it was the first county for which we received a parcel database. Although Clayton's parcel base was still being built, they did have parcels in GIS format with attributes for most of the newer developments, which was our area of interest for the street updates. We developed a methodology to check local street names and manually enter address range values to the DLGF arcs on screen using the geo-referenced parcel dataset as a "back coverage" for our streetbase.

This was a relatively time-consuming process compared to street-to-street conflation of values, but considerably faster and easier than handling hardcopy plat maps as we did in the 1990s for ARCmap.

In Fulton County we worked with Doug Smith (IS Manager) and Carl Anderson (GIS Manager). Fulton was by far the largest and most challenging county that we worked on. Although GDOT had only captured 515 street segments via GPS, Fulton's local streetbase contained considerably more arcs which we incorporated into the DLGF streetbase where possible, along with their names and addresses. The biggest challenge here was incorporating the addresses from Fulton's street segments into the existing DLGF system, both in terms of consistent ranges and one-to-many relationships with the features. We devised a method which allowed us to capture most of the new local features but preserve the current DLGF address ranges, if necessary, until our Phase One review with GDOT and ITOS. In general, the positional accuracy of Fulton's street features was very good, but there were numerous segments that did not appear on our 2003 imagery or in our 2004 Aero Atlas street books that we used for reference. We "tagged" these arcs for further review in the next phase of our streetbase update.

In Douglas County we worked with Stacy Greer (GIS Manager). We actually began our earliest work on the streetbase with Douglas County as a potential pilot project between ARC and Aero Surveys of Georgia. Although we eventually decided not to contract with Aero for the Phase One effort within the 10-county Atlanta Region, we may soon require their services in Phase Two and beyond as our planning area has recently expanded to 20 counties. In addition to this alteration of course, we ultimately completed Douglas County in two passes due to the acquisition of parcel data after the arrival of the County's two streetbases which we know as "Centerlines" and "Final Streets." Both of these streetbases had good positional accuracy, though Final Streets had no address ranges. By contrast, approximately 55% of the segments in Centerlines had name attributes and 42% had both names and addresses. Fortunately, the parcel database covered the entire county with 87% of the records containing both street name and address attributes, so we used the same approach we developed in Clayton County to create address ranges where needed.

In Cherokee County we worked with Johnny Ghorley (Geographic Information Director) and Ashley Walker (CAD Manager Cherokee 911). Cherokee turned out to be one of the easiest counties that we worked on, in spite of the fact that GDOT had captured 970 street segments via GPS, the second highest total in the region. On a smaller scale, Cherokee's streetbase was similar to Gwinnett in that it was up-to-date and had good positional accuracy of features, as well as very good street names and address ranges. The relative ease of the work here was a function of the smaller growth rate in Cherokee and the fact that we had gone through the learning curve in Gwinnett.

In Henry County we worked with Pat Delk (GIS Coordinator) and Robert Appleby (rGa Assoc.). Henry County was unique for two reasons: it had the largest number of street segments captured by GDOT via GPS with 1547; and it was the only county that had absolutely no address ranges in their streetbase, but excellent positional accuracy and attributes in a parcel database. In light of this situation, we developed a "spatial join" methodology to capture the discrete addresses from the parcel polygons for use as ranges on the street centerlines. Although this process was not fully automatic for the entire county, it saved considerable time in attributing the target DLGF arcs from the source local county data.

In Fayette County we worked with Pete Frisina (Senior Planner) and Bryan Fairrel (Cartographer). Where Henry County had the most street segments captured by GDOT via GPS, Fayette had the

fewest with only 131. As a relatively low growth county, they also had very few local segments to add to the DLGF database, though the positional accuracy of all their segments was relatively good. In consideration of all these factors, plus their order of production along our learning curve, Fayette County proved to be our most quickly completed county. This, in spite of the fact that only 55% of the local streets had names and none of them had address ranges. Fortunately, Fayette had a good parcel database with 84% of the records containing both names and addresses.

So we were able to process all 10 of our counties without having to refer to cumbersome and time consuming hardcopy tax maps or plat maps which we had used in the 1990s for our previous street centerline database, ARCmap. Although a tremendous amount of credit goes to GDOT for getting us to where we are today in the Atlanta Region, we strongly believe that the key to sustained success is in an upward flow of data, for it is at the county level where the majority of the "real world" streets are created and maintained. Not surprising, our emphasis throughout Phase One was on local data and knowledge, so not only did we call all of our GIS Coordinators for GIS and CAD files, but we personally visited most of them to get a better understanding of their needs and to coordinate our maintenance efforts.

Phase Two and Beyond:

It is important to emphasize that ARstreets was designed to be an interim subset of GDOT's state-wide DLGF street centerline database for the Atlanta Region. Throughout the Phase One production, ARC worked with GDOT, through ITOS, to develop the methodology of a new local / regional / state-wide street maintenance process. In turn, GDOT and ITOS are developing a methodology for reviewing our work and accepting changes to the DLGF, and then reconciling these changes with their Road Characteristics (RC) database which is tied to the streetbase through Dynamic Segmentation, a linear referencing system.

In the meantime, ARC/GIS has begun the Phase Two update of ARstreets with Step "A" – the continuation of our established methodology in our newly expanded region. Recent changes to our MPO (Metropolitan Planning Organization) and EPA Non-Attainment boundaries require us to add Barrow, Bartow, Carroll, Coweta, Forsyth, Hall, Newton, Paulding, Spalding and Walton counties for a 20-county streetbase. Once again, we are acquiring local street and parcel databases for both features and attributes but may need to populate address ranges in some counties from TIGER data as well. When this step is completed in mid-2006, we will return to update our "core" 10 counties in Phase 2B with even greater coordination with our local county governments.

Conclusion:

Although a significant challenge, it simply makes sense that we design and build a sustainable "grass roots" local / regional / statewide system of collecting and attributing streets throughout our growing region so as to minimize duplication and inefficiency. In addition to the obvious benefits to the State and ARC, a consistent regional streetbase is also beneficial to our various counties and municipalities for work outside their boundaries. In the short term, we fully recognize that each of our local governments has their own streetbase needs to which we must relate. In the long term, we believe we must form new partnerships and methodologies to make all of our streetbase maintenance efforts more effective and more affordable for planning, emergency response and economic development.