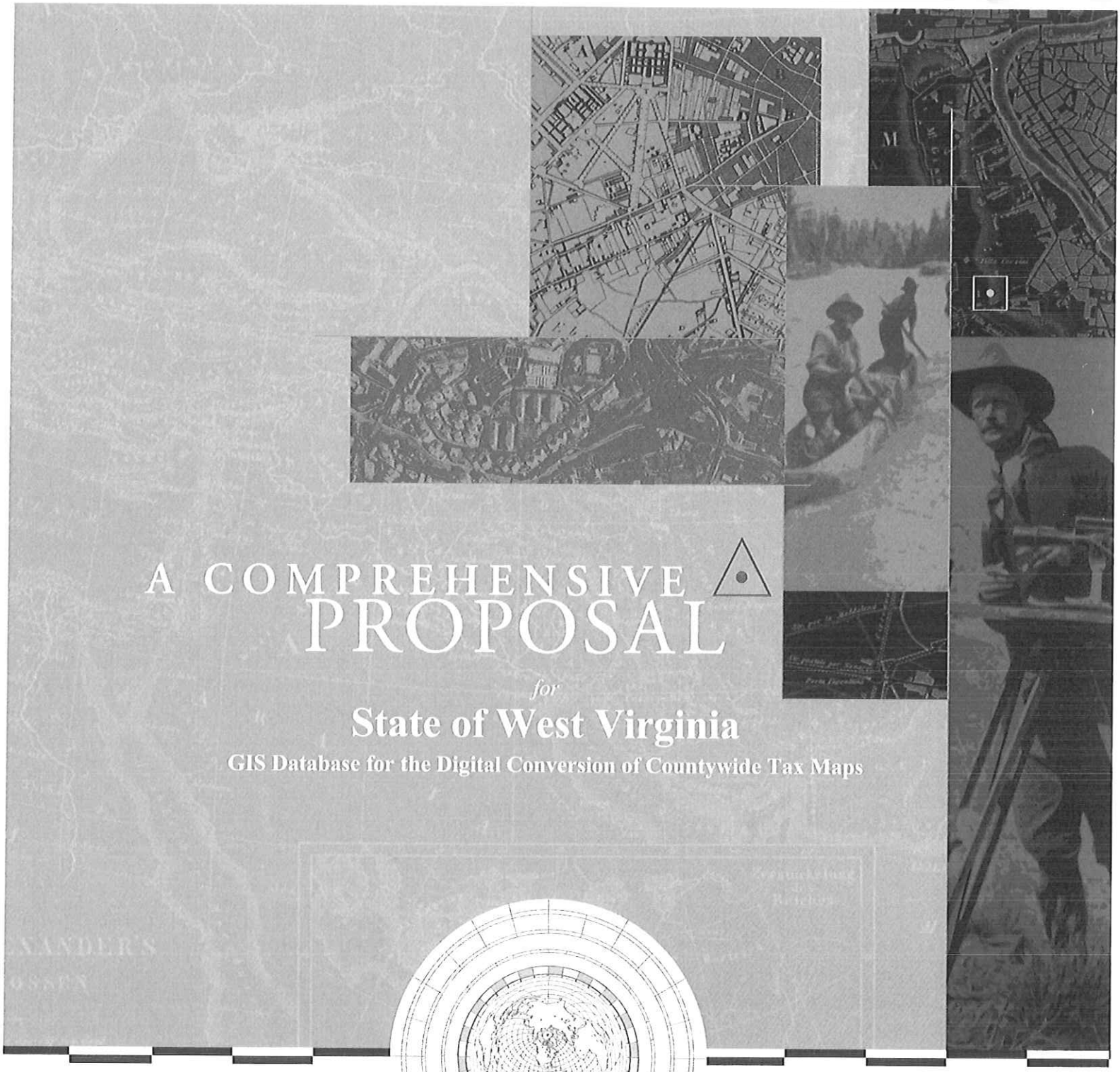

A COMPREHENSIVE PROPOSAL

for

State of West Virginia

GIS Database for the Digital Conversion of Countywide Tax Maps

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SMART DATA STRATEGIES

Table of Contents

Cover Letter

July 11, 2012

West Virginia Department of Administration
Purchasing Division
2019 Washington Street East
Charleston, WV 25305

RE: RFQ TAX12007

Smart Data Strategies, Inc. is pleased to submit a proposal to the West Virginia Property Tax Division (WVPTD) for services related to the digital cadastral conversion of Mingo County. Our comprehensive solution will meet all technical specifications and general requirements in the RFQ to ensure your complete satisfaction.

Smart Data Strategies has worked with over 250 assessment jurisdictions nationwide for the past twenty years, specifically focusing on parcel level projects. Therefore, we are extremely familiar with the International Association of Assessing Officer's (IAAO) standards and recommendations in the *Standard on Manual Cadastral Maps and Parcel Identifiers* (2004), the *Standard on Digital Cadastral Maps and Parcel Identifiers (2012), as well as the* WV procedural rule 189CRS3.

Per specifications in the RFP SDS will:

- Provide adequate workspaces for technicians and integrate technological improvements (e.g. hardware and software) to ensure maximum productivity.
- For specified project milestones: maintain accurate timetables, documentation of procedures and complete metadata for data layers.
- Preserve fiscal commitment and related responsibilities for conversion, maintenance, and improvements for cadastral map conversions and maintenance.
- Ensure the proposed GIS strategy meets the needs and expectations for the WVPTD and for each county.
- Establish "kick-off' meeting with county and selected vendor to address potential needs, refined workflows, and to address questions or concerns within 15 days of the contract award date.
- Complete a Pilot Project (sample run) to complete the SOW in its entirety within 30 days of the "kick-off' meeting.
- Submit monthly deliverables to WVPTD for Quality Control (QC) by the 5th of each month.
- Submit final deliverables no later than December 15, 2012.

The SDS team is confident that our comprehensive solution will meet all technical specifications and general requirements to ensure your complete satisfaction. We look forward to working with Mingo County and WVPTD in the near future. If you have any questions, please do not hesitate to contact me at sales@sds-inc.com or (615)794-5280, ext: 2447.

Best Regards,

Billy Burle
VP Sales and Marketing
Smart Data Strategies, Inc.

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: TAX12007

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:
(Check the box next to each addendum received)

[✓] Addendum No. 1	[ ] Addendum No. 6
[ ] Addendum No. 2	[ ] Addendum No. 7
[ ] Addendum No. 3	[ ] Addendum No. 8
[ ] Addendum No. 4	[ ] Addendum No. 9
[ ] Addendum No. 5	[ ] Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Smart Data Strategies
Company

B. Bu
Authorized Signature

7-11-12
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.
Revised 6/8/2012

Rev 09/08

State of West Virginia
VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with ***West Virginia Code***, §5A-3-37. (Does not apply to construction contracts). ***West Virginia Code***, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the ***West Virginia Code***. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Resident Vendor Preference, if applicable.

1. **Application is made for 2.5% resident vendor preference for the reason checked:**
___ Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; **or,**

___ Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; **or,**

___ Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; **or,**

2. **Application is made for 2.5% resident vendor preference for the reason checked:**
___ Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or,**

3. **Application is made for 2.5% resident vendor preference for the reason checked:**
___ Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or,**

4. **Application is made for 5% resident vendor preference for the reason checked:**
___ Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; **or,**

5. **Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:**
___ Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; **or,**

6. **Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:**
___ Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: Smart Data Strategies Signed: B. Burl

Date: 7-11-12 Title: VP Sales & Marketing

*Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

RFQ No. TAX12007

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:
"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (***West Virginia Code*** §61-5-3), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: Smart Data Strategies

Authorized Signature: B B Date: 7-11-12

State of Tennessee

County of Williamson, to-wit:

Taken, subscribed, and sworn to before me this 11th day of July, 2012.

My Commission expires December 9th, 2014.

AFFIX SEAL HERE

KATHY SUHONEN
STATE OF TENNESSEE
NOTARY PUBLIC
WILLIAMSON COUNTY, TN

NOTARY PUBLIC Kathy Suhonen

Company Overview

SDS, a privately-held, woman-owned company founded in 1989, has built a reputation for delivering quality GIS data products, cadastral data management tools, and other Geographic Information System (GIS) data services in a timely and economical manner. Over the course of the last 22 years, SDS has provided professional mapping services, GIS software services to over 250 jurisdictions across the US and Canada. Our mission is to Real Property Intelligence™ by helping organizations organize land records data and make it accessible and usable through a variety of GIS editing, analysis, and public viewing tools. Our strategy to meet this goal includes the following objectives:

- commit to a high level of customer-focused technical support;
- implement rigid quality-assurance and quality-control measures that help us to deliver a high degree of accuracy in a wide variety of GIS data acquisition, processing, and conversion services;
- apply proven and emerging programming technology and methods in the design and delivery of quality software tools to increase efficiency in the property assessment office and related organizations;
- continually streamline the workflows of our clients by availing them professional GIS consulting, training, and technical support services;
- broker graphic and non-graphic property/mapping data from various sources for purposes ranging from civil engineering projects and environmental impact studies to enhanced utility customer service and emergency management planning; provide these products and services with a reasonable total cost to our clients.

Company History

From 1989 to 1995, SDS primarily performed GIS data conversions for the property assessment industry. In 1995, SDS began to develop custom software solutions for its clients due to an industry gap between conversion services and the availability of software capable of utilizing digital data. Capitalizing on extensive knowledge of land records workflows and inefficiencies, SDS began to deliver comprehensive solutions tailored to meet the needs of each client. This value-based service led to an increase in demand for the company's office-automation solution. To fulfill this need, SDS developed a commercial-off-the-shelf (COTS) application in 1997. DREAMaps™ was the first modular application to automate the entire land records workflow. DREAMaps™ for Real Property Intelligence now includes a transaction manager, a land records management suite, and a transportation suite. Both include five modules that can work independently or integrate into client workflows to create dynamic GIS web-enabled or desk-top tools.

Area of Expertise: GIS Services and Products

For 22 years, Smart Data Strategies has provided GIS services to jurisdictions throughout the United States. During that time, Smart Data Strategies acquired significant expertise in GIS services and products, including the following areas:

Data Conversion: Smart Data Strategies has successfully delivered digital datasets, cadastral data management systems, and other cadastral/GIS consulting projects for a variety of clients, including more than 250 organizations and several private-sector companies. SDS uses well-established methods, including deed research, COGO, and best-fit construction approaches, as well as inventive application of modern GIS and programming techniques to provide a unique blend of focused services to users of property data. **Smart Data Strategies has converted more than 20 million parcels throughout the U.S. – no other company even comes close.**

Geodatabase Modeling: Geodatabase models allow the establishment of rules that can automate behaviors which underlie the digital map maintenance process. Smart Data Strategies employs an iterative prototyping method for geodatabase design, in which working copies of a geodatabase are passed back and forth between Smart Data Strategies and the client to facilitate discussions of design alternatives. Smart Data Strategies co-authored the ESRI land parcel data model, and has advanced the model for several Counties.

Parcel Maintenance: Many states require that parcel maps remain current within a specified timeframe. This puts undue pressure on the mapping staff to keep maps up to date, while at the same time keeping pace with new technology and responding to a myriad of requests from the public. Smart Data Strategies offers WeMAP as an option for mapping offices to outsource the map maintenance to Smart Data Strategies at a fraction of the cost while guaranteeing the data remains current. This provides all the benefits of GIS without the maintenance process. Included with WeMAP are weekly updates, DREAMaps™ Doc, DREAMaps™ Analyst, and data hosting via eMapsPlus.com.

GIS Application Development: Smart Data Strategies is an ESRI business partner, and sells shrink-wrapped GIS applications that add value to ArcGIS for users involved with parcel maintenance, land valuation and land acquisition. This primary software product that Smart Data Strategies provides is DREAMaps™, a suite of products providing the tax assessment office with Document Management, CAMA Integration, Online Data Distribution, CAMA/GIS Land Records Analysis, and a Map Editing Tool, which is in use in many jurisdictions presently. Today DREAMaps™ is being used to manage nine million parcels across the United States.

GIS Hosting and Data Distribution: eMapsPlus.com GIS data hosting and distribution service provides 24/7 online access to maps and property data via the internet. eMapsPlus.com serves as a Geoportal for over 70 counties across the U.S., allowing users to navigate the map, identify parcels, perform various search functions as well as reporting and creating mail labels. As an option for counties that wish to recoup some of their GIS costs, Smart Data Strategies will manage all of the data subscriptions and data purchases via a robust ecommerce and site administration engine. Currently, eMapsPlus.com receives over 1 million hits per week.

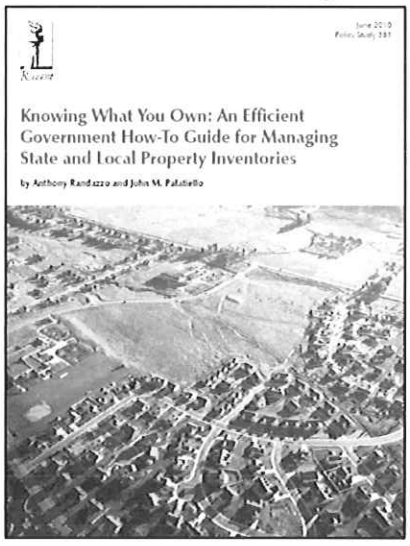
Smart Data Strategies Accomplishments
Smart Data Strategies is recognized as an industry leader, illustrated in part by the following accomplishments:

- In October of 2010, the US Department of Housing and Urban Development contracted with SDS and its partners to collect digital property data for 127 counties in order to monitor the effectiveness of funds related to the Neighborhood Stabilization Program. This is the first time a federal agency has issued such a contract.

- In August of 2009, The **Mississippi State Department of Transportation** was awarded the Innovation Award by the National Alliance of Highway Beautification Agencies (NAHBA) for its implementation of DREAMaps™ for Outdoor Advertising Management System.

- In July of 2009 and September of 2009, Smart Data Strategies President and CEO Susan Marlow testified to congress (the financial oversight and natural resources congressional subcommittees) on the use of geospatial technology in the government sector.

- In August of 2009 The **Mississippi Secretary of State's Office** awarded Smart Data Strategies a multi-million dollar contract for a state lands management system – the system and the company is highlighted in a recent report published by the Reason Foundation titled *Knowing What You Own: An Efficient Government How-To Guide for Managing State and Local Property Inventories*



- In October 2008 Smart Data Strategies completed its second major parcel conversion project in Maricopa County (1.5 million parcels). The project has gained national acclaim for its innovative methodologies and has received multiple industry awards.

- In July 2007, Smart Data Strategies successfully completed the construction of a statewide digital parcel base map encompassing every county in the State of Tennessee. The Tennessee Base Mapping Program was the **single largest statewide parcel conversion project of its kind.**

- In July 2005, Smart Data Strategies was awarded the "Declaration of Innovation" award from the US Department of Labor, Employment and Training Administration (DOL-ETA), for its partnership with IGISS.

Project Approach

Parcel Project Overview

Smart Data Strategies will develop a GIS database for the digital conversion of countywide tax maps delivered in an ESRI GIS format that will replicate the complete set of tax maps and produce a digital map book that is compliant to state/local standards and all specifications outlined within the RFQ. The generalized procedures are listed below:

1. Rectification of tax maps
2. Vectorization- Creating digital data layers by using snapping techniques where applicable.
    a) Attribute tagging
    b) IAS data linking
    c) Annotation/symbol tagging
3. Replicate the original cartographic styles, elements, and arrangements of the tax maps.
4. Publish finished tax maps in a true Geographic Information System (GIS) manner.
5. Maintain an effective, open, and communicative process with the WVPTD and County throughout all phases of the project. County involvement during decision-making criteria and review to ensure anticipated final products.

The following sections provide greater detail to the parcel conversion approach.

Parcel Conversion Approach

The Mingo County parcel conversion project will undergo three main phases: (1) Project Kick-off/Initiation; (2) Pilot Phase; and (3) Full Production Phase. The following sections provide details about how each phase is accomplished, including descriptions about the Procedures Manual development and Database Design acceptance procedures.

Project Initiation

Upon written notice to proceed, the project will begin with a kick-off meeting involving project-related personnel from SDS and Mingo County. Smart Data Strategies has designated David McReynolds as the project manager. He will direct the actions of the SDS project team and serve as the primary point-of-contact for Mingo County.

The project kick-off meeting, to be held on-site at Mingo County, will provide an opportunity for SDS and Mingo County to discuss the following topics, as applicable:

- Receipt of source documents;
- Selection of primary project contacts from Mingo County for regular and as-needed communication with the SDS project manager;
- The Procedures Manual — a living document that will serve as a project road-map for the SDS staff as well as an as-built documentation of the completed conversion project for Mingo County's future reference. The document will be provided in an informative and concise manner to facilitate acceptance. It is imperative that all parties have a clear understanding of all aspects of the project. Clear and specific communications with regard to project expectations and procedures are essential in ensuring Mingo County has the program they desire. The Procedures Manual will address issues such as the following:
    - Project Background
    - Database Design
    - Conversion Process
    - Quality Control Procedures (both Smart Data Strategies and Mingo County)

- Delivery Schedule
- Program Deliverables
- Communications Procedures
- Maintenance Options
- Data Acceptance Methodology

- Expectations of Mingo County as to project scope, required involvement on the part of Mingo County, and desired goals of the project;
- Project scheduling topics, including details of the pilot project, methods used to allow project tracking by Mingo County, staggered delivery of converted data, and final delivery.
- Quality assurance and quality control procedures to be undertaken by both parties throughout the life of the project.

Source Data Evaluation
A thorough evaluation of sources is always necessary to ensure that SDS' internal processes are designed to meet the final product requirements.

Pilot Project
An accepted pilot project is the foundation for any successful cadastral adjustment project. A typical pilot area conversion applies the proposed project procedures to a sub-set of the entire area to be converted, allowing all parties to interactively determine that the project procedures will result in the quality data deliverable that is desired. Smart Data Strategies suggests using a mix of urban and rural parcels. The pilot project will allow Mingo County to review sample deliverables produced using the processes detailed in the preliminary project procedures manual. Based upon the pilot experience, the SDS team and Mingo County will have a solid understanding of the project requirements and will proceed to full production with acceptance of the geodatabase design, data quality standards and procedures. Prior to the start of the pilot, Mingo County will make available the necessary source documents. During the pilot, if necessary, SDS will produce a report that identifies any issues to be resolved. This issue report will describe any inconsistencies in the data or specific problems that might occur in the future use of the data. Project procedures may be modified as a result of the pilot phase to ensure that the full project meets Mingo County's needs. Smart Data Strategies' experience with various GIS data formats, coupled with a thorough pilot project, will provide Mingo County with knowledge relating to issues that might otherwise be overlooked.

In summary, the goals of the pilot project are as follows:
- Provide a representative sample of the data produced by the production steps outlined in the procedures manual.
- Review the data model.
- Resolve any issues encountered during the pilot conversion process.
- Identify corrective measures that will ensure a data product that meets or exceeds the specifications set forth by Mingo County.
- Agreement of the Data Acceptance Methodology and Scoring.

Best-fit Concept
The fitting of parcel data to a new landbase is economical and can be expected to provide acceptable accuracy results. This is possible because the source documents were constructed and maintained from legal descriptions, and the new landbase provides evidence of "occupation." Owners of individual properties tend to manage or use their property uniquely, and this unique use often provides clear evidence that can be observed on digital orthoimagery. In many instances "occupation" evidence is

more revealing than the legal description, especially in rural areas where bounded descriptions are commonly used.

The best-fit approach for parcel mapping is accomplished by referencing the data to the digital orthophotograph. The technician uses ground evidence to place the digital data in the correct general location. Fence lines, hedge rows, building outlines, ridge lines, ditch lines, lakes, and streams, along with the existing assessor ownership maps, are used to determine specific parcel boundaries. The technician will make a block-by-block adjustment of the parcels to the ground evidence. The phrase *block-by-block* indicates that a block of parcels would be aligned to the landbase. This amounts to working in and completing a small area at a time. When the ground evidence (from the orthophotography) is used, the parcel line information will be adjusted according to the most reliable visible information available.

The following represents the systematic process used during the best-fit approach to parcel conversion:

Step 1 – Georeferencing the tax map In Step 1, the tax map is registered to the correct spatial location according to the map index. The mapping technician identifies neat line corners of the tax map and links them to the corresponding corners of the appropriate cell in the digital index of maps for the specific county. The mapping system then performs a bilinear transformation and records the transformation parameters in a "world" file that goes with the tax map image. Future reference to this tax map will then always use the same transformation parameters for viewing in the context of real-world coordinates.	
Step 2 – Construct road rights-of-way In Step 2, the mapping technician places a street centerline along the visual center of a road, railroad or utility clearing. The construction of the centerline will observe cartographic constraints such that straight segments will be two-point lines, and curves will be circular arcs. Operators will use CAD fillet commands to ensure the calculated tangent points between arcs and straight lines are mathematically perfect. From the constructed centerline, the operator then works outward by using COPY PARALLEL functions based on the right-of-way widths as shown on the tax map sources. The resulting right-of-ways generally extend beyond the visible edge of pavement, representing the actual width of the invisible right-of-way.	

Step 3 – Locate parcel lines by ground evidence

In Step 3, the digital orthophotographs will be used to determine occupation lines, and these lines will provide the foundation of the parcel location. Property lines are captured on a block-by-block basis until the block is completed. Parcel placement is easily accomplished using this method since, even in rural areas, visible streams, roads, and occupation evidence provides enclosed areas in which the parcels must fit.

Step 4 – Annotation

When linework is complete for an area, annotation is captured for that area. The map technician will use the existing ownership maps for reference and place text for all annotation feature present on the original map. Typically, in urban areas, this will include the parcel numbers, dimensions, street names, group letters, subdivision name and section, and any municipal information. SDS experience will be used to ensure that each annotation is placed on the map in accordance with the technical standards provided by the County and in such a manner that the completed map is cartographically pleasing to view.

Using this approach, a very high level of accuracy can be expected while at the same time isolating any parcels that require additional rigorous editing.

In its 22 years of parcel mapping experience, SDS has developed and refined this process on projects with similar scope and delivery to Mingo County's project. The process is designed to provide systematic, standardized procedures that economize operator effort and minimize error, thus assuring the County of a total quality product. Automatic quality control checks have been strategically placed in the production flow to identify errors or omissions early in the conversion process to affect expeditious corrections. Later sections of this proposal will discuss the QA/QC processes.

Key aspects of this best-fit approach will include:

- Digitize tax maps
- Establish real-world coordinates as control points for the orientation of the data to the orthophotography.
- Analyze the ground evidence on the digital orthophotographs and use these features as guidelines for the placement of such map features as "occupation" lines.
- Digitally adjust the linework layers to match the orthophotography, which serve to aid in the correct placement of the parcel lines in comparison to the actual ground features.
- Adjust annotation layers to match the adjusted linework layers.
- Routinely provide Errata Notes and PAR Forms to aid in the resolution of data errors or problematic areas.

Data Quality Standards

The digital data will match the following data quality standards:

Edge-matching – All digitized map sheets must be edge-matched (both visually and by coordinate) with adjacent sheets. No edge-matching tolerance will be allowed.

Common Boundaries – All graphic features that share a common boundary, regardless of digital map coverage, must have the exact same digital representation of that feature in all common digital files.

Connectivity – Where graphic elements visually meet, they must also digitally meet. All confluence of line and polygon data must be exact mathematically, that is no "dangles/overshoots/undershoots," "offsets," or "pseudo nodes" are permitted. Lines that connect polygons must intersect those polygons precisely; every endpoint must be an intersection point of the respective polygon.

Line Quality – A high-quality cartographic appearance shall be achieved. Transitions from straight line to curvilinear line segments shall be smooth and without angular inflections at the point of intersection. The digital representation must not contain extraneous data at a non-visible level. There should be no jags, hooks, or zero-length segments. Curvilinear graphic features should be smooth, with a minimum number of points. When appropriate, line-smoothing programs will be used to minimize the angular inflection in curvilinear lines. Any lines that are straight, or should be straight, should be digitized using only two points representing the beginning and ending points of the line.

Segmentation – The digital representation of linear elements must reflect the visual network structure of the data type. An element should not be broken or segmented unless that segmentation reflects a visual or attribute code characteristic, or unless the break is forced by database limitations.

Polygon Closure and Centroids – For area features being digitized, the last coordinate pair must be exactly (mathematically) equal to the first coordinate pair. No line or polygon shall cross itself, or any other digital feature, except to join at an actual confluence. All digitized features that continue across map boundaries shall be edited to effect smooth, continuous lines. Each polygon must also have a single, unique centroid to which attributes can be associated.

Polygon Layer and Exclusiveness – Polygons of a single data layer must cover the area of interest completely and be exclusive within that area. There can be no holes in the polygon and no overlaps in a layer.

Point Criteria – All point features shall be digitized as a single X, Y coordinate pair at the visual center of that graphic feature.

Line Criteria – All lines (linear features and area boundaries) to be digitized from existing source maps shall be topologically structured. End points must be specifically defined at each end. Intersections of lines must be represented as distinct endpoints of the lines.

Graphic Standards – Symbol alignment shall follow good cartographic practices to assure the pleasing presentation of displays and plots.

Annotation Criteria – All annotation shall be consistent in defined sizes, fonts, levels, angles, and offsets. In general, the orientation and display of annotation will follow accepted rules of cartographic production to ensure high quality, readable and aesthetic map products for display and plotting. The annotation and titling shall be at the standard scales of 1"=200' and 1" = 600'. In addition, annotation will be placed with the following goals in mind:

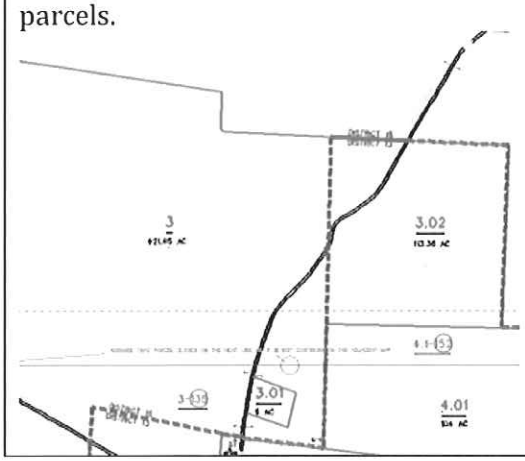
- To obscure the minimum amount of other planimetric features.
- Along (and splined to follow) linear features
- Captured as per the source document.
- Beside/above/under point features reading from west to east as appropriate.
- To occur at least once on each map sheet for which the map feature appears.
- To be right leading from west to east, except for linear features.
- To be correct with regard to grammar and spelling, and to be in upper case only.
- Once for numerous identical features that occur in close proximity to each other.

Resolution of Discrepancies (Smart Data Strategies PAR Form)

Smart Data Strategies will bring boundary discrepancies to Mingo County's attention for resolution and correct depiction in the digital parcel file. On those occasions when technicians encounter issues that they cannot resolve without additional feedback from Mingo County, the project manager will work with the technician to create a PAR (Problem and Resolution) form that will be sent to the county for further instruction and/or clarification to SDS. The PAR form will contain a picture of the area in question along with documentation regarding the conflict. In the event the technician has a potential solution, SDS will include the proposed solution on the PAR form. All PAR forms will become a permanent part of the project documentation (added to the procedures manual).

The following shows an example of a PAR form used by Smart Data Strategies.

Smart Data Strategies, Inc 357 Riverside Drive, Suite 100 Franklin, TN 37064	
PAR NUMBER:	DATE SENT: 2/7/2005
Project Name: TNBMP	To/PAR Response From: Roger Lowe
From/ PAR Response return to: Jim Hall	F: 615-741-3888, P: 615-741-7628 x473
F: 615-794-5310, P: 615-794-5280	Cc: TGI/Sam Moffat
Source Name : Campbell tax map 123	F: 865-220-9922, P: 865-220-9920
Location of Problem:	Number of Attachments: 1
Description of Problem: Using the TVA boundary will create a gap between	DPA Suggested Resolution:

parcels and TVA lake for some parcels. Using the TVA boundary will shorten some parcels. 	

PAR forms will be used whenever a discrepancy is detected during the conversion process. More specifically, Smart Data Strategies will use the PAR procedure anytime the following situations occur:

- Discrepancies are detected between the digital data and orthophotography.
- Discrepancies are detected when edge-matching map sheet to map sheet.
- Discrepancies are detected between rights-of-ways and parcels.

Quality Control / Quality Assurance

Smart Data Strategies will incorporate quality control and assurance measures during this project.

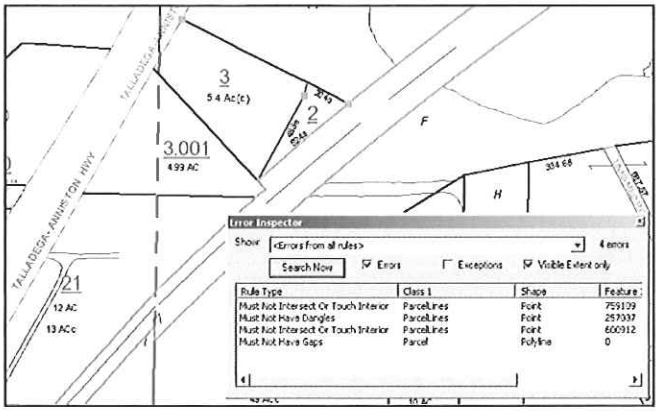
On-Screen Review

The first phase is a manual on-screen review. The technician compares the digital data to the scanned map ensuring all digitizing is complete and all features are collected. The following guidelines will be followed for the placement of annotation:

- To obscure the minimum amount of other features
- As per the source document
- Along (and splined to follow) linear features
- Beside/above/under point features reading from west to east, as appropriate
- To occur at least once on each map sheet for which the map feature appears

Topology

The second phase includes topology checks. Smart Data Strategies proposes to define and maintain appropriate topology rules for the parcel polygons, parcel lines and any related feature classes that could potentially be expressed with at least partially coincident segments. The topology rules will become part of the initial Geodatabase design and are included in the base scope of the work being proposed. During this phase, the ESRI Topology application is run. If any topology errors exist, they will be displayed in the error inspector.



The following is a list of topology rules that Smart Data Strategies typically uses during parcel conversion projects. These can be built upon if required and determined during the pilot phase.

- Parcel polygons must not have gaps
- Parcel polygons must not overlap
- Parcel lines must not have dangles
- Parcel lines must not self-overlap
- Parcel lines must not intersect
- Parcel lines by sub-type must be covered by parcel polygon

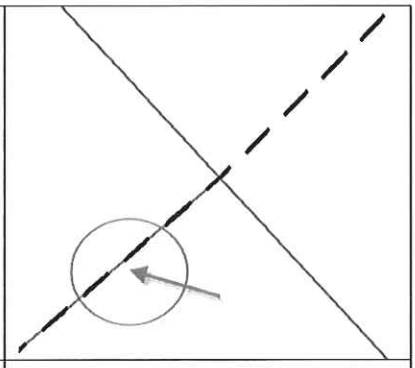
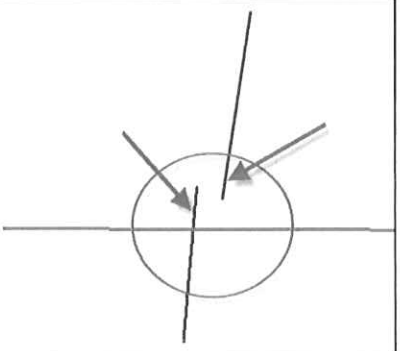
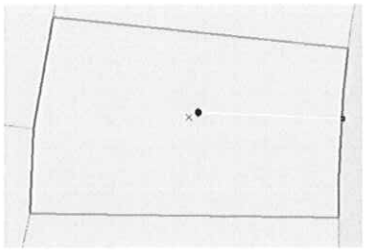
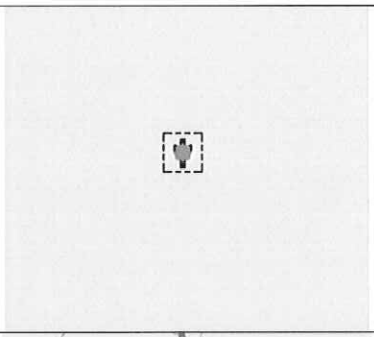
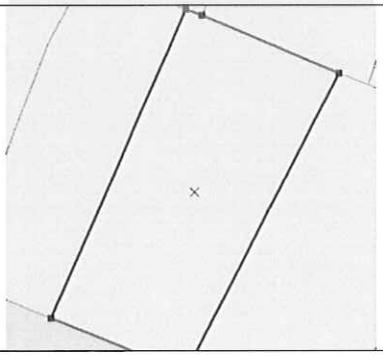
Internal Checkplot Review

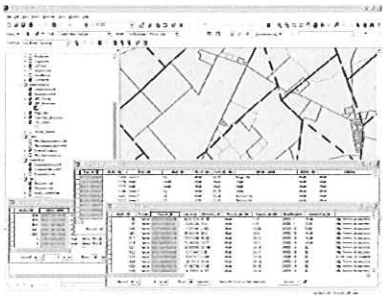
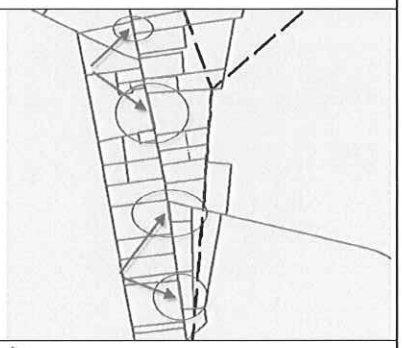
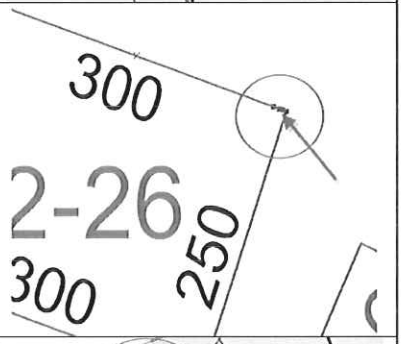
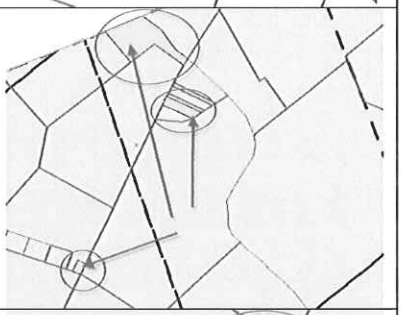
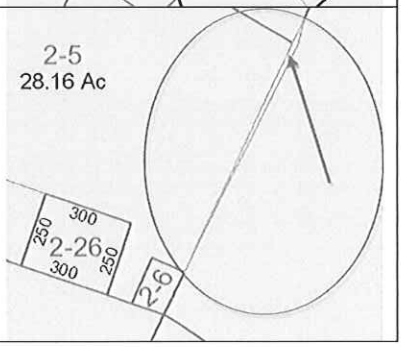
To supplement the on-screen edit processes, hardcopy plots are created to assist the editors in reviewing the map data for line placement and general cartographic appearance. Manual editing procedures are performed, paying close attention to text overstrikes, obvious missing text, missing leader lines, and spelling errors.

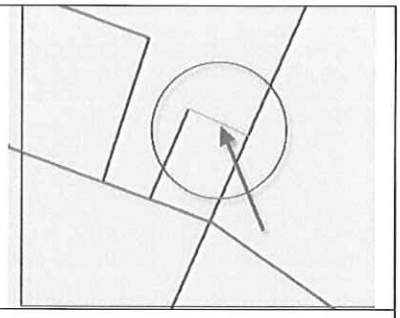
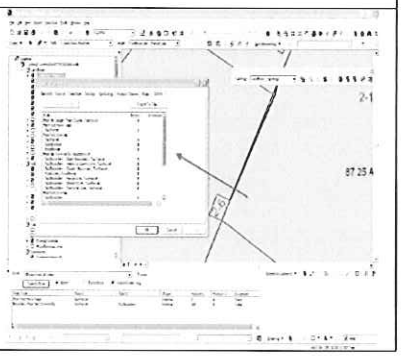
All plots are checked against the original source documents to ensure accuracy and quality. Errors such as misplaced parcel lines, right-of-way lines, or annotation are flagged and returned to the technicians for digital correction. As corrections are completed, operators sign-off on each individual check-plot error flag, indicating that the problem has been resolved and by which method. Once all edits are complete, all prior errors on the check-plots are highlighted and the checkplots are stored for future reference.

Automated Digital Checks

The automated checks rely on the project database, which was established during the project setup phase, to ensure compliance with project specifications and good mapping standards. Errors found during digital checks are automatically flagged by the system for action by QC technicians. Custom routines are used to validate data for qualities such as the following:

Coincident Boundaries - All graphic features that share a common boundary, regardless of digital map coverage, must have the exact same digital representation of that feature in all common digital files.	
Connectivity - Where graphic elements visually meet, they must also digitally meet. All confluence of line and polygon data must be exact mathematically, that is no "dangles / overshoots/ undershoots," "offsets," or "pseudo nodes" are permitted. Lines that connect polygons must intersect those polygons precisely; every endpoint must be an intersection point of the respective polygon.	
Polygon Closure - For area features being digitized, the last coordinate pair must be exactly (mathematically) equal to the first coordinate pair. No line or polygon shall cross itself, or any other digital feature, except to join at an actual confluence. All digitized features that continue across map boundaries shall be edited to effect smooth, continuous lines.	
Point Criteria - All point features shall be digitized as a single x, y coordinate pair at the visual center of that graphic feature.	
Line Criteria - All lines (linear features and area boundaries) to be digitized from existing source maps shall be topologically structured. End points (nodes) must be specifically defined at each end. Intersections of lines must be represented as distinct endpoints (nodes) of the arcs.	

Database Structure - Initially, all data is verified for conformance with client project specifications and database design. Datasets are validated to ensure they contain the appropriate feature classes and subclasses. During this process, individual attribute item definitions are checked for conformance with the database design. In addition, project parameters such as map projection, units, and applicable map scales are validated.	
Feature Consistency - Custom routines verify compliance with defined cartographic standards. Specifically, life features will be verified for feature codes, true arcs and Source vs COGO values. Annotation characteristics such as symbol font, size, offset, and justification are validated. Point features are verified for their symbol value, size and rotation.	
Node Errors / Short Line Segments - Custom routines check to ensure that no line overshoots, undershoots or short line segments remain after the topologic processing is complete. Undesirable pseudo nodes are also flagged at this stage.	
Attribute Check - All polygons, lines and points are evaluated against rules defined by the County for anomalies.	
Polygon Gaps - Gaps occur when surrounding polygons don't perfectly match one another along the boundary. Slivers are identified through a series of topology checks and flagged for correction.	

Duplicate Line or Point Features - Similar to checking for over striking annotation, QC routines check for duplicate or even similar line and point features.	
Parcel Number Validation - QC routines produce parcel number reconciliation reports that identify the following types of data errors: • Records in the graphic database with no match in the non-graphic property database. • CAMA records in the CAMA database with no match to the graphic database. • Records in the CAMA database with multiple matches in the graphic database.	
Consistency Checks - The QC application provides for project-specific consistency checks that validate data integrity based on a series of rules or conditions. For example, rules can be defined to specify that all polygons coded as parcels must have a parcel number and calculated acreage, or that public right-of-way polygons must not have a parcel number.	

Data Acceptance Testing QA/QC

The third step of Smart Data Strategies' quality assurance process involves the mathematical calculation of an acceptance score for a specified dataset or (DAT). Random samples are selected from the final dataset (dataset that has been through all of the QA/QC steps up to this point) & tested against the project specifications to ensure that the quality of the data meets or exceeds the acceptable standard. This standard is represented as a percentage of correctness (or adherence to the project specifications) & is negotiated with the client during the kickoff meeting. Datasets that do not meet or exceed the quality standard are rejected back to the beginning stages of quality control and must pass each stage of the QA/QC process again in order to be tested. No dataset is delivered to the client without passing the DAT stage. Smart Data Strategies standards of excellence for this scoring are to exhibit a 99.0 accuracy rate on all deliverables to the county for the attributes/objects defined in the DAT scoring methodology.

Smart Data Strategies uses a DAT Scorecard to calculate, track, and record the acceptance percentage of each dataset. The following is an example of an actual DAT.

	_____County, IL10 | Smart Data Strategies Project CS0114 | DAT Scorecard								
	revision 1.1 | 1/3/2005								
	Batch Name:	Batch							
	Date Received:	27-May-							
	Reviewed By:								
	Review Completed On:								
	Object Name	Points per Object	Count in Batch	Points in Batch	Count in Sample	Points in Sample	Sample %	Defect Points	Quality %
1	Lot Annotation	30	36,974	1,109,220	36,974	1,109,220	100.00%	150	99.99%
2	Parcel Annotation	20	9,571	191,420	9,571	191,420	100.00%	36	99.98%
3	Block Annotation	15	1,012	15,180	1,012	15,180	100.00%	0	100.00%
4	Miscellaneous Annotation	5	32	160	32	160	100.00%	0	100.00%
	Total		47,589	1,315,980	47,589	1,315,980	100.00%	186	99.99%

References

Portage County, Ohio
PARCEL CONVERSION PROJECT

Brian Kelley, CIO
449 S. Meridian St., 6th Floor
Portage County Admin. Bldg.
Ravenna, Ohio 44266
330-297-3584
bkelley@portageco.com

Phone:

Project Description

Smart Data Strategies (SDS) was selected by Portage County, the 15th most populous county in the state, to develop a parcel based enterprise wide GIS in order to provide citizens with accurate and reliable geographic information. The 77,147 parcels were converted from a variety of sources including:

- GPS/Survey Control Points
- Subdivision Plats, Plats of Survey, Original Town Plats, Deeds, Condominium Regime
- Miscellaneous surveys, road books, etc.
- Portage County tax maps
- CAD tax map drawings DWG format
- LBRS Street Centerline
- 2006 Orthophotography

All plats (subdivisions & individual surveys) were constructed using the distance & bearing information & then fit to match the orthophotography as a single unit. Tax maps were fit to the orthophotography using a block by block adjustment approach. All digital mapping was based upon State Plane Coordinate System (NAD 1983). The connectivity, area definition, and contiguity of the map features such as points, lines, polygons, and annotation that define topology were structured to be topologically sound. Graphic and non-graphic databases were in full compliance with the County Specifications for computer-assisted mapping.

Fayette County, Ohio
PARCEL CONVERSION PROJECT

Scott David Cormany
GIS Director
Fayette County GIS
1415 US 22 SW , Suite 200
Washington Courthouse, OH 43160
Phone: 740-253-9994
scott.cormany@fayette-co-oh.com

Project Description
Smart Data Strategies (SDS) was selected by Fayette County to complete a GIS digital parcel project resulting in a seamless, topologically correct parcel basemap. The parcels were converted from a variety of sources including:

- OSIP 2007 Imagery
- Spring 2005 6-inch pixel resolution black and white county wide digital orthophotography meeting NMAS at the 1:100 scale
- GPS Derived Road Centerlines and Point address Data conforming to LBRS standards
- Digital streams network mapped at a 1:100 scale
- County Boundary Polygon created from Historical Markers and Survey Grade GPS
- Existing GIS datasets
- CAMA data from Manatron
- Deeds
- GPS data

The primary construction method utilized was a best-fit methodology. The best-fit approach for parcel mapping was accomplished by registering the existing tax map to the digital orthophotography. The parcels were digitized using the landbase as the controlling source. In this approach, the technician uses ground evidence to register the property boundaries. Fence lines, hedge rows, building outlines, ridge lines, ditch lines, lakes, and streams, along with the existing assessor ownership maps, are used to determine parcel boundaries. SDS also integrated some existing GIS data as well as constructed some areas from deeds and plats.

Richland County, Ohio
John Jerger
GIS Coordinator
Mansfield, Ohio
(419) 774-6392

Project Description

Smart Data Strategies provided digital parcel mapping for approximately 69,000 parcels. The parcels were best-fit to a new planimetric base map. A block-by-block adjustment was made of all parcel lines to match the new base map. As each block was adjusted, a parcel ID attribute was assigned to each parcel for association to the non-graphic appraisal database. The parcel numbers maintained on the tax maps did not match the PIN numbers in the appraisal database. Thereofore, Smart Data Strategies reconciled the two systems by reading all of the property descriptions to determine the correct PIN ID for each parcel. All features that existed on the tax maps were converted into digital format for analysis and evaluation of property values. SDS was responsible to incorporate existing digital AutoCAD (Richland Area Only) data into a final product for a complete continuous dataset. The final dataset was delivered in Intergraph's Geomedia format.

A few years after the original conversion project was completed, Smart Data Strategies performed a data migration project moving all of the existing Geomedia data to the ESRI format. Currently, Richland County utiziles the DREAMaps Analyst and Mapper software for managing their tax parcel data.

"SDS has been there every step of the way. Their assistance to our office has been very good. SDS is a company that not only will work with you on your current project, but is willing to help and support you long into the future. They truly care about their customers." – John L. Jerger, Richland County GIS Coordinator

State of Tennessee
TENNESSEE BASE MAPPING PROGRAM

Dennis Pedersen
GIS Director
Tennessee Office of Information Resources
312 8th Avenue
Nashville, TN 37243
Phone: (615) 741-9365
Dennis.Pedersen@state.tn.us

Project Description

Smart Data Strategies (SDS), through a joint venture with EarthData International, was awarded and completed a contract for the Tennessee Basemap Project (TNBMP) to develop and maintain a parcel database for the entire state of Tennessee. This contract positioned SDS as the first and only solutions provider to create, convert, and maintain a standardized digital parcel database for an entire state. After successful completion of Phase One of the TNBMP, SDS continued into Phase Two, and completed Tennessee's ninety-five counties. A completed county included orthophotography (flown and rectified), parcel conversion to a digital format based on the orthophotography, and parcel integration with the state's Computer Assisted Appraisal System (CAAS). The State of Tennessee began capturing cadastral (property boundary) information on paper maps in a standardized format in the mid-1960's. For the past 40 years, the process has seen some divergence in methodology. As a result, no two counties have exactly the same mapping techniques and only a few have any significant graphical digital data to support the tax assessor. Since the State, through this project, required standardized databases from each county, SDS was faced with converting and manipulating multiple data types and map conditions. During Phase One, SDS was able to define a process that begins with a data discovery period, proceeds through converting to the state standard, and ends with a rigorous Quality Assurance closeout practice. The State of Tennessee and the individual counties are pleased with the results provided by SDS.

Carroll County, Maryland
GIS PARCEL PROJECT

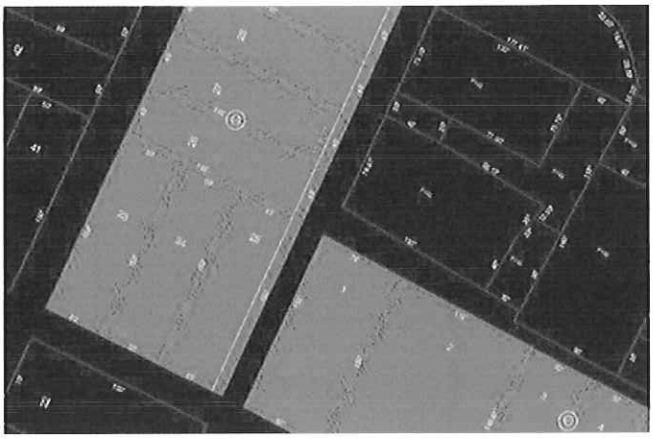
Irmina D. Cluck
Enterprise GIS & Database Manager
225 North Center Street
Westminster, MD 21157
Phone: 410-386-2053
icluck@ccg.carr.org

Project Description

Smart Data Strategies provided standard map conversion services for Carroll County using best-fit to orthophotography and Coordinate Geometrey (COGO) construction methodologies for the conversion of 68,000 parcels. The county resources that will be used include subdivision plats, deeds, and tax maps. Smart Data Strategies designed and implemented the geodatabase for Carroll County including definition of topology rules by using a custom adaptation of the FGDC standards. The final product will be delivered in the geodatabase format and will be loaded into ArcSDE for maintenance. The parcel data provided by Smart Data Strategies will serve as the basemap for Carroll County. Additional attribute data was entered indicating the method used to construct the parcel, the ratio of deed acreage to calculated acreage, and rotation value to fit the photo. Property corners were constructed as clean intersections without under-shoots or dangles; all parcels shall be built to polygon and "close". The line work as COGO'd was delivered, as well as the polygons constructed from them. The source data used included the existing tax maps in raster format produced and maintained by the Maryland Department of Assessment and Taxation (DAT) and the Maryland Department of Planning (MDP).. Also provided was planimetric data at the same scale and a list of the right-of-way widths of county roads in order to fit parcels to road rights-of-way. Carroll County has approximately 3,525 previously vectorized parcels that will be inserted and edge matched into the county area. The coordinate system used was Maryland State Plane grid, NAD83, feet. Polygons were joined with the database supplied by DAT and MDP

Anne Arundel County, Maryland
PROPERTY GEODATABASE PROJECT

Caroline Gaulke
Office of Information Technology
2662 Riva Rd
Annapolis, MD 62703
Phone: (410) 222-4022
Fax: (217) 788-2503



Project Description

Anne Arundel County needed to develop a parcel map to manage an estimated 330,000 parcels. With an estimated 200,000 property boundaries captured on the Department of Public Works existing 1:480 scale (1"= 40') water & sewer utility maps, the county decided to utilize this information to jump start the development of the parcel layer. Wishing to utilize the ESRI Geodatabase, the county contracted with SDS, an ESRI Business Partner, for consultation and conversion services. The project had three distinct phases including:

- Vector conversion of the existing raster TIF images
- Compiling the DWG files completed in the Phase I and those completed by the county
- Design geodatabase
- Convert AutoCAD DWG data from Maryland Dept. of Planning
- Apply Unique ID for all Phase II polygons
- Retrieval, organization, categorization of source documents (sub plats) from plats.net
- Capture of plats by COGO & Heads-up means
- Assimilate with Phase II geodatabase
- Populate polygons with Tables provided by the County

A prototype area was completed before each phase to determine the appropriate steps necessary to receive process approval. Smart Data Strategies completed all three phases within schedule and with very high quality scores.

Project Team

Susan Marlow – President / CEO

As founder and CEO of Smart Data Strategies, Inc., Ms. Marlow is responsible for all aspects of the company's business. She is familiar with all facets of the parcel conversion industry, having successfully completed GIS and Parcel Conversion projects for cities and counties across the United States. Ms Marlow is known and respected throughout the GIS community as a pioneer in land records management. Under Ms. Marlow's guidance, Smart Data Strategies has used an innovative approach to the development of procedures and processes to ensure client satisfaction and has gained considerable experience by successfully completing mapping programs. Ms. Marlow believes in the importance of the property layer as one of the NSDI foundation layers of information and involves herself in many movements to promote a unified local, state, and national property database sharing initiative.

Congressional Testimony

- Subcommittee on Energy and Mineral Resources: Oversight and Legislative Hearing; Federal Geospatial Data Management; July 2009
- Subcommittee on Oversight and Investigations; House Committee on Financial Services; Role of Technology in Financial Services Oversight

Published articles and reports:

- Capitalizing on New Technologies: Transportation Projects Simplified with GIS Integration, IRWA, Nov/Dec 2007
- Choosing a Technology Path in a Difficult Economy, IAAO, Fair and Equitable, April 2009
- National Land Parcel Data: A Vision for the Future, National Research Council, April 2007
- GIS for Assessors, Joint Publication IAAO/URISA, Volume 1, 1989, Revised Volume 2, 1995

Professional Committees

- Chairman of the MAPPS, Federal Cadastral Task Force
- Chairman, Transportation Research Board (TRB), Panel for Integrating Geospatial Technologies into the ROW Process
- Member NAS committee Land Parcel Databases: A National Vision
- Chairman, Institute for GIS Studies
- Member of the Federal Geographic Data Committee (FGDC)
- Member, International Association of Assessing Officials

Monica Dennis, Director of Operations and Cadastral Mapping Specialist (CMS)

Total Years of GIS Industry Experience: 20
With Smart Data Strategies Since: 1996

Education:
IAAO CMS Designation
AAAO Certified Mapping Specialist
AS, Business Administration, Northeast State Community College
Alabama IIA/ Alabama Appraisal Manual
Alabama III/ Basic Mapping
Alabama VII/ Intermediate Mapping
Alabama VIII/ Advanced Mapping
IAAO VI/ Fundamentals of Cadastral Mapping
IAAO Property Assessment Valuation
General Management Certified Program
ESRI GIS Courses

Affiliations:
Member, International Association of Assessing Officials

Responsibilities:
Mrs. Dennis manages the day-to-day operations for the Integration/Conversion Services Department at Smart Data Strategies. Her duties and responsibilities include:

- Management of all department projects including the project managers, GIS technicians, QC staff, and subcontractors
- GIS project set up, design, training and implementation
- Training in the use and plotting of Cadastral Maps
- GIS data maintenance and support
- Systems integration

Experience:
Prior to joining Smart Data Strategies, Mrs. Dennis was employed for eight years by the DeKalb County, Alabama Tax Assessors Office. While at the County, Mrs. Dennis was responsible for assessment mapping and deed resolution issues. This experience has enabled her to work closely with appraisal and assessment staff and has provided her a thorough understanding of the appraisal and assessment processes. In her last year of employment with the County, Mrs. Dennis was the GIS Coordinator for the implementation of DeKalb County's GIS Project.

Mrs. Dennis is a Certified Mapping Specialist (CMS) with IAAO.

Mrs. Dennis' is currently wrapping up the Mississippi Department of Transportation Crash Data Cleansing Project where SDS was tasked with the data cleansing of 600,000+ records and developing a data cleansing application. The latest project assigned to Mrs. Dennis is the Mississippi Secretary of States Land Management application. This project will be the implementation of a statewide system allowing for the acquisition, disposal, inventory and management of all State owned property including GIS component.

David McReynolds, Project Manager

Total Years of GIS Industry Experience: 14
With Smart Data Strategies Since: 1995

Education:
AS, Computer Drafting and Design, ITT Technical Institute

Certifications:
IAAO Course 6
ESRI's ArcGIS I and II
Microsoft's VB.net Programming

Responsibilities:
Mr. McReynolds is responsible for the client's satisfaction concerning all contractual requirements. He plans, directs, controls, and monitors all program activities. His responsibilities include:

- Maintain direct contact with client
- Maintain documentation of project progress and requests
- Produce Project Procedure Manual
- Generate status reports
- Review, QA/QC, and deliver data
- Fulfill administrative contractual duties such as scheduling and budget control

Experience:
Mr. McReynolds has successfully managed and completed numerous GIS projects. He is well-versed in many aspects of modern GIS techniques, including the intricacies of accurately translating data between a variety of popular formats, database designs, and the best-fit and COGO approaches to cadastral data conversion. His technical expertise includes:

- 6+ years ESRI's 9x ArcMap, ArcCatalog, ArcToolBox and the Metadata editor
- 6+ years using SDS Map Book Generator and designing custom plotting routines
- Proficient proper relational database design including the correct usage of
    - Proper cardinality between tables (one-to-one, one-to-many, parent/child relationships, etc.)
    - Primary Keys
    - Foreign Key Relationships (With and without the utilization of cascading)
    - Usage of correct data types on each field
    - Accurate field names and corresponding field descriptions for documentation
    - Indexes, Constraint, Triggers
- 2+ years of database schemas design using Visio 2003 for Geodatabase data modeling and design using "best practices" models for clients
- 10+ years in creating and maintaining AML scripts and routines.
- 10+ years using various text editing programs such as UltraEdit-32, emacs and notepad to write and manipulate scripts
- 10+ years using ESRI's Arc/Info workstation using Arc, AML, Arcedit, Arcplot, COGO, Info, Tables, and Grid

Finny Cherian, GIS Specialist

Total Years of GIS Industry Experience: 14
With Smart Data Strategies Since: 2001

Education:
Electrical and Electronics with Distinction, Mahatma Gandhi University Kerala, Kerala, India
Pre Degree Course, University of Kerala, Kerala, India

Certifications:
ArcGIS Annotation: Tips and Tricks
Creating and Editing Geodatabase Features with ArcGIS 8.3 (for ArcEditor and ArcInfo)
Creating, Editing, and Managing Geodatabases for ArcGIS 8.3
Migrating Coverages into the Geodatabase
Creating and Editing Linearly Referenced Features with ArcGIS 9 (for ArcEditor and ArcInfo)
Linear Referencing with ArcGIS Desktop

Responsibilities:
Mr. Cherian duties include managing the quality of GIS related tasks, including monitoring program activities such as:

- Aggregation of data from multiple sources into a standardize geodatabase
- Geodatabase design
- Data conversion
- Data migration
- Data adjustment

Experience:
Mr. Cherian is highly experienced in managing mapping projects of various sizes. He is an expert in many aspects of modern GIS techniques, including the intricacies of accurately translating data between a variety of popular formats, database design, and the best-fit and COGO approaches to cadastral data conversion using MicroStation, ESRI, and Autodesk products. He also is experienced in CAD software such as AutoCAD, Microstation and proper relational database design including:

- Proper cardinality between tables (one-to-one, one-to-many, parent/child relationships, etc.)
- Primary Keys
- Foreign Key Relationships (With and without the utilization of cascading)
- Usage of correct data types on each field
- Accurate field names and corresponding field descriptions for documentation

Kay Allen, GIS Technician

Total Years of GIS Industry Experience: 17
With Smart Data Strategies Since: 1993

Education:
Attended David Lipscomb College, Nashville, Tennessee
IAAO Mapping 101 and Course 600- Principles and Techniques of Cadastral Mapping

Responsibilities:
Ms. Allen is responsible for managing the cadastral project team. Her duties include:

- Analyzing deeds and wills to complete daily We Maps parcel updates.
- Read the and make the changes to their parcel records
- Fulfill requests counties may have such as correcting parcels
- Plot map sets.

Experience:
Ms. Allen has effectively supervised SDS editing staff for many years. Responsible for editing all digitally produced cadastral maps, she is experienced in working with written procedures and following project specifications to ensure quality control guidelines are surpassed.

Matthew Neighbors, Quality Assurance / GIS Technician

Total Years of Industry Experience: 6
With Smart Data Strategies Since: 1

Education:
Bachelor of Science, Major: Geosciences, Middle Tennessee State University

Technical Skills:
ArcGIS, AutoCAD, ArcView, Trimble, SQL

Responsibilities:
Mr. Neighbors' responsibilities include:

- Perform GIS/QA/QC services for multiple GIS projects.
- QC GIS data using various inputs such as LiDAR data, orthophotography, scanned documents, and digital GIS data
- Design, develop and maintain links between various databases and schemas
- Create maps using GIS software including ESRI and AutoCAD

Experience:
Prior to joining SDS, Mr. Neighbors gained extensive experience with GIS and transportation projects having worked with Trimble, various engineering companies, and the Alabama Department of Transportation where is primary responsibility was to work on various GIS projects including centerline alignment and updating attribute data for the Alabama Roadway Inventory. Currently he is in charge of all of the QA/QC for the SDS Alabama Outdoor Advertising Project for ALDOT.

Rob Marlow, Vice President of Technical Services

Total Years of GIS Industry Experience: 13

With Smart Data Strategies Since: 1995

Education:

BA, Business Administration Economics and Finance, Middle Tennessee State University

Responsibilities:

Mr. Marlow manages the technical support staff to ensure client requests are completed. He also manages the creation of online courses for the DREAMaps™ Suite and external training schedules, software training, training materials, and organizing internal training for the company. His responsibilities include:

- Manage the Technical Support staff that supports over 1000 users of the DREAMaps software suite
- Coordinate the internal and external education at Smart Data Strategies
- Training instructor for Smart Data Strategies Software
- Manage installs and implementations
- Manage current client base

Experience:

Mr. Marlow has 13 years of GIS experience, including project management, parcel production/conversion, network infrastructure, marketing, grant management, and course development. His experience includes:

- Serving as the Vice President of Technical Support at Smart Data Strategies, Mr. Marlow has overseen the successful implementation of over 15 enterprise geospatial database implementations, and currently manages four enterprise systems. Throughout these projects, experience was gained in data loading, database configuration, hardware and software configurations, and troubleshooting techniques.

- Implementing eMapsPlus for over 30 clients has provided Mr. Marlow a wealth of experience in web enabled data portals. Creating these sites over the past 5 years has increased his level of experience with several different types of geospatial data.

- Mr. Marlow directed the development of The Geospatial Business Hub Project as part of the President's High Growth Job Training Initiative. Included in this work was the development of geospatial courses at two community colleges, coordination of promotional events, and the creation of documentation on the project management of a geospatial business hub. As part of this project SDS developed the **Virtual Business Hub** (VBH), an online project management tool. During the development of the VBH, the project management cycle was thoroughly investigated and then implemented into the toolset. Areas covered included scheduling, communication, problem and resolution tracking, budgeting, and project status tracking. Smart Data Strategies currently uses the VBH as a project management tool.

Pricing

The following outlines Smart Data Strategies pricing for the Mingo County's parcel project.

TAX12007 COST SHEET

COUNTY	DIGITAL TAX PARCEL POLYGONS DATA	COST	FINISHED TAX MAP PUBLICATION	COST
BRAXTON	16,439		277	
CALHOUN	8,766		149	
GRANT	12,172		260	
HARDY	14,655		298	
JACKSON	19,474		322	
LEWIS	15,223		231	
LINCOLN	17,029		264	
LOGAN	29,212		399	
MCDOWELL	31,020		535	
MINGO	25,986	$111,220	369	$5,535
MONONGOLIA	49,865		638	
MONROE	13,483		255	
ROANE	14,521		241	
TYLER	8,994		149	
WEBSTER	10,765		251	
Total	287,604		4638	
	Total Cost	$111,220	**Total Cost**	$5,535

Phone# & Fax#	Email address	Date	Vendor's name and signature
888.384.6214 615.794.5310	sales@sds-inc.com	7/11/12	Smart Data Strategies