SERIAL 06142 RFP GDACS – GEOSPATIAL ADJUSTMENT PROJECT

DATE OF LAST REVISION: March 05, 2009 CONTRACT END DATE: October 31, 2009

CONTRACT PERIOD THROUGH OCTOBER 31, ~~2008~~ 2009

TO: All Departments

FROM: Department of Materials Management

SUBJECT: Contract for **GDACS – GEOSPATIAL ADJUSTMENT PROJECT**

Attached to this letter is published an effective purchasing contract for products and/or services to be supplied to Maricopa County activities as awarded by Maricopa County on **October 31, 2007 (Eff. 11/01/07).**

All purchases of products and/or services listed on the attached pages of this letter are to be obtained from the vendor holding the contract. Individuals are responsible to the vendor for purchases made outside of contracts. The contract period is indicated above.

_____

Wes Baysinger, Director
Materials Management

BW/mm
Attach

Copy to: Materials Management
Russ Heisinger, Assessor

CONTRACT PURSUANT TO RFP

SERIAL 06142-RFP

This Contract is entered into this 31st day of October, 2007 by and between Maricopa County ("County"), a political subdivision of the State of Arizona, and SMART DATA STRATEGIES, INC., an TENNESSEE corporation ("Contractor") for the purchase of GEO-SPATIAL ADJUSTMENT services.

1.0 TERM

1.1 This Contract is for a term of One (1) year, beginning on the 1st day of November, 2007 and ending the 31st day of October, ~~2008~~ **2009**.

1.2 The County may, at its option and with the agreement of the Contractor, extend the period of this Contract for additional terms up to a maximum of One (1) years, (or at the County's sole discretion, extend the contract on a month to month bases for a maximum of six (6) months after expiration). The County shall notify the Contractor in writing of its intent to extend the Contract period at least thirty (30) calendar days prior to the expiration of the original contract period, or any additional term thereafter.

2.0 PAYMENT

2.1 As consideration for performance of the duties described herein, County shall pay Contractor the sum(s) stated in Exhibit "A."

2.1.1 PAYMENT SCHEDULE

Total capped Not To Exceed Project Cost is $1,650,000.00 to include all Travel and incidental expenses.

PILOT PROJECT COSTS

Pilot Project Costs in the amount of $80,000.00 will be payable upon the Contractors successful completion and County acceptance of deliverables relevant to Pilot Project #1 and Pilot Project #2. Scope of Work relevant to Pilot Projects #1 & #2 is contained in Exhibit B- Scope of Work.

Pilot Project billing will not be subject to Retainage and shall be deemed payable (subject to contract payment terms) upon final acceptance by Maricopa County.

BALANCE OF PROJECT COSTS

The contractor shall bill on a monthly basis for adjusted CAD files completed during the applicable month less a 20% retainage.

Adjusted CAD files shall be billed at a contract rate of $623.51 per file*. Each monthly invoice shall reflect a separate line item reflecting the 20% retainage deduction for that applicable month.

*At time of contract it is estimated that post-pilot completion there will be approximately 2518 CAD files to be adjusted. Total post Pilot project cost of $1,570,000.00 divided by outstanding CAD files reflects a cost of $623.51 per file distribution. This per file distribution shall include payment for all Tasks and Deliverables associated with successful delivery of the entire Scope of Work. It is estimated that during the duration of this project this total file size may grow slightly.

RETAINAGE

All Post-Pilot Project invoicing shall be subject to 20% retainage. The 20% retainage or $314,000.00 shall be payable upon completion and acceptance of the entire project. To include delivery of:

Any outstanding Adjusted CAD Files above and beyond the estimated 2518 contract figure.

Any Tasks, Deliverables, and/or Services relative to the Scope of Work and completion of the total project as contracted.

2.1.2 DELIVERY SCHEDULE

The project participants need to limit the time the existing GIS data is not available for normal data maintenance. The participants expect the Contractor to provide a production schedule showing a steady input of source materials from the County and delivery of completed adjusted areas. The Assessor's Office has expressed the desire to have 50 sections completed a week for the cadastral adjustment. The entire project should be completed in (1) One calendar year.

A GDACS Project Parcel Count Distribution Schedule is attached herein as Exhibit A-3. The distribution schedule provides approximate Parcel Counts applicable to their Block assignments and the designated schedule of their release throughout the project. It will be the contractors responsibility to provide the sufficient production and delivery necessary to meet the mandated quarterly delivery thresholds. Exhibit A-3 may only be amended via formal change order amenable and executed by both parties.

A Pilot Project – Project Plan has been incorporated herein as Exhibit A-1 at time of contract signing. Should the contractor successfully complete the Pilot Project and be given a notice to proceed on the balance of the project, a complete Project Plan for the balance of the project shall be submitted for consideration. Upon acceptance the mutually amenable Project Plan shall be integrated and become Exhibit A-2 to the final contract.

2.1.3 LATE DELIVERIES

Data deliveries rejected by the County due to excessive errors or edits will not be considered as received and could be subject to late delivery penalties. The intent is to have the Contractor deliver the adjusted parcel data as "First Time Right". The County may consider accepting a delivery with minor edits, meaning County staff can fix the corrections quickly (i.e. 15 minutes or less).

The contract shall be responsible for meeting the quarterly delivery thresholds as designated in Exhibit A-3. The contractor shall be assessed a $100 per calendar day penalty for each day it is out compliance in meeting the designated quarterly delivery thresholds.

2.2 Payment shall be made upon the County's receipt of a properly completed invoice. Invoices shall contain the following information: Contract number, purchase order number, item numbers, description of supplies and/or services, sizes, quantities, unit prices, extended totals and any applicable sales/use tax.

2.3 INVOICES AND PAYMENTS:

2.3.1 **The Contractor shall submit two (2) legible copies of their detailed invoice before payment(s) can be made. At a minimum, the invoice must provide the following information:**

2.3.1.1 Company name, address and contact
2.3.1.2 County bill-to name and contact information
2.3.1.3 Contract Serial Number
2.3.1.4 County purchase order number
2.3.1.5 Invoice number and date
2.3.1.6 Payment terms
2.3.1.7 Date of service or delivery
2.3.1.8 Quantity (number of days or weeks)
2.3.1.9 Contract Item number(s)
2.3.1.10 Description of Purchase (product or services)
2.3.1.11 Arrival and completion time (if applicable)
2.3.1.12 Total Amount Due

Problems regarding billing or invoicing shall be directed to the using agency as listed on the Purchase Order.

2.3.2 Payment will be made to the Contractor by Accounts Payable through the Maricopa County Vendor Express Payment Program. This is an Electronic Funds Transfer (EFT) process. After Award the Contractor shall fill out an EFT Enrollment form (to be provided by the Procurement Officer) or as located on the County Department of Finance Website as a fillable PDF document (www.maricopa.gov/finance/).

2.3.3 EFT payments to the routing and account numbers designated by the Contractor will include the details on the specific invoices that the payment covers. The Contractor is required to discuss remittance delivery capabilities with their designated financial institution for access to those details.

3.0 DUTIES

3.1 The Contractor shall perform all duties stated in Exhibit "B."

3.2 The Contractor shall perform services at the location(s) and time(s) stated in Exhibit "B," or as otherwise directed in writing.

3.3 During the Contract term, County shall provide Contractor's personnel with adequate workspace for consultants and such other related facilities as may be required by Contractor to carry out its contractual obligations.

4.0 TERMS & CONDITIONS

4.1 INDEMNIFICATION:

To the fullest extent permitted by law, Contractor shall defend, indemnify, and hold harmless County, its agents, representatives, officers, directors, officials, and employees from and against all claims, damages, losses and expenses, including, but not limited to, attorney fees, court costs, expert witness fees, and the cost of appellate proceedings, relating to, arising out of, or alleged to have resulted from the negligent acts, errors, omissions or mistakes relating to the performance of

this Contract. Contractor's duty to defend, indemnify and hold harmless County, its agents, representatives, officers, directors, officials, and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury, sickness, disease, death, or injury to, impairment, or destruction of property, including loss of use resulting there from, caused by any negligent acts, errors, omissions or mistakes in the performance of this Contract including any person for whose acts, errors, omissions or mistakes Contractor may be legally liable.

The amount and type of insurance coverage requirements set forth herein will in no way be construed as limiting the scope of the indemnity in this paragraph.

The scope of this indemnification does not extend to the sole negligence of County.

4.2 INSURANCE REQUIREMENTS:

Contractor, at Contactor's own expense, shall purchase and maintain the herein stipulated minimum insurance from a company or companies duly licensed by the State of Arizona and possessing a current A.M. Best, Inc. rating of B++6. In lieu of State of Arizona licensing, the stipulated insurance may be purchased from a company or companies, which are authorized to do business in the State of Arizona, provided that said insurance companies meet the approval of County. The form of any insurance policies and forms must be acceptable to County.

All insurance required herein shall be maintained in full force and effect until all work or service required to be performed under the terms of the Contract is satisfactorily completed and formally accepted. Failure to do so may, at the sole discretion of County, constitute a material breach of this Contract.

Contractor's insurance shall be primary insurance as respects County, and any insurance or self-insurance maintained by County shall not contribute to it.

Any failure to comply with the claim reporting provisions of the insurance policies or any breach of an insurance policy warranty shall not affect the County's right to coverage afforded under the insurance policies.

The insurance policies may provide coverage that contains deductibles or self-insured retentions. Such deductible and/or self-insured retentions shall not be applicable with respect to the coverage provided to County under such policies. Contactor shall be solely responsible for the deductible and/or self-insured retention and County, at its option, may require Contractor to secure payment of such deductibles or self-insured retentions by a surety bond or an irrevocable and unconditional letter of credit.

County reserves the right to request and to receive, within 10 working days, certified copies of any or all of the herein required insurance policies and/or endorsements. County shall not be obligated, however, to review such policies and/or endorsements or to advise Contractor of any deficiencies in such policies and endorsements, and such receipt shall not relieve Contractor from, or be deemed a waiver of County's right to insist on strict fulfillment of Contractor's obligations under this Contract.

The insurance policies required by this Contract, except Workers' Compensation, and Errors and Omissions, shall name County, its agents, representatives, officers, directors, officials and employees as Additional Insureds.

The policies required hereunder, except Workers' Compensation, and Errors and Omissions, shall contain a waiver of transfer of rights of recovery (subrogation) against County, its agents, representatives, officers, directors, officials and employees for any claims arising out of Contractor's work or service.

Contractor is required to procure and maintain the following coverages indicated by a checkmark:

4.2.1 Commercial General Liability.

Commercial General Liability insurance and, if necessary, Commercial Umbrella insurance with a limit of not less than $1,000,000 for each occurrence, $2,000,000 Products/Completed Operations Aggregate, and $2,000,000 General Aggregate Limit. The policy shall include coverage for bodily injury, broad form property damage, personal injury, products and completed operations and blanket contractual coverage, and shall not contain any provision which would serve to limit third party action over claims. There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability arising from explosion, collapse, or underground property damage.

4.2.2 Automobile Liability.

Commercial/Business Automobile Liability insurance and, if necessary, Commercial Umbrella insurance with a combined single limit for bodily injury and property damage of not less than $1,000,000 each occurrence with respect to any of the Contractor's owned, hired, and non-owned vehicles assigned to or used in performance of the Contractor's work or services under this Contract.

4.2.3 Workers' Compensation.

Workers' Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor's employees engaged in the performance of the work or services under this Contract; and Employer's Liability insurance of not less than $100,000 for each accident, $100,000 disease for each employee, and $500,000 disease policy limit.

Contractor waives all rights against County and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the Workers' Compensation and Employer's Liability or commercial umbrella liability insurance obtained by Contractor pursuant to this Contract.

4.2.4 Certificates of Insurance.

4.2.4.1 Prior to commencing work or services under this Contract, Contractor shall furnish the County with certificates of insurance, or formal endorsements as required by the Contract in the form provided by the County, issued by Contractor's insurer(s), as evidence that policies providing the required coverage, conditions and limits required by this Contract are in full force and effect. Such certificates shall identify this contract number and title.

4.2.4.2 Cancellation and Expiration Notice.

Insurance required herein shall not be permitted to expire, be canceled, or materially changed without thirty (30) days prior written notice to the County.

4.5 NOTICES:

All notices given pursuant to the terms of this Contract shall be addressed to:

<u>For County:</u>
Maricopa County
Department of Materials Management
Attn: Director of Purchasing
320 West Lincoln Street
Phoenix, Arizona

<u>For Contractor:</u>
Smart Data Strategies, Inc.

357 Riverside Dr., Ste. 100
Franklin, TN. 37064
Phone: 615-794-5280

4.6 REQUIREMENTS CONTRACT:

4.6.1 Contractor signifies its understanding and agreement by signing this document that this Contract is a requirements contract. This Contract does not guarantee any purchases will be made (minimum or maximum). Orders will only be placed when County identifies a need and issues a purchase order or a written notice to proceed.

4.6.2 County reserves the right to cancel purchase orders or notice to proceed within a reasonable period of time after issuance. Should a purchase order or notice to proceed be canceled, the County agrees to reimburse the Contractor for actual and documented costs incurred by the Contractor. The County will not reimburse the Contractor for any avoidable costs incurred after receipt of cancellation, or for lost profits, or shipment of product or performance of services prior to issuance of a purchase order or notice to proceed.

4.6.3 Contractor agrees to accept oral cancellation of purchase orders.

4.7 TERMINATION FOR CONVENIENCE:

The County reserves the right to terminate the Contract, in whole or in part at any time, when in the best interests of the County without penalty or recourse. Upon receipt of the written notice, the Contractor shall immediately stop all work, as directed in the notice, notify all subcontractors of the effective date of the termination and minimize all further costs to the County. In the event of termination under this paragraph, all documents, data and reports prepared by the Contractor under the Contract shall become the property of and be delivered to the County upon demand. The Contractor shall be entitled to receive just and equitable compensation for work in progress, work completed and materials accepted before the effective date of the termination.

4.8 TERMINATION FOR DEFAULT:

4.8.1 In addition to the rights reserved in the Contract, the County may terminate the Contract in whole or in part due to the failure of the Contractor to comply with any term or condition of the Contract, to acquire and maintain all required insurance policies, bonds, licenses and permits, or to make satisfactory progress in performing the Contract. The Procurement Officer shall provide written notice of the termination and the reasons for it to the Contractor.

4.8.2 Upon termination under this paragraph, all goods, materials, documents, data and reports prepared by the Contractor under the Contract shall become the property of and be delivered to the County on demand.

4.8.3 The County may, upon termination of this Contract, procure, on terms and in the manner that it deems appropriate, materials or services to replace those under this Contract. The Contractor shall be liable to the County for any excess costs incurred by the County in procuring materials or services in substitution for those due from the Contractor.

4.8.4 The Contractor shall continue to perform, in accordance with the requirements of the Contract, up to the date of termination, as directed in the termination notice.

4.9 STATUTORY RIGHT OF CANCELLATION FOR CONFLICT OF INTEREST:

Notice is given that pursuant to A.R.S. §38-511 the County may cancel this Contract without penalty or further obligation within three years after execution of the contract, if any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the County is at any time while the Contract or any extension of the Contract is in effect,

an employee or agent of any other party to the Contract in any capacity or consultant to any other party of the Contract with respect to the subject matter of the Contract. Additionally, pursuant to A.R.S §38-511 the County may recoup any fee or commission paid or due to any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the County from any other party to the contract arising as the result of the Contract.

4.10 OFFSET FOR DAMAGES;

In addition to all other remedies at law or equity, the County may offset from any money due to the Contractor any amounts Contractor owes to the County for damages resulting from breach or deficiencies in performance under this contract.

4.11 ADDITIONS/DELETIONS OF SERVICE:

The County reserves the right to add and/or delete products and/or services provided under this Contract. If a requirement is deleted, payment to the Contractor will be reduced proportionately to the amount of service reduced in accordance with the proposal price. If additional services and/or products are required from this Contract, prices for such additions will be negotiated between the Contractor and the County.

4.12 SUBCONTRACTING:

The Contractor may not assign this Contract or subcontract to another party for performance of the terms and conditions hereof without the written consent of the County, which shall not be unreasonably withheld. All correspondence authorizing subcontracting must reference the Proposal Serial Number and identify the job project.

4.13 AMENDMENTS:

All amendments to this Contract must be in writing and signed by both parties.

4.14 RETENTION OF RECORDS:

The Contractor agrees to retain all financial books, records, and other documents relevant to this Contract for five (5) years after final payment or until after the resolution of any audit questions which could be more than five (5) years, whichever is longer. The County, Federal or State auditors and any other persons duly authorized by the Department shall have full access to, and the right to examine, copy and make use of, any and all said materials.

If the Contractor's books, records and other documents relevant to this Contract are not sufficient to support and document that requested services were provided, the Contractor shall reimburse Maricopa County for the services not so adequately supported and documented.

4.15 AUDIT DISALLOWANCES:

If at any time, County determines that a cost for which payment has been made is a disallowed cost, such as overpayment, County shall notify the Contractor in writing of the disallowance. County shall also state the means of correction, which may be but shall not be limited to adjustment of any future claim submitted by the Contractor by the amount of the disallowance, or to require repayment of the disallowed amount by the Contractor.

4.16 ALTERNATIVE DISPUTE RESOLUTION:

4.16.1 After the exhaustion of the administrative remedies provided in the Maricopa County Procurement Code, any contract dispute in this matter is subject to compulsory arbitration. Provided the parties participate in the arbitration in good faith, such arbitration is not binding and the parties are entitled to pursue the matter in state or federal court sitting in Maricopa County for a de novo determination on the law and facts. If the parties cannot agree on an arbitrator, each party will designate an arbitrator and

those two arbitrators will agree on a third arbitrator. The three arbitrators will then serve as a panel to consider the arbitration. The parties will be equally responsible for the compensation for the arbitrator(s). The hearing, evidence, and procedure will be in accordance with Rule 74 of the Arizona Rules of Civil Procedure. Within ten (10) days of the completion of the hearing the arbitrator(s) shall:

4.16.1.1 Render a decision;

4.16.1.2 Notify the parties that the exhibits are available for retrieval; and

4.16.1.3 Notify the parties of the decision in writing (a letter to the parties or their counsel shall suffice).

4.16.2 Within ten (10) days of the notice of decision, either party may submit to the arbitrator(s) a proposed form of award or other final disposition, including any form of award for attorneys' fees and costs. Within five (5) days of receipt of the foregoing, the opposing party may file objections. Within ten (10) days of receipt of any objections, the arbitrator(s) shall pass upon the objections and prepare a signed award or other final disposition and mail copies to all parties or their counsel.

4.16.3 Any party which has appeared and participated in good faith in the arbitration proceedings may appeal from the award or other final disposition by filing an action in the state or federal court sitting in Maricopa County within twenty (20) days after date of the award or other final disposition. Unless such action is dismissed for failure to prosecute, such action will make the award or other final disposition of the arbitrator(s) a nullity.

4.17 SEVERABILITY:

The invalidity, in whole or in part, of any provision of this Contract shall not void or affect the validity of any other provision of this Contract.

4.18 RIGHTS IN DATA:

The County shall own have the use of all data and reports resulting from this Contract without additional cost or other restriction except as provided by law. Each party shall supply to the other party, upon request, any available information that is relevant to this Contract and to the performance hereunder.

4.19 INTEGRATION:

This Contract represents the entire and integrated agreement between the parties and supersedes all prior negotiations, proposals, communications, understandings, representations, or agreements, whether oral or written, express or implied. The table below reflects all exhibits applicable to this entire agreement.

EXHIBIT A – PRICING

EXHIBIT A-1 PROJECT PLAN - PILOT
EXHIBIT A-2 PROJECT PLAN

EXHIBIT B – SCOPE OF WORK

4.20 GOVERNING LAW:

This Contract shall be governed by the laws of the state of Arizona. Venue for any actions or lawsuits involving this Contract will be in Maricopa County Superior Court or in the United States District Court for the District of Arizona, sitting in Phoenix, Arizona.

4.21 CHANGE ORDER PROCESS

Any revision to the specified Scope of Work, Task, or Deliverable must me documented via a Formal Change Order Process.

The Maricopa County Project Manager is ultimately responsible for the overall management of the project scope, and therefore responsible for the final approval of all change requests. The contractors Project Manager will be responsible for sizing, pricing, and implementing approved Change Requests.

Prior to commencing work on this project, Contractor is required to submit an applicable Change Order Request Form for approval by the Maricopa County Project Manager. The resulting form will serve as the only recognized means to alter/change the applicable Scope of Work (as designated in this contract).

4.22 CONTRACTOR STAFF

This project requires the use resources from Contractor as below:

PRIMARY/SENIOR STAFFING MODEL:

Finny Cherian – SDS PROJECT MANAGER

Rudy Stricklan – ONSITE PROJECT MANAGER

Monica Dennis – DIRECTOR OPERATIONS

Nikhil Jani – SENIOR MANAGER, GIS

Kay Allen – EDITING SUPERVISOR

Marty Schaeffer – PROJECT ADVISOR

Phil Ponce – TECHNICAL MANAGER

Bo Guo – GIS SPECIALIST

Any changes to the primary staff identified in the staffing model must be submitted in writing to the designated County Project Manager. County will reserve the right to interview and/or have final approval on any proposed changes to this primary/senior staffing model.

4.23 NON-COMPETE CLAUSE:

To the extent permitted by Law, during the term of this Agreement and for a period of one (1) year after its termination, neither party will directly or indirectly (a) solicit for hire or engagement any of the other party's personnel who were involved in the provision or receipt of Services under this Agreement or (b) hire or engage any person or entity who is or was employed or engaged by the other party and who was involved in the provision or receipt of Services under this Agreement until one hundred eighty (180) days following the termination of the person's or entity's employment or engagement with the other party. For purposes herein, "Solicit" does not include broad-based recruiting efforts, including without limitation help wanted advertising and posting of open positions on a party's internet site.

4.24 TRAVEL

Project cost is a total burdened Firm Fixed Price to include any and all applicable travel.

Any extraneous travel charges pertinent to changes in Scope of Work, must be approved by Maricopa County, and must be in accordance with the Maricopa County Travel Policy and must be accompanied by a change order (if applicable).

4.25 DELIVERABLE – ACCEPTABLE MEDIA

The selected Contractor will be expected to deliver, at a minimum, the adjusted GIS data in the formats described in Table below. Conversion methods can involve using other digital mapping formats and technologies as long as the final County delivered data is in the format specified in Table below.

Layer to be Adjusted	**Delivery Format**
Assessor's parcels	ESRI shapefile & MicroStation V8
Assessor's parcel text	ESRI shapefile & MicroStation V8
Assessor's subdivision boundaries	ESRI shapefile & MicroStation V8
Planning & Development zoning	ESRI shapefile
Planning & Development annexations	ESRI shapefile
Planning & Development city boundaries	ESRI shapefile

4.26 COUNTY PROVIDED SOURCE MATERIALS

The contracted vendor must agree that all data, maps, aerial photos and support materials may only be used to fulfill their contractual obligations of the project. All data, maps, aerial photos and support materials may not be sold or distributed without prior written approval from Maricopa County. The data may be shared with approved subcontractors with the same restrictions.

4.27 **VERIFICATION REGARDING COMPLIANCE WITH ARIZONA REVISED STATUTES §41-4401 AND FEDERAL IMMIGRATION LAWS AND REGULATIONS:**

4.27.1 **By entering into the Contract, the Contractor warrants compliance with the Federal Immigration and Nationality Act (FINA using e-verify) and all other Federal immigration laws and regulations related to the immigration status of its employees. The contractor shall obtain statements from its subcontractors certifying compliance and shall furnish the statements to the Procurement Officer upon request. These warranties shall remain in effect through the term of the Contract. The Contractor and its subcontractors shall also maintain Employment Eligibility Verification forms (I-9) as required by the U.S. Department of Labor's Immigration and Control Act, for all employees performing work under the Contract and verify employee compliance using the F-verify system. I-9 forms are available for download at USCIS.GOV.**

4.27.2 **The County may request verification of compliance for any contractor or subcontractor performing work under the Contract. Should the County suspect or find that the Contractor or any of its subcontractors are not in compliance, the County may pursue any and all remedies allowed by law, including, but not limited to: suspension of work, termination of the Contract for default, and suspension and/or department of the Contractor. All costs necessary to verify compliance are the responsibility of the Contractor.**

4.28 **VERIFICATION REGARDING COMPLIANCE WITH ARIZONA REVISED STATUTES §§35-391.06 AND 35-393.06 BUSINESS RELATIONS WITH SUDAN AND IRAN:**

4.28.1 **By entering into the Contract, the Contractor certifies it does not have scrutinized business operations in Sudan or Iran. The contractor shall obtain statements from its subcontractors certifying compliance and shall furnish the statements to the Procurement Officer upon request. These warranties shall remain in effect through the term of the Contract.**

4.28.2 **The County may request verification of compliance for any contractor or subcontractor performing work under the Contract. Should the County suspect or find that the Contractor or any of its subcontractors are not in compliance, the County may pursue any and all remedies allowed by law, including, but not limited to:**

suspension of work, termination of the Contract for default, and suspension and/or department of the Contractor. All costs necessary to verify compliance are the responsibility of the Contractor.

4.29 **CONTRACTOR LICENSE REQUIREMENT:**

4.29.1 **The Respondent shall procure all permits, licenses and pay the charges and fees necessary and incidental to the lawful conduct of his business. The Respondent shall keep fully informed of existing and future Federal, State and Local laws, ordinances, and regulations which in any manner affect the fulfillment of a Contract and shall comply with the same.**

4.29.2 **Respondents furnishing finished products, materials or articles of merchandise that will require installation or attachment as part of the Contract, shall possess any licenses required. A Respondent is not relieved of its obligation to posses the required licenses by subcontracting of the labor portion of the Contract. Respondents are advised to contact the Arizona Registrar of Contractors, Chief of Licensing, at (602) 542-1502 to ascertain licensing requirements for a particular contract. Respondents shall identify which license(s), if any, the Registrar of Contractors requires for performance of the Contract.**

IN WITNESS WHEREOF, this Contract is executed on the date set forth above.

CONTRACTOR

Susan Marlow

AUTHORIZED SIGNATURE

Susan Marlow

PRINTED NAME AND TITLE

357 Riverside Dr Suite 100, Franklin, Tn 37064

ADDRESS

10/22/07

DATE

MARICOPA COUNTY

BY: _____ _____

DIRECTOR, MATERIALS MANAGEMENT DATE

BY: _____ OCT 31 2007

CHAIRMAN, BOARD OF SUPERVISORS DATE

ATTESTED:

_____ OCT 31 2007

CLERK OF THE BOARD DATE

APPROVED AS TO FORM:

_____ 10/25/7

DEPUTY MARICOPA COUNTY ATTORNEY DATE

EXHIBIT A – PRICING

SERIAL 06142-RFP
PRICING SHEET: NIGP 9254501
BIDDER NAME: Smart Data Strategies, Inc.
VENDOR # : W000007194
BIDDER ADDRESS: 357 Riverside Dr., Suite 100 Franklin, TN. 37064
P.O. ADDRESS:
BIDDER PHONE #: 615-794-5280
BIDDER FAX #: 615-794-5310
COMPANY WEB SITE: www.sds-inc.com
COMPANY CONTACT (REP): Susan Marlow, President/CEO
E-MAIL ADDRESS (REP): sales@sds-inc.com

WILLING TO ACCEPT FUTURE SOLICITATIONS VIA EMAIL: __X___ YES _____ NO

OTHER GOV'T. AGENCIES MAY USE THIS CONTRACT: ___X__YES _____ NO

PAYMENT TERMS: NET 30

INDICATE PERCENTAGE OF M/WBE PARTICIPATION IF ANY HERE:___75_____%

1.0 PRICING:

Pricing should reflect a Frim Fixed for Each Designated Specified Project

	PROJECT	PRICING
1.1	**GIS CADASTRAL ADJUSTMENT**	**$ 1,270,000.00**
1.2	**Pilot Project - Cadastral & Planning & Development**	
	1.2.1 PILOT #1	**$ 50,000.00**
	1.2.2 PILOT #2	**$ 30,000.00**
1.3	**Planning & Development Data Adjust**	**$ 300,000.00**

2.0 PRICING:

2.1 ADDITIONAL LABOR HOURS

HOURLY RATES - Additional Requirements as Assigned
Please Note Hourly Rates

Please Provide Posistion Titles and Applicable Hourly Rate

		PER HOUR
2.1.1 SR. Project Manager	**$**	**120.68**
2.1.2 Project Manager	**$**	**101.64**
2.1.3 Cadastral Specialist	**$**	**68.84**
2.1.4 GIS Technician	**$**	**64.89**
2.1.5 QC Technician	**$**	**52.49**

EXHIBIT A-1
PILOT PROJECT-PROJECT PLAN

EXHIBIT A-1
PILOT PROJECT-PROJECT PLAN

ID	Task Name	Duration	Start	Finish
1	**Contract Signing**	1 day	Thu 11/1/07	Thu 11/1/07
2	**Kick-Off Meeting (tentative date)**	1 day	Tue 11/13/07	Tue 11/13/07
3				
4	**Parcel Pilot**	**45 days**	**Tue 11/13/07**	**Tue 1/15/08**
5	Receive Source Document	0 days	Tue 11/13/07	Tue 11/13/07
6	Data Adjustment	20 days	Wed 11/14/07	Tue 12/11/07
7	Quality Control	3 days	Wed 12/12/07	Fri 12/14/07
8	Quality Assurance (EMS)	5 days	Mon 12/17/07	Fri 12/21/07
9	Pilot Review for County	15 days	Mon 12/24/07	Fri 1/11/08
10	Pilot Review Meeting	2 days	Mon 1/14/08	Tue 1/15/08
11				
12	**Zoning Pilot**	**20 days**	**Tue 1/15/08**	**Tue 2/12/08**
13	Receive Source Documents	0 days	Tue 1/15/08	Tue 1/15/08
14	Data Adjustment	10 days	Wed 1/16/08	Tue 1/29/08
15	Quality Control	2 days	Wed 1/30/08	Thu 1/31/08
16	Quality Assurance (EMS)	2 days	Fri 2/1/08	Mon 2/4/08
17	Pilot Review for County	5 days	Tue 2/5/08	Mon 2/11/08
18	Pilot Review Meeting	1 day	Tue 2/12/08	Tue 2/12/08

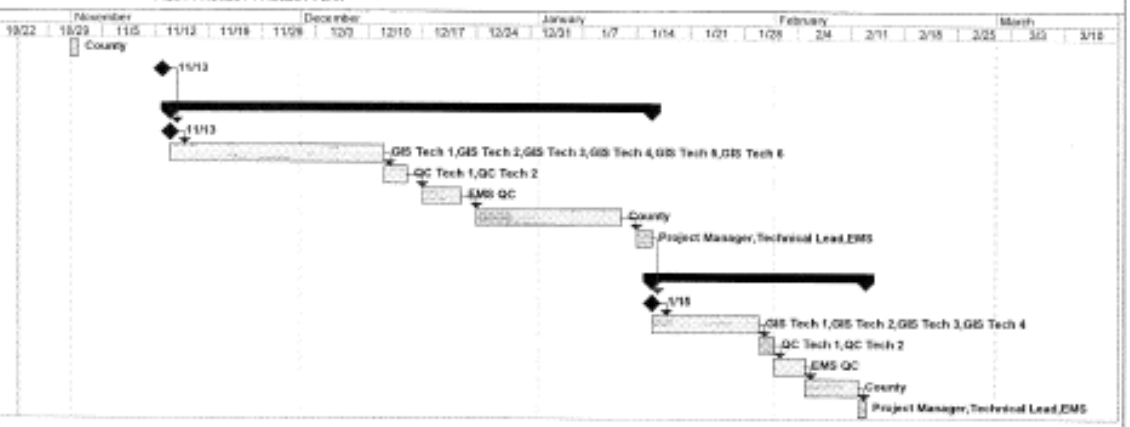


EXHIBIT A-1 PILOT PROJECT-PROJECT PLAN
Date: Thu 10/25/07

Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary | Group By Summary | Deadline

Page 1

EXHIBIT A-3
PARCEL COUNT DIST. SCHEDULE

Maricopa County GDACS Project
Parcel Count per block of 50 Drawings

EXPECTED DELIVERY THRESHOLDS

Block	Parcel Count	Totals	QTR
1	64254		
2	70923		
3	43641		
4	50860		
5	76597	**306275**	**QTR 1**
6	73182		
7	59658		
8	31832		
9	58283		
10	34847		
11	26150		
12	46137		
13	49583		
14	36811		
15	20540		
16	17655		
17	23056		
18	29257	**506991**	**QTR 2**
19	53929		
20	34463		
21	42262		
22	36590		
23	58312		
24	46319		
25	35602		
26	52196		
27	18718		
28	12787		
29	33781		
30	20507		
31	30781		
32	40710		
33	69360	**586317**	**QTR 3**

34	58515		
35	60809		
36	47488		
37	34642		
38	68394		
39	71782		
40	56154		
41	26518		
42	15621		
43	26125		
44	11043		
45	12883		
46	7409		
47	6754		
48	2897		
49	**483**	**507517**	**QTR 4**
Total	**1907100**	**1907100**	

EXHIBIT B – SCOPE OF WORK

1.0 INTENT:

Maricopa County contract for the provision of adjusting existing GIS datasets. The County seeks to adjust existing GIS features to the County's Geodetic Densification and Cadastral Survey (GDACS). The GDACS project generated survey level information for the County's section and quarter-section corners. The adjusted GIS features also need to overlay the County's orthophotography.

The Contractor will be expected to deliver, at a minimum, the adjusted GIS layers using proven methodologies in the formats specified by the County within. The source materials will include the existing GIS layers, Assessor's Office parcel CAD drawing files for new land subdivisions, GDACS monuments, digital orthophotography and adjusted parcels from the City of Peoria.

GEOSPATIAL ADJUSTMENT SPECIFICATIONS

This project involves the adjustment or re-registration of several existing GIS layers shared by many County departments. The intent is to complete the adjustment with the least amount of disruption to normal GIS data maintenance activities. The GIS layers will be adjusted using the County's Geodetic Densification and Control Survey (GDCAS) corner monuments. The adjusted data also needs to overlay the County digital orthophotography correctly supporting map production.

GDACS Description

The Maricopa County Department of Transportation (MCDOT) developed the Geodetic Densification and Cadastral Survey (GDACS) Project. The goal of the GDACS project was to provide an accurate surveyed base grid for development of a countywide shared GIS system. This project included using GPS to perform a dependent resurvey of the Public Land Survey System (PLSS) Monuments within the Townships including section and quarter-section monuments. This involved extensive research of existing survey records, analyzing monument location information and record information, determining a surveyed location for each PLSS corner and replacing or upgrading corner monuments. This was accomplished by using GPS measurements, recording each resulting Township survey plat, and delivering a monument database complete with location, description, corner determination notes and photos of the corner monuments to the County. For additional information on GDACS please refer to the Maricopa County web site at:

http://www.mcdot.maricopa.gov/survey/home.htm

COUNTY ORTHOPHOTOGRAPHY

The Flood Control District of Maricopa County has been managing the County's orthophotography program. In 2005 the County acquired digital color orthophotography for the metro area at a pixel resolution of 0.8 feet. In 2006 the County acquired new digital color orthophotography allowing staff to keep up with the rapid growth in Phoenix. The 2006 orthophotography is at a pixel resolution of 0.32 feet for most of the metropolitan area and 0.8 pixel resolution for the remaining rural areas of the County. The 2006 orthophotography has been delivered for portions of the Phoenix metro area. If the 2006 orthophotography is not available for an area prior to starting the GIS adjustment project the Contractor will be provided with the 2005 or earlier orthophotography. The County's orthophotography was controlled using the GDACS control network and is suitable for 100 scale mapping. The County's orthophotography can be viewed on the County web site at:

http://www.maricopa.gov/assessor/gis

The County's orthophotography can be viewed on the GIS web site at a scale of 1" = 2,500' or closer.

The existing County GIS data is in the Arizona State Plane Coordinate System, NAD83, Central Zone, Units in US feet. Please note that **International Feet** are required for the project deliverables. All digital map data produced under this project will need to be delivered in this coordinate system.

GENERAL INFORMATION

The Assessor's Office cadastral maps were originally produced in the early 1950's as graphic representations (paper) of properties created from recorded deed, plats, and surveys. These were based on the standard township-range-section geography, using a standard section of 5,280 square feet. In the late 1990's the Assessor's Office completed a conversion project from hard copy paper maps to MicroStation CAD files and ESRI GIS shapefiles countywide. The conversion project used available survey ground control, hard copy maps, digital COGO'd engineering drawings and other sources to develop the GIS parcel layer. The completion of the County's GDACS ground control network project was not available until after the completion of the Assessor' conversion project. The completion of the GDACS project provides an opportunity for the County to perform a parcel adjustment based on solid survey control.

The Assessor's Office maintains their parcel data by section map in different software formats including ESRI shapefiles and MicroStation V8 dgn files. A section map roughly relates to a section of land in the Public Land Survey System (PLSS). The Assessor tries to keep new subdivisions together causing some section drawings to be larger than a PLSS section. The daily maintenance to the parcel geometry is completed in the
MicroStation CAD files. The current process to maintain the parcel layer generally involves the following:

- Translate external AutoCAD drawings into MicroStation .dgn files
- Update MicroStation CAD files with new linework and text
- QC modifications to individual section drawings
- Generate Assessor Parcel Numbers (APN) for each polygon
- Validate APN's in GIS files with County Secure Master Database using Property Information Management System (PIMS)
- Make any necessary corrections
- Generate final GIS files for staff and the web site
- Create plot files for paper map output

This process allows County staff to easily use provided CAD files from engineering and survey companies to assist with maintaining the countywide parcel layer. The existing GIS parcel layer has been developed using several sources to develop features as accurate as possible. The sources used include:

- Recorded deeds, plats and surveys
- Subdivision drawings from engineering companies
- COGO'd land parcels
- Parcels adjusted and provided by several cities
- COGO'd and/or digitized parcel splits
- Digitized parcels

2.0 <u>SCOPE OF WORK</u>:

2.1 PILOT PROJECT

The contractor will be required to successfully complete the Pilot Projects as specified below prior to commencing work on the balance of the project. Maricopa County shall reserve the right to terminate contract should the contracted vendor fail to successfully complete the prescribed Pilot Projects. Full acceptance of all Pilot Project deliverables shall constitute successful completion and a Purchase Order will be issued for the balance of the project.

County staff will prepare and deliver the source materials for the pilot area prior to the scheduled start of the pilot. County staff will prepare a packet of source materials for each section to be adjusted in the pilot area and provide this information to the Contractor. Based on the workflow expectations the Contractor will be given packets for the sections to be adjusted one week before the pilot project will begin.

The pilot involves the adjustment of the existing parcel data using the GDACS corner monuments and orthophotography. The County has identified 2 pilot areas:

PILOT AREA 1 –

Pilot Area 1 consists of 12 sections - Gilbert, Queen Creek Area from Ocotillo Rd. south to Hunt Highway and from Higley Rd east to Hawes Rd. The area remains 12 sections but the parcel count would increase.

PILOT AREA 2 –

Pilot area 2 represents a rural area with 2004 orthophotography (1 ft pixel resolution) and survey control monuments (approximately 3.5 mile spacing), no section corner monuments are available for this area.

The selected pilot areas provide the Contractor with a representation of issues to be found throughout the county including new subdivisions, older residential communities and commercial areas. The Contractor will deliver the adjusted pilot data in MicroStation and ESRI shapefile format.

2.1.1 CADASTRAL PILOT - TASK

The Contractor should conduct an evaluation of each section by overlaying the existing parcel data with the orthophotography and GDACS monuments. The evaluation should help identify the best method to adjust the parcels for each specific section. The adjusted parcels for a specific section need to be edge-matched with adjoining sections.

The following are the data source hierarchy when performing the parcel adjustment:

1. New Land Subdivisions – place and rotate engineering CAD files
2. COGO'd land parcels - retain accuracy of COGO'd data
3. Parcels adjusted by City of Peoria
4. Recently split parcels
5. Lesser accurate parcels - use heads-up digitizing methods (Contractor shall specify adjustment methodologies to be used).
6. New Land Subdivisions – place and rotate engineering CAD files
7. COGO'd land parcels - retain accuracy of COGO'd data
8. Parcels adjusted by City of Peoria
9. Recently split parcels
10. Lesser accurate parcels - use heads-up digitizing methods (Contractor shall specify adjustment methodologies to be used).

In those areas where different adjustment methods are used, the Contractor will need to match adjoining areas producing a cartographically correct parcel map.

2.1.2 CADASTRAL PILOT – DELIVERABLE

The Contractor is expected to complete the adjustment and necessary QC procedures for the pilot area. The Contractor needs to deliver the final adjusted data to the County in MicroStation V8 (dgn) and ESRI shapefile formats. The Contractor also needs to provide check plots for the pilot sections and a project report. The project report should provide information pertaining to the methodology used, specific issues encountered and general information relating to the parcel adjustment.

2.1.3 COUNTY QUALITY ASSURANCE CHECK - CADASTRAL

County staff will perform QC and acceptance tests of the adjusted pilot data. The County's QC may include:

- Visual check of the adjusted parcels to the GDACS corner monuments
- Visual check of the adjusted parcels to the County's orthophotography
- Compare originally provided parcels to the adjusted parcels
- **Automated check to verify APN's have not been changed on the adjusted parcels**
- **Automated check to verify the data is on the proper MicroStation V8 levels**
- **Perform MicroStation and ArcGIS topology checks**
- Check line quality and fit within each section
- **Check CAD layers match Assessor's Office CAD standards**
- **Check curves have not been stroked or segmented**
- Check edge-matching between section drawings
- **Check for short segments and zero length lines**
- **Check for overshoots and undershoots**
- Check for correct text placement and alignment
- Field Checks

Items above in **Bold** indicate quality issues that need to meet zero error tolerance.

Following the County's QC, the Contractor may be asked to perform corrections on the pilot data if sufficient errors were identified. The County understands that the pilot project is an iterative process with refinements to the adjustment procedures and methodology. The Contractor needs to be communicating with the County's Project Manager during the pilot project to resolve issues.

2.1.4 PLANNING & DEVELOPMENT PILOT - TASK

The County will ask the Contractor to perform a pilot project using the proposed adjustment methodology. The pilot involves the adjustment of the existing P&D data using the GDACS corner monuments and orthophotography. The P&D pilot will be performed using Pilot Area 1 from the cadastral data adjustment task. Pilot area 1 consists of 12 sections near the Happy Valley Road & Hwy 60 (Grand Avenue area) intersection, Pilot area 1 represents a suburban makeup of new subdivisions, older residential and commercial properties with available source materials including GDACS corner monuments and 2005 & 2006 orthophotography. Refer to Figures 3-2 & 3-3 for location maps of the pilot areas. These areas can also be viewed using the County's Interactive Mapping web site.

County staff will prepare a source material packet for the pilot area and provide this information to the Contractor. The source materials may include:

- Legal descriptions for annexations
- Existing GIS data
- Zoning maps
- GDACS corner monuments
- County orthophotography

The source material packet would include legal descriptions for 3,600 annexation features. Currently these are available in hard copy format and would need to be copied or scanned to deliver them to the Contractor.

2.1.5 PLANNING AND DEVELOPMENT PILOT – DELIVERABLES

The Contractor needs to perform an evaluation of the pilot as it relates to the P&D GIS layers. The evaluation should assist the Contractor with identifying the best method to complete the data adjustment and develop a list of questions for P&D staff. In areas where a zoning line also represents a parcel line, the contractor needs to adjust the zoning line to be coincident with the parcels. This will eliminate current issues where the zoning lines and parcels do not lineup. The P&D adjusted data needs to be edge-matched and delivered as a single seamless shapefile.

The Contractor is expected to complete the adjustment and necessary QC procedures for the pilot area. The delivered pilot data will be delivered as an ESRI shapefile. Check plots and a project report shall also be delivered to the County for acceptance testing. The project report should provide information pertaining to the methodology used, specific issues encountered and general information relating to the P&D data adjustment task.

2.1.6 COUNTY QUALITY ASSURANCE CHECK – P&D

County staff will perform QC and acceptance tests of the adjusted pilot data. The County's QC may include:

- Visual check of the adjusted data to the GDACS corner monuments
- Visual check of the adjusted data to the County's orthophotography
- Compare originally provided data to the adjusted data
- Perform ArcGIS topology checks
- Check line quality and fit within each section
- Check curves have not been stroked or segmented
- Check edge-matching between section drawings
- Check for short segments and zero length lines
- Check for overshoots and undershoots
- Check for correct text placement and alignment

Following the County's QC, the Contractor may be asked to perform corrections on the pilot data if sufficient errors were identified. The County understands that the pilot project is an iterative process with refinements to the adjustment procedures and methodology. The Contractor needs to be communicating with the P&D lead during the pilot to resolve issues. The completed pilot data needs to be a quality deliverable that when checked and accepted by the County, is considered the first delivery of the adjusted P&D data.

2.1.7 PERIOD OF PERFORMANCE - PILOT

The pilot projects will be completed in 6 weeks – Per Pilot Project Plan – Attached herein as Exhibit A-1.

The County expects to require 2-3 Weeks to perform QC tests and quantify the accuracy of methodology used.

Pilot Project

An accepted pilot project is the foundation of any successful parcel conversion project. A typical pilot area conversion applies the proposed project procedures to a sub-set of the entire area to be converted, allowing Smart Data Strategies Team and Maricopa County to interactively determine that the project procedures will result in the quality data deliverable that is desired by Maricopa County. The pilot project will allow Maricopa County to review sample deliverables produced using the

processes detailed in the preliminary project procedures manual. Based upon the pilot experience, the Smart Data Strategies team and Maricopa County will have a solid understanding of the project requirements and will proceed to full production based on the accepted data quality and procedures. Maricopa County has selected 2 pilot areas; Pilot area 1 is 12 sections near the Happy Valley Road & Hwy 60 (Grand Avenue area) intersection, Pilot area 2 consists of 6 sections near Hyder Road and 571st Avenue in the Southwest portion of the county. These two pilot areas will show a representation of issues to be found throughout the county including new subdivisions, older residential communities and commercial areas. Prior to the start of the pilot, Maricopa County will make available the necessary source documents identified earlier. During the pilot, if necessary, Smart Data Strategies 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 later use of the data. Project procedures may be modified as a result of the pilot phase to ensure that the full project meets Maricopa County's needs. Smart Data Strategies Team's wealth of experience with various GIS data formats, coupled with a thorough pilot project, will serve Maricopa County with a wealth of knowledge relating to issues that might otherwise be missed. The pilot data will be delivered in both MicroStation dgn files and ESRI shapefiles in Arizona State Plane Coordinate System, Central Zone, NAD83(1992) datum, units of International Feet.

In summary, the goals of the project pilot are as follows:

- ***Provide a representative sample of the data produced by the production steps outlined in the procedures manual***
- ***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 Maricopa County.***
- ***Agreement of the Data Acceptance Methodology and Scoring***

2.2 GEOSPATIAL ADJUSTMENT SPECIFICATIONS

This project involves the adjustment or re-registration of several existing GIS layers shared by many County Departments. The intent is to complete the adjustments with the least amount of disruption to normal GIS data maintenance activitites. The GIS layers will be adjusted using the County's Geodetic Densification and Control Survey (GDACS) corner monuments. The adjusted data also needs to overlay the County digital orthophotography correctly supporting map production.

The proposed GIS data adjustment scope should include the following:

- Project initiation/work plan/communications plan
- Pilot project
- Countywide production
- Quality control (including correction process and plan)
- Resumes of key team members

The Contractor will need to develop their production schedule in coordination with the Assessor's Office daily splits and mapping production.

The Data Adjustment project needs to include a surveyor to oversee the proposed process and ensure adjusted data meets the County's accuracy requirements. The selected Contractor will be

expected to deliver, at a minimum, the adjusted GIS data in the formats described in Table 3-1. Conversion methods can involve using other digital mapping formats and technologies as long as the final County delivered data is in the format specified in Table 3-1.

Table 3-1

Layer to be Adjusted	Delivery Format
Assessor's parcels	ESRI shapefile & MicroStation V8
Assessor's parcel text	ESRI shapefile & MicroStation V8
Assessor's subdivision boundaries	ESRI shapefile & MicroStation V8
Planning & Development zoning	ESRI shapefile
Planning & Development annexations	ESRI shapefile
Planning & Development city boundaries	ESRI shapefile

The County desires to adjust the existing GIS data on a section by section basis and achieve the best available adjustment based on the available source data. The final delivered GIS data structure including feature types, topology and attribute requirements will be based on the County's GIS standards and conversion methodology agreed upon collectively by the County and the selected Contractor. The Contractor will also need to be available to perform corrections to the adjusted data based on the County's quality and acceptance testing.

The Contractor shall provide any programs and/or scripts created for this project that will assist the County with future data maintenance and QC tasks. If creation/provision of the maintenance program/scripts involves a third party, all associated costs to Maricopa County and any other pertinent information should be provided in the applicant's response as separate line item costs.

The County will make available a number of information sources to assist with the GIS data adjustment including:

- GDACS section and quarter-section monument information (MCDOT & MCASR)
- Digital orthophotos (FCDMC)
- Digital CAD files of new land subdivisions (MCASR)
- Existing GIS parcel data to be adjusted (MCASR)
- Existing GIS zoning data to be adjusted (MCP&D)

Note:

MCDOT – Maricopa County Department of Transportation
MCASR - Maricopa County Assessor's Office
FCDMC – Flood Control District of Maricopa County
MCP&D – Maricopa County Planning and Development

2.2.1 PROJECT INITIATION

Project initiation involves the County providing a notice to proceed to the Contractor. The first task will include the Contractor meeting with the County's Project Manager to establish administrative and communication procedures. Initiation should include on-site coordination with County staff preparing source materials and performing QC and acceptance testing. A kick-off meeting should also be conducted at which time the Contractor can present their final work plan and schedule. The work plan should specify Contractor and County staff roles and responsibilities. The selected Contractor is expected to use this opportunity to clarify any requirements for adjusting the GIS data, production priorities, review known problems areas, specific alignment rules, delivery logs and County needs. The County will also provide their expectations relating to accuracy, database standards, topological integrity, edge-matching, delivered formats and resolving data inconsistency problems.

This phase is expected to produce a work plan to complete the geospatial adjustment tasks and administrative procedures. The work plan will guide the remaining project tasks and shall include the workflows used to perform the parcel adjustment. County staff needs to be able to use the adjustment workflow for future data maintenance tasks. This includes discussions of handling specific adjustment situations and County known issues. The Contractor will be responsible for maintaining the project work plan during the project.

The County also desires the Contractor to use a web-based Problem / Resolution database to log specific issues, proposed solutions and final County solutions. The web site should have the capability to log specific issues into a database by location (i.e. section, township and range) and allow screen shots or graphics to be attached to easily understand the problem. Emails should be sent to key technical staff so specific issues can be resolved quickly. The Contractor should provide a description on how they will communicate technical issues to the County staff to receive guidance or responses quickly.

Technical Approach

Project Overview

The Maricopa County Geospatial Adjustment Project will undergo three main phases to accomplish the requirements set forth, these are the following:

(1) Project Kick-off/Initiation;

(2) Pilot Phase; and

(3) Full Production Phase.

Project Initiation

Upon written notice to proceed, the project will begin with a kick-off meeting involving project-related personnel from Smart Data Strategies, EMS and Maricopa County. Smart Data Strategies has designated Finny Cherian as their project manager and EMS has designated Rudy Stricklan, RLS as their On-Site Project Manager. Rudy is a registered surveyor with the State of Arizona, see license following this page. Rudy will direct the actions of the Smart Data Strategies/EMS project team and serve as the primary point of contact for Maricopa County. Finny will serve as the Smart Data Strategies project manager and liaison with Genesys, Inc.

Project Kick-Off Meeting

The project kick-off meeting, to be held on-site at Maricopa County, will provide an opportunity for Smart Data Strategies Team and Maricopa County to discuss the following topics for both the parcel adjustment and the planning ad zoning adjustment, as applicable:

- ***Receipt of source documents which will include GDACS survey points, Orthophotography and MicroStation dgn files.***
- ***Selection of primary project contacts from Maricopa County for regular and as-needed communication with the Smart Data Strategies Team project manager;***
- ***The Procedures Manual — a "living" document that will serve as a project road-map for the Smart Data Strategies staff as well as as-built documentation of the completed conversion project for Maricopa 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 Maricopa County has the program they desire. The Procedures Manual will address issues such as the following:

- ***Project Background***
- ***Conversion Process***
- ***Quality Control Procedures (both Smart Data Strategies Team and Maricopa County)***
- ***Delivery Schedule***
- ***Program Deliverables***
- ***Communications Procedures***
- ***Data Acceptance Methodology***

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

2.2.2 LAYER ADJUSTMENT PRIORITIES

The County reviewed the 18 foundational GIS layers during the client requirements study to determine which layers require adjustment to GDACS and the orthophotography. The existing GIS layers requiring adjustment:

- Assessor's parcels, parcel text & subdivision boundaries
- Assessor's map ID grid
- Planning & Development annexations, zoning & city boundaries

The following table describes which of the 18 GIS foundational layers require adjustment to GDACS and the orthophotography.

City Boundaries	Need adjustment
Planning & Development Zoning	Need adjustment
Planning & Development Annexations	Need adjustment
Parcels including annotation and dimensions	Need adjustment
Subdivision Boundaries	Need adjustment
Street Centerlines - Assessor's Office	Need adjustment
Special Districts – Assessor's Office	Need adjustment
Map ID grid	Need adjustment
Air Quality Monitoring Stations	No adjustment needed
Airport Boundaries	No adjustment needed
Census Tracts, Block Groups and Blocks	No adjustment needed
County Park Boundaries	No adjustment needed
County Park Facilities	No adjustment needed
County Trails	No adjustment needed
County-owned Building Locations	No adjustment needed
Department specific districts	No adjustment needed
GDACS Survey Control	No adjustment needed
GDACS Survey Monuments (section & quarter-sections)	No adjustment needed
Mosquito Control Traps & Chemical Sensitive Citizens	No adjustment needed
Probation Cases	No adjustment needed
Regional Lakes	No adjustment needed

School District Boundaries	No adjustment needed
Section Lines	No adjustment needed
Sheriff Office Districts	No adjustment needed
Sheriff Office Patrol Beats	No adjustment needed
Sheriff Office Reporting Areas	No adjustment needed
Street Centerlines (Elections, MCDOT & Phoenix FD)	No adjustment needed
Voting Precincts	No adjustment needed
Zip Code Boundaries	No adjustment needed

Please note:

The Assessor's Office GIS parcel data covers the entire county. The Planning and Development GIS data only covers the unincorporated County. Contractors can view the existing data on the County's Internet Mapping website at:

http://www.maricopa.gov/assessor/gisPortal/gis_portal.asp

This link provides access to several departments GIS websites allowing the Contractor to preview and evaluate the data.

2.3 ADJUSTMENT SPECIFICATIONS

The following specifications relate to the existing GIS layers that require adjustment to GDACS and the orthophotography based on the client requirements study.

2.3.1 ASSESSOR'S OFFICE CADASTRAL LAYER ADJUSTMENT

All County project participants expressed a need to have the cadastral layers adjusted to GDACS and overlay the County's orthophotography. These layers are used as a base map for many of the County's maps and exhibits. These layers are also key in completing spatial analysis tasks with concerns to land ownership. The project participants would like to have the parcels adjusted to a spatial accuracy of +/- 5 feet or better.

In areas where parcel lines are common to a GDACS section or quarter-section corner monument, the adjusted parcels need to be at an accuracy of +/- 1 foot to the GDACS corner monument. The proposed methodology should provide details on how the Contractor will achieve the desired accuracy requirements. The County is also interested in alternative methods or discussions concerning parcel data accuracy based on the available survey control, orthophotography and other source materials. The cadastral layers consist of:

- Parcels
- Parcel Text and Dimensions
- Subdivision Boundaries
- Assessor Book Boundaries

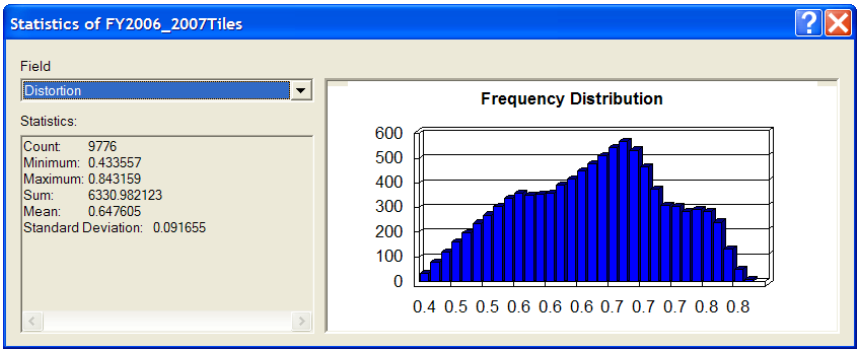
Since the RFP calls for accuracy of ±1', it is a prudent measure to study the source data to ensure it will support this requirement. Since we are relying heavily on the County Orthophotography, we will review the metadata to be sure our efforts are built upon sound engineering and survey judgment.

As a result of this review, a critical first issue to resolve is the assertion in Section 2.0, 'County Orthophotography', that existing GIS data from the County is in the "Arizona State Plane Coordinate System, NAD83, Central Zone, Units in US Feet". <u>This is most definitely not the case with the GDACS monuments and the digital orthophotography</u>, as their metadata from several sources states that both products are in the Arizona

State Plane Coordinate System, Central Zone, on the NAD83 datum, but are in units of International Feet as required by Arizona State Statutes.

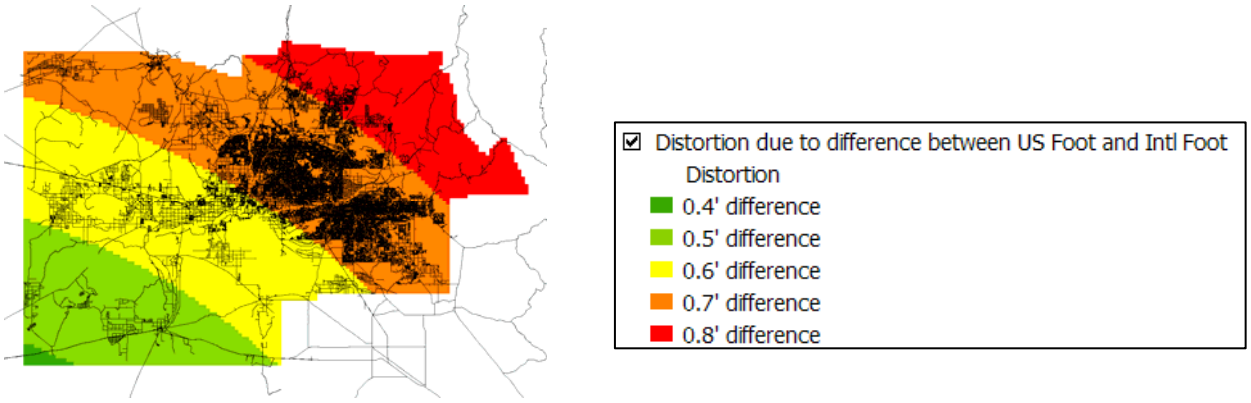
If the existing Assessor parcels and zoning polygons are indeed in units of U.S. Survey Feet, then a necessary first step will be to transform these datasets to International Foot units. Although the difference between U.S. Survey Feet and International Feet is indeed small on a ratio basis (1:1,640,414), this ratio becomes significant when the mantissa of the coordinate system X-Y values becomes large. In the case of State Plane coordinate values for Maricopa County, the X and Y values are large enough (6-7 whole digits) to make nearly a one-foot difference (see below) between the same point expressed in U.S. Survey Feet and International Feet units. This fact brings into question our ability to attain the desired level of accuracy before we even begin.

The relative magnitude of this difference is illustrated in this histogram, developed from the 9776 tiles of the 2006-2007 digital orthophotography coverage for the County:



The average difference over the entire County is seen to be 0.65 foot, and the maximum difference is 0.84 foot.

Viewed in map format, the ranges of U.S. Survey Foot and International Foot differences over the County are seen in this analysis:



<u>The parcel and zoning data for the most-populated portion of the County therefore has an inherent error of almost three-quarters of a foot when compared to the GDACS and orthophotography datasets, if the statement that parcels and zoning data are in U.S. Survey Feet, rather than the International Feet units of GDACS and the digital orthophotography, is in fact the case.</u>

The net is that if certain datasets of the County are indeed in units of U.S. Survey Feet, they will need to be transformed to International Feet units before they can be accurately compared to the GDACS points and the digital orthophotography (to achieve the desired 1-foot accuracy in GDACS areas stated in the RFP). Although

mathematically straightforward, this transformation will still be time-consuming, and will result in certain features (e.g., annotation) to be displaced from its current position more than may be intended.

In this response, Smart Data Strategies makes no costing assumptions for the initial U.S. Survey Foot to International Foot conversion issue, as it may in fact be proven unnecessary by the Pilot Project results (i.e., that the parcel and zoning datasets are in fact in units of International Feet already, as is strongly suspected). In any event, all data deliverables from Smart Data Strategies will be in the units required by the RFP and Arizona State Statutes: International Feet.

2.3.2 WORK FLOW EXPECTATIONS

The project participants need to limit the time the existing GIS data is not available for normal data maintenance. The participants expect the Contractor to provide a production schedule showing a steady input of source materials from the County and delivery of completed adjusted areas. The Assessor's Office has expressed the desire to have 50 sections completed a week for the cadastral adjustment. The entire project should be completed in 1 calendar year. The cadastral production flow may look like the following:

- Week 1 - County staff prepare source materials for sections 1-50
- Week 2 - Contractor adjusts data and performs QC for sections 1-50
- Week 2 - County staff prepare source materials for sections 51-100
- Week 3 - Contractor deliveries adjusted GIS data for sections for sections 1-50
- Week 3 - County performs QC and acceptance testing for sections 1-50
- Week 3 - Contractor adjusts data and performs QC for sections 51-100
- Week 3 - County staff prepare source materials for sections 101-150
- Week 4 - Contractor deliveries adjusted GIS data for sections for sections 51-100
- Week 4 - County performs QC and acceptance testing for sections 51-100
- Week 4 - Contractor adjusts data and performs QC for sections 101-150
- Week 4 - County staff prepare source materials for sections 151-200

… Continue process for remaining areas of the county

The Contractor can provide alternative workflow and schedule that achieves participates goals of limiting the time GIS data is not available to staff.

2.4 CADASTRAL DATA ADJUSTMENT

The intent of the parcel adjustment is to develop a GIS parcel layer that ties to GDACS, correctly overlays the County high-resolution orthophotography and retains the accuracy of the new COGO'd subdivision drawings converted from provided engineering companies. The proposed GIS cadastral data adjustment scope should include the following tasks:

- Project initiation/work plan/communications plan
- Pilot project
- Countywide production
- Quality Control and corrections (as needed)

2.5 COUNTYWIDE PARCEL ADJUST

Following the completion and acceptance of the pilot project, parcel adjustment tasks will commence for the remaining portions of the County based on the geographic prioritization schedule established by the County and Contractor during project initiation. The adjusted parcel data will comply with the final specifications and procedures generated during the pilot project. It is expected that the adjusted GIS parcel data will be delivered by Assessor's CAD drawing file geography. The County will provide the Contractor with a shapefile of the CAD ID grid, which references the CAD file boundaries.

The Contractor needs to deliver the adjusted parcel data as MicroStation V8 files and ESRI shapefiles. The ESRI shapefiles need to have the APN stored as an attribute and the adjustment methodology used coded to each parcel. The County will work with the Contractor to develop attribute values for the different methodologies that will be used to adjust the parcels. The County anticipates there will be 4-6 different adjustment methodologies that will be used for the parcel adjustment.

The County reserves the rights to field verify the final delivered adjusted parcels. This may involve having a surveyor collect locations using GPS to validate the spatial position of the adjusted parcels.

Following the delivery of the adjusted parcels, the County will perform QC and acceptance testing as outlined in the section describing the Pilot Project. Data delivered that fails to meet the County's acceptance review will be returned to the Contractor for revisions. The Contractor will have up to ten (10) business days to make corrections and resubmit the data to the County for QC and acceptance testing.

The County is also concerned that over the course of the project adjustment problems may be found following the initial QC and acceptance testing of specific sections. The County reserves the right to ask the Contractor to perform corrections for up to 6 months for areas where major adjustment problems are identified following the initial County QC and acceptance testing.

2.5.1 KNOWN PARCEL DATA ISSUES

The County is aware of specific areas where there are registration problems with the existing GIS parcels matching the survey corner monuments and overlaying the orthophotography. Areas with known poor parcel registration include:

- Paradise Valley
- Dobson Ranch
- Ahwatukee
- Desert Hills
- Happy Valley Rd. & Lake Pleasant Pkwy
- Grand Ave & Happy Valley Rd.
- Sun City West
- Romola
- Avondale
- Estrella Park
- Wittmann
- Circle City
- SE Wickenburg
- Wickenburg
- Aguila
- Rooks Rd
- Buckeye
- Gila Bend

Known Parcel Data Issues

The Smart Data Strategies Arizona On-site Project Manager, Rudy Stricklan, RLS, respectfully submits that the parcel registration problems for many of these areas is due more to the parcel re-mapping process utilized, rather than supposed error in the original source plat documents themselves. Although areas like Dobson Ranch, Sun City West and Ahwatukee appear complicated and error-prone due to their curvilinear layouts, the fact of the matter is that these areas were originally computed via computer-aided COGO programs, and actually fit together quite well—

when one is experienced in the COGO construction methodology used to compute such large subdivisions.

The reason Mr. Stricklan is particularly well-qualified to comment on many of these areas is because he was the Mapping Production Manager for the Arizona office of Technical Advisors, Inc.—the automated mapping service bureau that in the 1970's created the plat mapping for such developments as Dobson Ranch, Sun City, Sun City West, Ahwatukee and many other "problem" parcels. Under contract to engineering firms such as American Engineering (later acquired by RBF) and HDR, Technical Advisors delivered plat maps that were internally precise to within ±0.01 foot—based on accurately-surveyed Public Land Survey System section corners and other surveying control. Mr. Stricklan supervised the COGO computation of these and numerous other large-scale subdivisions during that time. He is therefore uniquely qualified to interpret these 'problem' areas and understand how they were computed, thereby preserving the COGO consistency that these areas were mapped to originally.

Another issue to be commented on from a Professional Surveyor's perspective is that of "matching subdivision boundaries". From a legal standpoint, subdivision boundaries do not necessarily have to fit together mathematically—they instead must be described as fitting according to the legal doctrine of senior rights. In essence, the more senior boundary survey holds, especially if the following conditions are true:

1. ***Of two overlapping surveys, the one first made has priority, particularly where the second is bounded with express reference to the first.***

2. ***Any calls of the second survey conflicting with monuments and calls of the first must yield thereto.***

So trying to fit subdivisions together using their respective boundaries is a false proposition—the senior subdivisions normally always have precedence, and the boundaries of junior subdivisions must fit to the more senior subdivision(s). This is an established principle of property case law.

As applied to the Maricopa County Geospatial Adjustment Project, what this means is that subdivision boundaries will be computed only after the respective parcels have been adjusted to their apparent ground positions. Although there may be mathematical discrepancies in subdivision boundary matching, there is as a matter of legal principle no hiatuses or overlaps where fitting between subdivisions is intended by description.

For many so-called hiatuses or overlaps, the principle of "de minimis lex non curat" applies: the law does not care for, or take notice of, very small or trifling matters. Most junior-senior survey overlaps and hiatuses are so small as to bring them within the scope of the "de minimis" definition.

A final comment must be made on the parcel accuracy requirements desired by the County. Property boundary line determinations cannot be made on the basis of mathematical best-fit reasoning. Accuracy in property boundary determination is accomplished only by properly-registered land surveyors, and only after extensive field and source document research. Any statement purporting to define the accuracy of adjusted property parcel lines without the necessary field visitation and document research constitutes fraud in the eyes of the Arizona State Board of Technical Registration. Smart Data Strategies will submit a professionally-reviewed and approved statement of apparent rectification accuracy that will speak

to the requirements of the RFP, but will not expose itself nor the County to potential litigation due to ill-advised "accuracy" claims.

Smart Data Strategies will add <u>subdivision boundary lines</u> and other administrative boundaries (e.g., Assessor Book Boundaries) based on the parcel adjustments, that is, once the individual parcels have been adjusted for a given area, the respective subdivision boundaries and other administrative boundaries will be added as a derivative product.

2.5.2 PARCEL ADJUSTMENT APPROACH

The Contractor shall provide a discussion in their proposal about how they will handle these poor registration problems and what methodologies could be used to adjust the parcels. The Contractor needs to provide a clear description of their approach to completing the data adjustment. The approach descriptions should include:

- How the boundaries and other features on the existing parcel data will be adjusted to the GDACS corner monuments and orthophotography
- How the data will be registered to the geographic coordinate space and edge-matched across adjoining sections
- The decision making process for handling issues such as boundary discrepancies, closures, gaps and overlaps
- Achieving the County's desired parcel data accuracy as specified earlier in this document
- Quality Control procedures
- Workflows to adjust these areas providing County staff with a technical process to maintain the parcel data

The County also includes downtown areas with multi-story residential and commercial buildings. The Assessor's Office handles this situation by generating a subdivision boundary for each floor in a building. The individual floor subdivision boundaries overlay each other. Parcel polygons are also generated for each floor. The parcel polygons for each floor do not always overlay each other for a specific building. The Contractor should provide a discussion on how to adjust and re-align the subdivision and parcel polygons for multi-story buildings.

The following is a list of items relating to adjusting the existing GIS parcels that need to be addressed in the Contractors proposal:

- Establish priorities based on the specific adjustment methodologies to perform countywide parcel adjustment
- Use the Assessor's CAD file geography as the geographic area to perform the adjustment
- Tie new subdivisions (last 6 years) to GDACS
- Retain positional accuracy of provided CAD parcel lines for all files (approximately 2,500 drawings)
- Attribute GIS parcels with the method used to perform the adjustment
- Perform parcel adjustment using existing MicroStation V8 files
- Do not modify APN's in provided existing GIS files
- Do not segment or stroke curve features
- Align multi-story building subdivision boundary and parcel polygons for individual buildings

- All digital parcel data will be adjusted and stored using double precision coordinates
- MCDOT is currently developing section line GIS features based on the GDACS monuments. If completed this will be provided to the selected Contractor as an additional source
- Adjustment of approximately 2,500 MicroStation V8 CAD drawings.
- Provide all GIS data in Arizona State Plane Coordinates, Central Zone, NAD 83, International Feet
- Provide all "link adjustment" files, including a date stamp, for all GIS data requiring link files to complete needed adjustments.

The production can begin only after all issues that may have arisen during the pilot are resolved and that the pilot phase is accepted as complete by the County. The Procedures Manual will ensure that all the parties involved understand the scope of this project, the processes to be used, and the products to be created. Upon this authorization, full-scale production will commence, based on the delivery priorities set forth during the kick-off meeting and any modifications made during the pilot phase.

Smart Data Strategies proposes a geospatial adjustment process that integrates all the contributing data sources' attribution, and does not rely solely on the simplistic "best picture fit" approach. The Smart Data Strategies process moreover uses mathematically-consistent transformation methodology that is applied according to measured error differences… again, not a blind reliance on apparent best picture fitting. It is a professional approach that yields measurably-accurate results.

The major steps of the Smart Data Strategies geospatial adjustment process as proposed for Maricopa County are as follows:

1. ***Analytically check the fit of the StreetNet centerlines to GDACS control points***

2. ***Visually check the fit of the StreetNet centerlines to the digital orthophotography***

3. ***Upon verification of StreetNet accuracy/consistency (and making any necessary modifications), rights-of-way buffers are constructed around each StreetNet segment, with widths assigned from reliable source documentation***

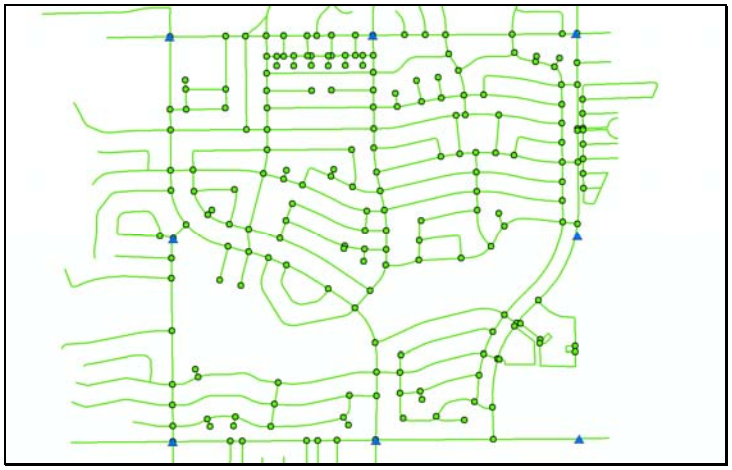
4. ***Digital parcel file centerline nodes are linked to corresponding StreetNet centerline nodes, creating a link table of coordinate from-to adjustment vectors***

5. ***Digital parcel linework and annotation are adjusted in a groupwise fashion (e.g., by individual plats) and residual errors are analyzed, as well as visual inspection against the orthophotography***

Each step of this process is illustrated below.

Step 1: Check registration of StreetNet to GDACS control points

The following example is Section 29, T3N, R1E of the G&SRB&M. Shown are the StreetNet segments and nodes in green, the proximate GDACS survey points as blue triangles:



A nearest-point analysis is performed, showing the distance from each GDACS point to the nearest StreetNet centerline node:

Attributes of GDACS

FID	Shape *	NORTHING	EASTING	ELEVATION	NEAR_FID	NEAR_DIST
6	Point	938842.294	588937.512	1118.431	6	1.54813
0	Point	933535.305	586337.109	1111.624	205	2.168049
3	Point	936183.503	586342.075	1113.311	132	2.625775
5	Point	938822.782	586296.092	1119.535	15	3.511092
1	Point	933553.766	588976.594	1102.051	199	4.073696
7	Point	938860.89	591575.087	1120.642	0	14.728505
4	Point	936220.953	591596.614	1107.535	124	159.407866
2	Point	933569.538	591619.322	1094.889	198	1119.967194

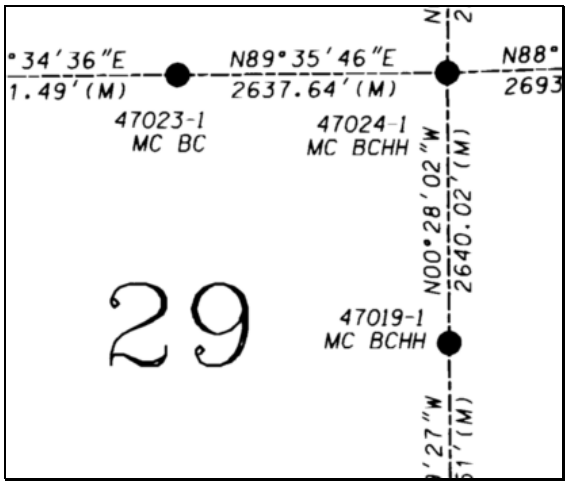
Although most of the measured differences are within a ±5' radius, several points are not, but visual inspection against points 2 and 4 in the orthophotography shows them to be legitimate— the StreetNet nodes are not in the vicinity of the GDACS points:

GDACS Point 4 is not close to a StreetNet node

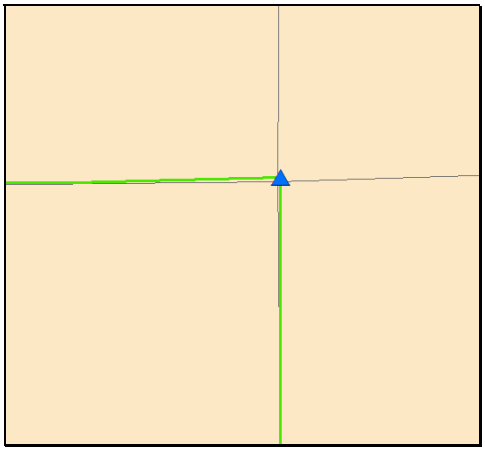
GDCAS Point 2 is not in the vicinity of streets

Point 7, however, (14.73' difference) is another matter.:

The StreetNet centerline point is seen to be easterly of the designated GDACS point. In this case, reference to the official GDACS plat of record (Book 863, Page 7, Document Number 06-1155513) verifies the position of the GDACS point relative to neighboring quarter-section points to the west and south:

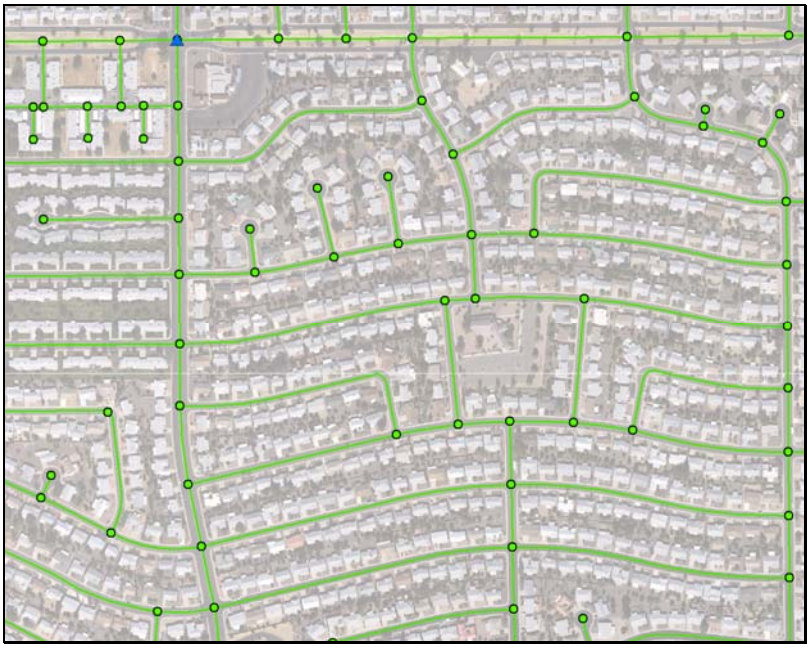


Therefore, the StreetNet centerline segments in this vicinity are edited to more closely match the section lines, from which the rights-of-way are derived:



Step 2: Check overall registration of StreetNet to Orthophotography

Once the StreetNet fit to GDACS points is verified for a given region (e.g., a PLSS section), all of the orthophotography in that region is displayed, and a visual check is made on a street-by-street basis to ascertain any obvious displacement errors. At such points, the StreetNet segments and nodes are checked against record sources, and edited to better fit on-ground conditions, as previously illustrated.



Step 3: Construct Rights-of-Way buffers

Right-of-way widths are obtained from reliable source documents (frequently the digital parcel maps themselves, if there is a high degree of consistency) and assigned to each StreetNet segment. Right-of-way widths can be different on either side of the centerline, and this step preserves any such asymmetries.

Notice at this point that the derived right-of-way in the vicinity of the Northeast corner of this section (where StreetNet was modified to better match GDACS) matches more closely to the photography (aligning very closely to the easterly walls of the parcels):

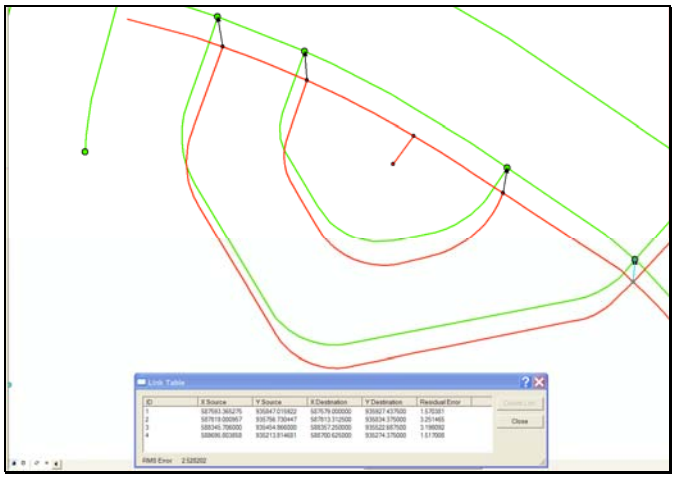
This situation illustrates the value of registered surveyor oversight, as well as using the GDACS point as the primary control for this intersection, even though the orthophotography indicated otherwise. In the process, a much better adjustment of parcels in the vicinity of this intersection will be obtained.

By constructing platted rights-of-way, another good visual indication of StreetNet accuracy is provided. Of course, areas of "sawtooth" rights-of-

way are not accounted for in this process—but such areas are comparatively isolated.

Step 4: Groupwise node adjustment link vectors established

At this point, the parcel file centerlines and their nodes are displayed against the backdrop of the now-accurate StreetNet nodes and segments (parcel file centerline features are in red, StreetNet is shown in green):



Displacement links are digitized from the applicable parcel centerline node to the matching StreetNet node. Since the nodes in each layer are objects, they are snappable features. There is therefore no pointing "error" in the link digitizing process. Moreover, this step could be largely automated, choosing nearest neighbor nodes between the layers analytically. The resultant Link Table is analyzed for consistency patterns.

Centerline node links will initially be set up on a section-by-section basis, attempting to adjust as many parcels as possible in one batch to an acceptable registration tolerance. The real beauty of the node-to-node link vector definitions, though, is that adjustment units can be as granular as necessary (down to the individual block level), insuring that overall adjustment parameters are held within tolerance. This technique is especially useful when only certain portions of a file are not "behaving", and we wish to perform additional piecewise adjustment to just those areas. In this way, overall parcel geometry can be preserved and matched to the digital Orthophotography. The amount of adjustment is always available for analysis and acceptance by the County.

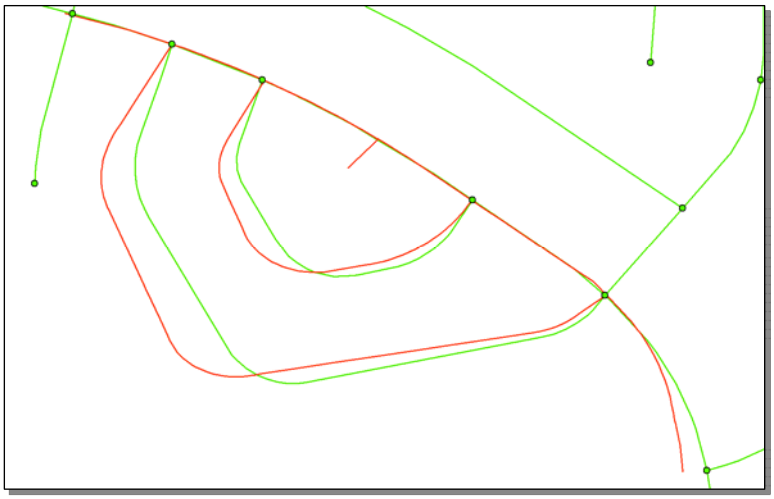
Step 5: Transformation

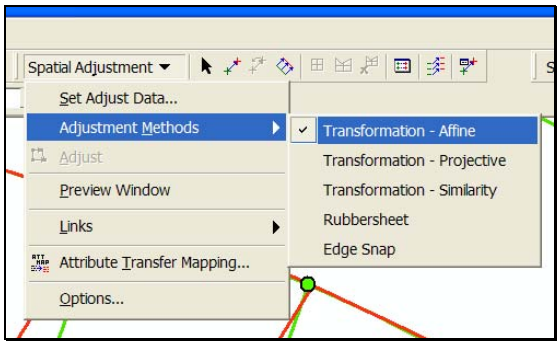
Although the <u>affine transformation</u> process was referred to in the Request For Proposal, in practice it doesn't give very satisfactory results, inasmuch as unacceptable skew can be introduced. While an affine transformation preserves proportions on lines, it does not uniformly preserve angles or lengths. It is not a conformal projection process: shapes of features can be (and frequently are) changed.

In contrast, a <u>similarity transformation</u> only scales, rotates, and translates the data. It will not independently scale the axes, nor will it introduce any skew. It maintains the aspect ratio of the features transformed, thereby preserving the relative shape of features. Higher-order geometry (such as

curves) remains intact as well. The similarity transformation is a conformal process.

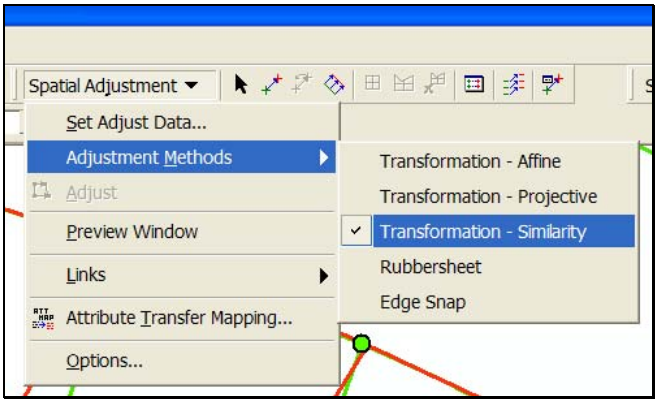
If an <u>affine transformation</u> is to be performed on the parcel centerlines as shown previously, this will be the result:



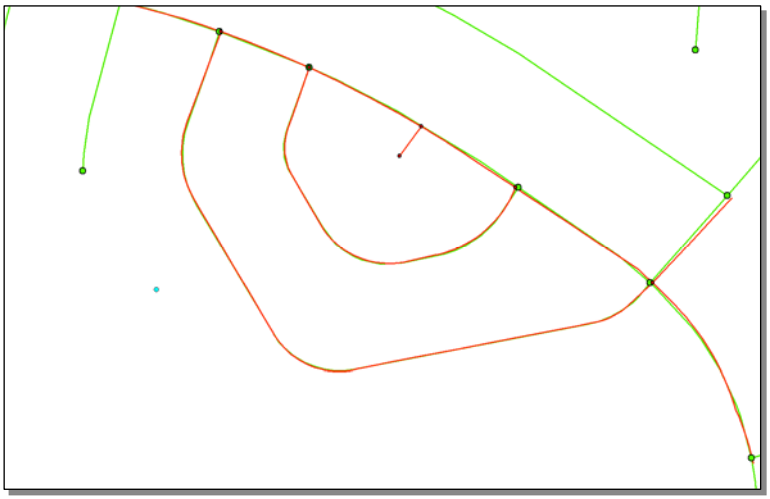


Results of Affine Transformation Process: unacceptable skew is introduced, even though node points match.

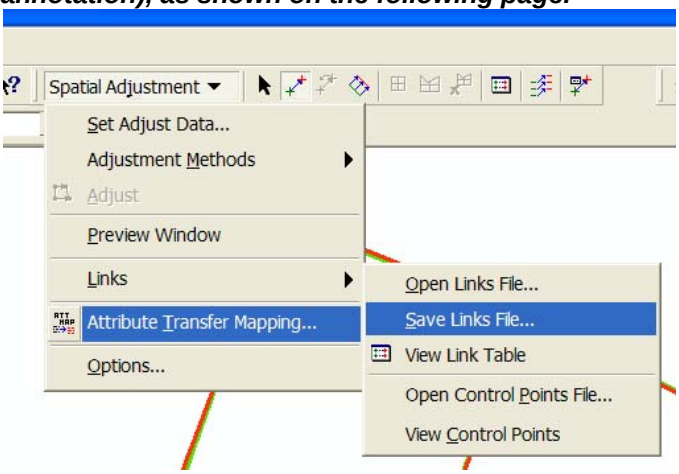
As recommended by Smart Data Strategies, this is the result of using the similarity transformation methodology:



Results of Similarity Transformation Process as recommended by Smart Data Strategies



At this point, a collinearity analysis can be performed on the adjusted linework, giving a sense of overall adjustment "goodness". If the analysis results are acceptable, then the adjustment link vectors can be saved for this area of adjustment, to be applied to other features of the parcel files (i.e., the linework and annotation), as shown on the following page.



When the derived links file is used to transform the parcel lines and annotation, the following overall adjustment is observed, against the orthophotography backdrop:

The rights-of-way buffers give an additional sense of fit for the subject parcels.

A zoomed-in view of one of the adjusted blocks

There are several important key concepts and advantages to note in this process:

- ***Use of the proper transformation algorithm. By using the similarity transformation, no skew distortion is introduced, and shape conformality is preserved. Additionally, for COGO'd areas, only rotation and translation will be applied. Curved segments stay as true curves in the transformation process. This is additionally verified by analyzing the link vectors, and observing that they are uniformly valued and directionally consistent.***

- ***Use of StreetNet as the adjustment layer (once it has been verified to GDACS and the orthophotography). Using a vector feature layer as opposed to a raster layer enables analysis that quantifies and verifies the adjustment at the same time, plus these side benefits:***

  - ***automated snapping to node points, resulting in fewer errors overall***
  - ***statistical checks on node-to-node link displacement and consistency (e.g., uniform link directions, Root Mean Square Error lists within allowable tolerances, etc.)***
  - ***provides quantifiable Quality Control checking analysis documents to County reviewers***
  - ***although not a requested deliverable, any necessary modifications to StreetNet are indicated during its verification to GDACS and/or the orthophotography.***

- ***Adjusting parcels in user-defined groups (either by batch sections, or individual plats; or, where more rigorous adjustment is needed, by individual blocks). The chosen granularity of the adjustment process constrains error more efficiently and preserves the parcel geometry itself. Where blocks overlap section lines, they will be adjusted as complete units, insuring edge matching.***

- ***'Different adjustment methodologies' (as referred to in the RFP) are not anticipated for this project. The similarity transformation will be used throughout, with areas needing considerable modifications transformed on a block-by-block basis. COGO'd areas will also be adjusted with the similarity process, but constrained with rotation and translation adjustment parameters only.***

2.6 PLANNING & ZONING DATA ADJUSTMENT

Maricopa County Planning & Development (P&D) Department is the responsible agency that interacts with the public on land use issues in the unincorporated areas of the County. This includes the preparation of a County General Plan land use, reviewing zoning applications, permits, etc. P&D also works with the cities to review and process annexation notices and city boundary changes. GIS is being used to support staff that are developing land use plans and reviewing zoning applications. They maintain several GIS layers that are shared with various departments. The P&D GIS layers to be included in the GDACS Geospatial Adjustment Project include:

- Annexations
- Zoning
- City Boundaries

The project participants need these layers to be at a spatial accuracy of +/- 5 feet or better. The spatial accuracy may vary based on the available source materials. The proposed methodology should provide details on how the Contractor will achieve the desired accuracy requirements. The Planning and Development GIS data can be reviewed on the County's Interactive Mapping web site named "PlanNet" at:

http://planning.maricopa.gov

General Information

The Planning & Development GIS data provides a foundation for land use related tasks. The annexation, zoning and city boundary data have been developed based on provided legal descriptions, hard copy drawings, digital CAD files and other recorded documents. P&D also uses the Assessor's parcel layer as a guide when performing plan review, adding new GIS features or performing data maintenance tasks. P&D maintains their GIS data in ESRI shapefile format.

The annexation layer was developed based on recorded documents such as legal descriptions, surveys, etc. The information is generally provided by the cities requesting the annexation. P&D staff uses the legal description to update the GIS layer and determine if there are any land related issues. A legal description is available for each of the 3,600 annexation polygon features. Annexation features are developed using the measurements on the legal description and tied to the GDACS section corner monuments. The County maintains a single GIS annexation layer.

The zoning layer was developed using the best available information including surveys, hard copy drawings, etc. Generally a map is provided to update the zoning layer and County staff use other available GIS layers such as the parcels, GDACS corner monuments, orthophotography, etc. to update or add new zoning features. The spatial accuracy of the zoning layer varies based on the available source information. The County currently maintains several zoning layers to track different types of zoning issues including:

- Current zoning
- Zoning overlays
- Special uses
- Pending cases

A database is maintained for each zoning type layer that links the information to the Assessor's Parcel Number (APN). The zoning overlays, special cases and pending cases data can be geo-coded using the APN to create a point file for these types. This allows the County to maintain a single current zoning layer that needs to be adjusted to the GDACS corner monument and orthophotography. The zoning overlays, special uses and pending cases point shapefiles do not need to be re-adjusted.

The database link to the Assessor's Office APN will only cover parcels with one zoning type. There are many areas within the County where parcels have multiple zoning types.

Planning and Development also maintains a city boundary layer based on information received from the cities. The annexation layer, parcels and orthophotography are used as a basis to prepare the city boundaries. The County maintains a single ESRI shapefile of the city boundaries.

The Contractor needs to discuss how the P&D data adjustment will be scheduled as it relates to performing the cadastral data adjustment. They need to know if the P&D data will be adjusted at the same time as the parcel layer adjustment or after the parcels have been adjusted.

2.6.1 PLANNING AND DEVELOPMENT DATA ADJUSTMENT

The P&D GIS data needs to be adjusted so it ties to the GDACS corner monuments and overlays the orthophotography. The Contractor needs to provide a technical approach to adjust the three P&D GIS layers. The technical approach needs to describe the workflows to perform the data adjustment. The proposed workflows should provide County staff with procedures to perform future data maintenance tasks. The Contractors proposal should address the following tasks:

- Project initiation/workplan/communications
- Pilot project
- Countywide production
- Quality Control

2.6.2 COUNTYWIDE PLANNING AND DEVELOPMENT DATA ADJUSTMENT

Following the completion of the pilot project, adjustment tasks will commence for the remaining portions of the County based on the agreed production schedule. The adjusted P&D data will comply with the final specifications and procedures generated during the pilot project. It is expected that the adjusted P&D GIS data will be delivered as a single countywide shapefile. The Contractor also needs to add an attribute to track the specific methodology used to adjust the P&D data. The County anticipates that several adjustment methodologies may be used and will work with the Contractor to develop attribute values for each methodology.

County staff will perform QC and acceptance test of the delivered data. The Contractor will be expected to complete errors found during the County's QC efforts. Corrections need to be completed and resubmitted to the County for QC and acceptance.

Planning & Development

The Planning & Development Department utilizes GIS data derived largely from the Assessor's digital parcels, and subsequently modified based on zoning applications and/or other contributing documentation. It is furthermore necessary that P&D has knowledge of the latest municipal annexation adjustments (as well as existing municipality and other sovereign boundaries), which define the County's area of jurisdiction.

This Section discusses the three main geospatial features associated with P&D's work, and their conversion approach:

- ***Current County areas (i.e., "unincorporated County land")***
- ***Annexations***
- ***Zoning polygons***

As stated earlier, the Planning and Development portion of the project will be set-up during the initial project kick-off meeting. However, there will be a separate pilot project with the same pilot area as the parcel pilot that will follow the parcel adjustment pilot. The Planning and Development pilot project will follow the same procedures and have the same goals as listed below:

- ***Provide a representative sample of the data produced by the production steps outlined in the procedures manual***
- ***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 Maricopa County.***
- ***Agreement of the Data Acceptance Methodology and Scoring***

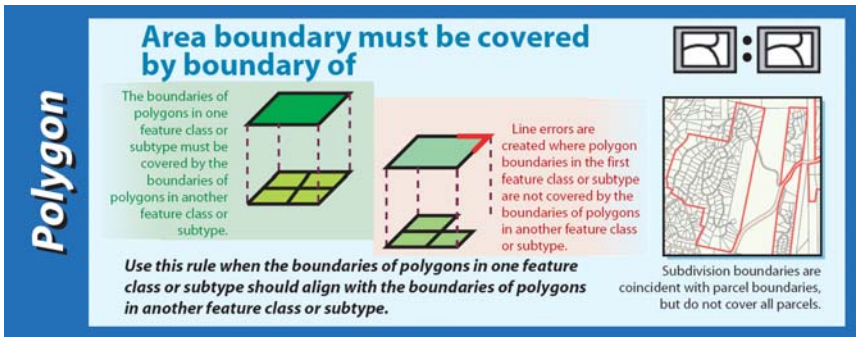
Current County Areas and Annexations

Accurate parcel delineation must exist before County boundaries can be correctly established. Therefore, the Assessor parcel adjustment process must have been performed and approved for a given area before correct County boundary lines (as well as annexation and zoning lines) can be established for that area. Accordingly, a sequencing of overall parcel adjustment will be made that allows County boundary determination to follow as closely as possible in the workflow schedule.

In large part, County boundary lines coincide with, or are explicitly positioned with reference to, the Assessor parcels and attendant rights-of-way. As a first step, Smart Data Strategies will analyze the supplied City Boundaries and Annexations documents under the supervision of an Arizona-registered Land Surveyor to ascertain the relevance of all such documents and the optimal way to incorporate their contents into boundary lines overlaid to the adjusted parcels.

This approach insures that all documents delineating County boundaries in any fashion are indeed coherent and pertinent from a professional surveying standpoint, and not merely "force adjusted" relative to the underlying parcels.

Another very significant advantage to the County in Smart Data Strategies's analytic approach is that topological relationships will be established between the polygons developed from the County boundary documents and the underlying adjusted parcel fabric. In GIS geodatabases, topology is the mathematical arrangement that defines how point, line, and polygon features share coincident geometry. In essence, coincident lines from one or more P&D "layers" are mathematically constrained to align with pertinent parcels and rights-of-way. An example of such a topological relationship is boundary-on-boundary overlays:



Also referred to in a previous Section of this Response about the parcel subdivision boundary issue -- formally defining this topological relationship in the geodatabase delivery to the County will insure that relevant boundaries are not merely adjusted

to parcels and rights-of-way, they are "married" for all time in the sense that topology errors will manifest themselves if the alignment is not completely accurate.

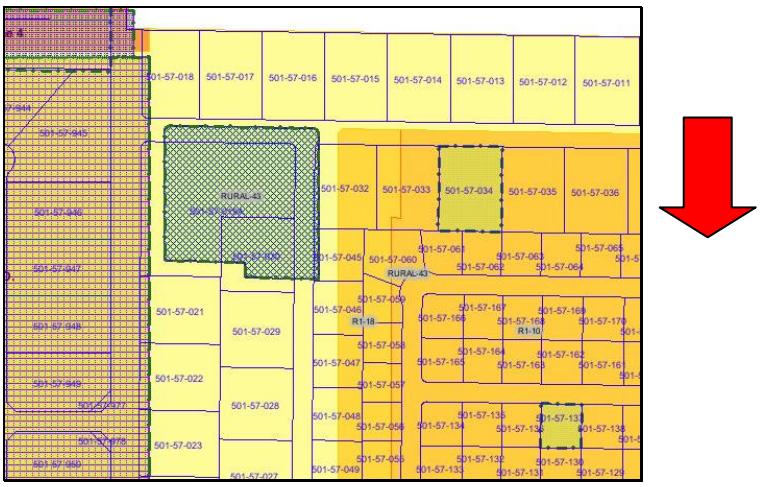
Smart Data Strategies will analyze all relevant annexation and City Boundary documents, and not just best-fit them to the adjusted parcels. Topological relationships will be built to enforce coincident line alignments as a matter of Quality Assurance, as well as provide the County a go-forward approach to keeping future annexation boundaries properly maintained.

Zoning Polygons

As is the case with annexations, zoning polygon boundary lines frequently coincide with, or are explicitly positioned with reference to, the Assessor parcels and attendant rights-of-way. To be sure, there are certainly many zoning lines that P&D deals with on a daily basis that do not coincide with or are even remotely referenced to existing parcels and/or rights-of-way. New zoning cases represent a significant number of such instances; however, zoning cases per se are not being covered in the scope of this Project.

Smart Data Strategies proposes to approach the zoning polygons adjustment in an analytic fashion as well: where coincident alignment with parcels and/or rights-of way is apparent from the zoning polygon(s), then that alignment will be defined through a topological relationship, as well as geometric construction. In other words, it is proposed that many zoning polygons be physically re-constructed by deriving them from the underlying adjusted parcel geometry, rather than warping zoning polygons that may frequently not align to the underlying parcels no matter how much "stretching and squeezing" is applied.

Several actual examples taken from the County's PlanNet site will illustrate the advantage of deriving new zoning polygons in certain instances, rather than adjusting the current ones:

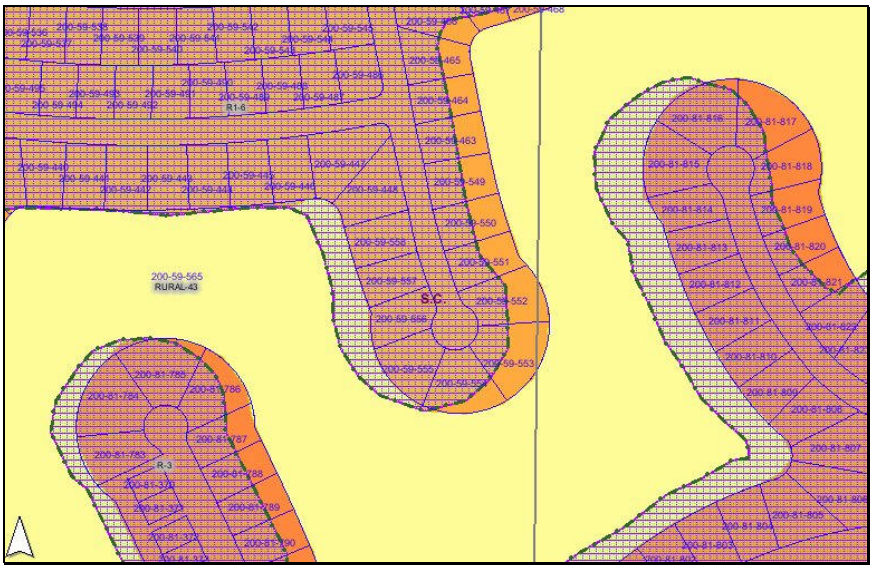


For the moment, ignore the zoning cases indicated by the hatched polygons bounded by dashed green lines (such as the one around parcel 501-57-034). The focus is on the R1-18 zoning area that obviously corresponds to parcels 501-57-032, 501-57-045, 501-57-046, 501-57-047, 501-57-048, and 501-57-049 (as well as other parcels outside the view area), and the R1-10 area in slightly darker orange to the east. The intention of the R1-18 polygon is to align with the aforementioned parcels, therefore it would be a more prudent (as well as quicker) technical approach to dissolve those parcels and assign the derived dissolve polygon as the overlay R1-18 polygon in this area—rather than warping the existing R1-18

polygon. This dissolve, of course, could be automated by assignment of an 'R1-18' attribute to the target parcels. The point is that a correct zoning polygon could be quickly generated in lieu of adjusting the current (and possibly poorly-digitized) R1-18 polygon in this region. A similar approach could be taken for the R1-10 parcels to the east.

Although not required in this Project, the same approach could have benefits for zoning case studies such as the RURAL-43 parcels immediately west of the R1-18 zoning polygon just discussed. The obvious intent of this rezoning is to include parcels 501-57-29 and 501-57-030, but the case polygon will have to be adjusted to the parcels. A better approach would be to dissolve those two parcels into a zoning case polygon. It's interesting to note that the zoning cases for parcels 501-57-034 and 501-57-137 in the R1-10 area seem to match their subject parcels pretty well—saying that attempting an overall re-adjustment of existing zoning case polygons in this region would be ill-advised.

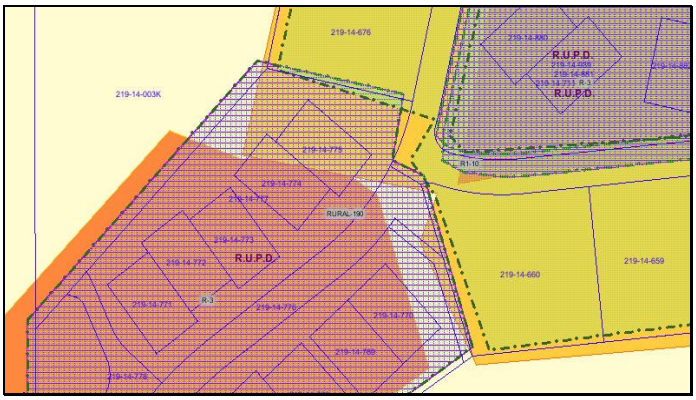
Another example is seen in this area of Sun City West:



Although a transformation of the zoning polygons would in general align with the subject parcels and rights-of-way, the graphics quality of the zoning polygons is fairly crude. Again, dissolving the parcels and rights-of-way into the applicable overlay zoning polygons would yield a better cartographic and analytic product.

It is recognized that parcels may of course have multiple zoning designations, and that this particular approach may have limitations in certain circumstances. It is felt, however, that a majority of instances will be applicable to this methodology. It may also be that this situation could be handled by a more elegant geodatabase schema handling 1:N parcel-zoning relationships, although outside the scope of this work effort.

In areas of extreme congestion, zoning polygon re-definition may be the only practical course, such as this example:



In summary, Smart Data Strategies proposes to analytically convert as many P&D data files as possible, rather than simply best-fitting them across the board. This approach will insure accurate alignment, as well as establish a proven procedure for future maintenance.

2.7 QUALITY CONTROL METHODOLOGY

All data will go through a rigorous 3 level Quality Control Process. Level One will be preformed by Genesys, Level Two by Smart Data Strategies and Level Three by EMS. This process will be used for the Parcel data and the P&D Layers.

Level 1 – Quality Control

Parcel Data

- ***A member of the QC group checks each file 1-to-1 with the orthophotos and GDCAS monument point to ensure that all the data is adjusted.***
- ***The image file is referenced in the background. The adjusted file is divided into 8 or 16 quadrants, or as appropriate, depending on the extents of the file. The entire vector file is reviewed quadrant by quadrant on the screen for line / annotation adjustment and also for dimensional tolerance as specified in the project scope. The file is zoomed-in to check for snaps and positional stability.***
- ***Once a quadrant is scanned, a flag is placed in that quadrant so that duplication of effort is avoided. Any missing elements are located in this process.***
- ***The QC group uses an in-house developed "QCHECK" routine. This routine reads valid data specifications as provided in the Layer List from a rule file. This rule file is built at the beginning of a project and is maintained as a standard rule file.***
- ***After the screen QC is completed, the QCHECK routine is run on the QCed file. The routine reads through the digital file and identifies:***
    - ***elements in the file that deviate from the defined criteria of element properties such as layer, color, type, thickness etc, which has been provided in the Layer List***
    - ***objects other than those defined for the project***
    - ***extra layers present in the file that could contain erroneous elements***
    - ***Layers that do not have any elements***
- ***All of the above elements are the identified defects in the file. Defects found during QC are flagged, and the file is returned for rework.***

- ***The reworked file is again subjected to the QCHECK routine to ensure compliance to specifications.***
- ***Topological cleaning tools are employed to ensure that the file is digitally free from geometric defects.***
- ***The digitized file also is checked for edgematch defects across the map tiles by referencing the adjacent tiles.***
- ***Routine will be run to identify any arcs that got dropped as complex lines during the process. If found any dropped arcs will be replaced as true arcs.***
- ***Remaining arcs will be checked to see whether any deformity has happened to them during the transformation. If so, such arcs also will be replaced.***
- ***All P&D GIS Data Layers will be verified against the original data to see whether they have been moved relatively by the same amount as the parcel layer. Care will be taken to make sure that the lines that are supposed to follow the parcel boundary / subdivision boundary or centerline are coincident with the right feature.***

Interim Quality Assurance

This step is adopted to ensure that the files meet the quality norms defined for the project for line placement and text placement before delivery to client. The file will be sent back for corrections at this stage only if the QA results fail to meet or exceed County expectations. This step does not replace the QC that is carried out at various stages during the work process.
The QA members check a batch of files ready to be delivered to the client using Statistical Quality Control methods, thus ensuring the end client a quality product. A checklist is made of possible defects against which the work product is marked-up as the QA proceeds. Depending on the specifications of the client, certain defects are considered critical, while others may be of less importance. All maps are checked for "critical" defects, while for non-critical defects, a sample number of maps will be checked. The following table provides a sample checklist:

Important steps that are followed:

1. ***Insert all adjacent files that will have a bearing on the continuity of parcel features. Reference in all image files of the inserted files.***

2. ***Perform a continuity check. If the file fails, the file is flagged as rejected and returned for rework. All files are required to clear the continuity check at 100%.***

3. ***Run the QCHECK routine to identify defects. Flag any defects found.***

4. ***Enclose a part of the file within a polygon so that approximately one-third of the captured features fall inside the polygon. All features within this polygon are checked for all acceptance parameters. Where a defect is detected, such features are flagged as defects.***

5. ***Run QA test tool. This tool returns a count of the features in the file, features within the polygon, and a count of the defects flagged within the area. These counts are used for computing the percentages representing the data quality.***

Smart Data Strategies will provide the second level of Quality Control using custom tools to perform automated checks to ensure the following standards are met. Custom routines are used to validate data for specific data qualities as defined below.

Data Quality Control Requirements

The digital data will match the following data quality standards:

Edge-matching – All 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 must be achieved. Transitions from straight line to curvilinear line segments must be smooth, and without angular inflections at the point of intersection. The digital representation must not contain extraneous data as 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 –No line or polygon can cross itself, or any other digital feature, except to join at an actual confluence. All adjusted 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.

Level 2 – Quality Control

Topology Checks

The second phase includes topology checks. Smart Data Strategies proposes to define and maintain appropriate topology rules for the parcel polygons and parcel lines and any related feature classes that could potentially be expressed with at least partially coincident segments. During this phase, the ESRI Topology application is run. If any topology errors exist, they will be displayed in the error inspector (see Figure 1 - Features participating in a Topology Class).

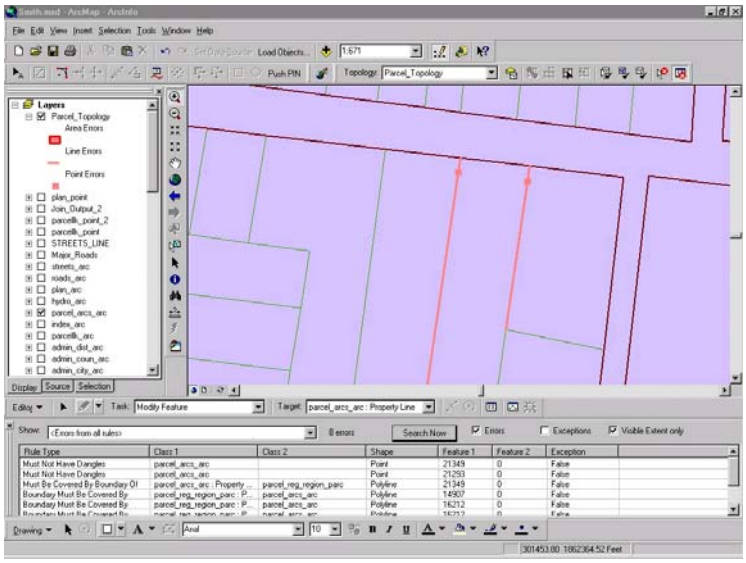


Figure 1 - Features participating in a Topology Class

The following is a list of topology rules that Smart Data Strategies typically usesduring 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***

Data Acceptance Testing QA/QC

The third phase 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 99.99% accuracy rate on all deliverables to the county for the attributes/objects defined in the DAT scoring methodology.

Data Acceptance Testing (DAT) Scorecard

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

_____ County, MD | SDS Project CS0114 |
DAT Scorecard

revision 1.1 | 1/3/2005

Batch Name:	**Batch**
Date Received:	**27-Jan.**
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%**

The overall production and quality control will be overseen by Rudy Stricklan, RLS, a registered surveyor licensed in the State of Arizona.

Level 3 – Quality Control

EMS Quality Control Process

The third level of quality control will be performed by EMS, with Quality Assurance tools developed over years of working with the Maricopa County Assessor's Mapping Division. Once Smart Data Strategies is complete, EMS will take in the data and post process it to ensure it meets the exacting standards of the County.

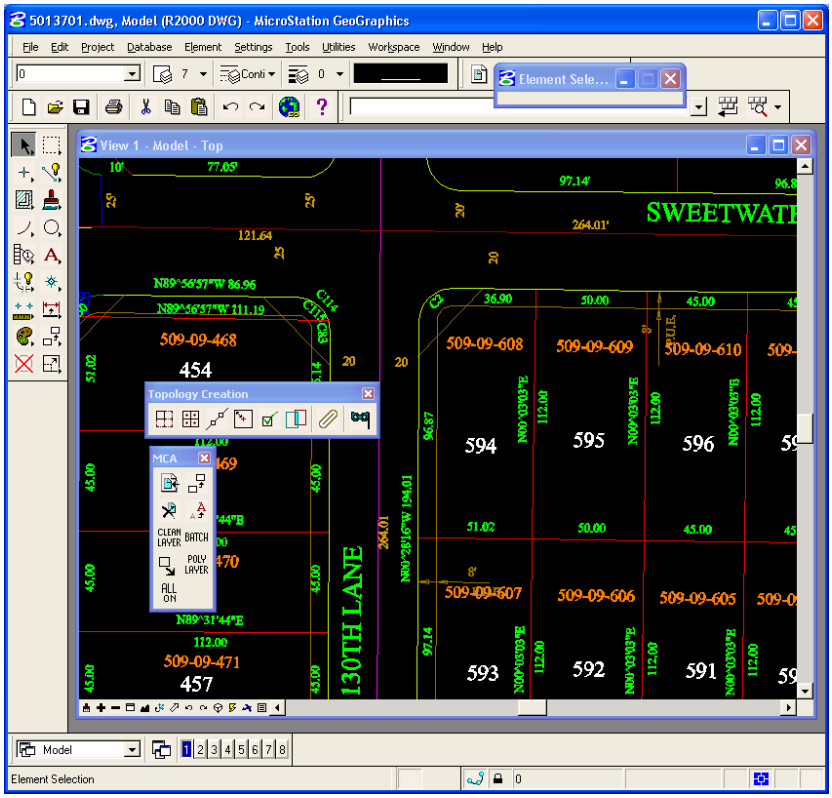
EMS Delivery Strategy

Once the rectified data is received from Smart Data Strategies, EMS staff will apply several QA/QC steps which are exactly the same as the processes used currently for internal subdivision mapping.

During the time between February and July of 2006, EMS processed over 31,000 parcels when these data sets were delivered to the exacting specifications of the Assessor's Mapping Department. In order to achieve this level of excellence, EMS worked closely with County parcel mapping staff to understand their methodology. EMS in turn developed processes and custom programs developed in the MicroStation Geographics development environment which post-processed the data. The intention is to emulate the same protocols for data accuracy and delivery timeliness.

Specifically, EMS will be testing for topology errors in parcel polygons that may be induced in the rectification process. Next we will apply our programs to determine if any annotation falls out of specification; all annotation will be the exact proper size, level and color. Lastly, we will further ensure that the remaining 50+ data

levels are in specification. The testing routines will alert us to any anomalies that may have been induced during the adjustment process at Smart Data Strategies.



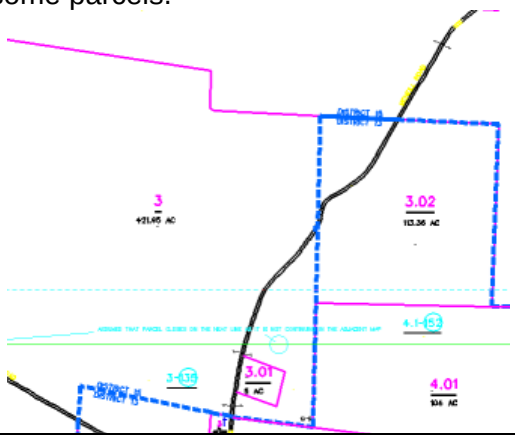
The figure above illustrates our custom MCA toolbar used to interactively QA/QC the Smart Data Strategies data. The process consists of a combination of out-of-the-box topology tools and custom tools developed in the Microstation Design Environment.

Although the data will be undergoing rigorous QA/QC prior to leaving Smart Data Strategies, this last level of processing at EMS ensures the data will be as error-free as possibly prior to delivery back to the County. Further processing of the .DGN files into the County GIS will not be impeded by any errors induced by our rectification process.

Resolution of Discrepancies (Smart Data Strategies PAR Form)

Smart Data Strategies will bring boundary discrepancies to Maricopa 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 Maricopa 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 Smart Data Strategies. 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, Smart Data Strategies 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: Maricopa Parcel Adjustment	To/PAR Response From:
From/ PAR Response return to: Finny Cherian	F: # , P: #
F: 615-794-5310, P: 615-794-5280	Cc: Maricopa County
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 parcels and TVA lake for some parcels. Using the TVA boundary will shorten some parcels. 	DPA Suggested Resolution:

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 map data and GDACS.***
- ***Discrepancies are detected when edge-matching map sheet to map sheet.***

2.8 DELIVERABLE DATA ACCURACY & ACCEPTANCE SPECIFICATIONS

2.8.1 Parcel Adjustment within GDACS-controlled PLSS Sections

2.8.1.1 Any parcel boundaries (and/or PLSS section lines) that intersect at a GDACS point shall be exactly snapped to said GDACS point. The Quality Assurance document verifying this shall be an ArcInfo Node Attribute Table report (or equivalent) detailing the arc segments emanating from each GDACS point.

2.8.1.2 Any parcel boundaries that snap to GDACS-proximity points (e.g., erroneous section corner monuments that were nonetheless used for mapping) shall be documented.

2.8.1.3 For parcel boundary lines lying within the interior of a GDACS-controlled PLSS section (but not intersecting a GDACS control point), the following adjustment process shall be followed:

2.8.1.3.1 A Hybrid Control Network (HCN) consisting of street centerline linework shall be developed for each PLSS section. The HCN shall be constructed from best-available centerlines contributed by sources external to the Maricopa County Assessor, and shall be photogrammetrically coincident to the median line of streetline improvements within a visual tolerance of ±2 International Feet. In roadway areas where the right-of-way centerline is provably offset from the apparent improvements median line (e.g., half-streets, certain section and half-section streets, etc.), the HCN linework will be constructed along the right-of-way centerline (as best determined), and additionally attributed to denote its non-alignment with the orthophotography.

2.8.1.3.2 Significant nodes and inflection points (i.e., points of curve and tangency) of the Assessor right-of-way centerline linework shall be adjusted to each section's HCN linework within a tolerance of ±1 International Foot. The Quality Assurance document verifying this shall be an ArcInfo NEAR analysis report (or equivalent) specifying the calculated distance from each adjusted Assessor centerline node and inflection point to the corresponding HCN registration point.

2.8.1.4 Parcels within blocks (areas bounded by street centerlines) shall be adjusted according to the following hierarchy and specifications:

2.8.1.4.1 COGO'd parcels shall be shifted and rotated as a block group to best fit the surrounding adjusted centerlines and their associated rights-of-way, with a visual check made from apparent lines of property occupation to the orthophotography (±2 International Feet visual tolerance). The Quality Assurance document provided shall be a Polygon Centroid Displacement report that shows the distance and polar angle from the unadjusted parcel centroid to the adjusted parcel centroid location. To the maximum extent possible, photogrammetric alignment shall be held within blocks, but it will be subservient to COGO'd dimensions (unless evidence to the contrary is documented).

2.8.1.4.2 Each COGO'd parcel adjusted in this manner shall be assigned a Confidence Factor of 6 (parcels that have their dimensions held, but do not photogrammetrically align will be assigned a

Confidence Factor of 6N).

2.8.1.4.3 Non-COGO'd parcels shall be shifted, rotated, and/or scaled to best fit the surrounding centerlines and their associated rights-of-way, and additionally adjusted to fit apparent lines of property occupation to the orthophotography (±2 International Feet visual tolerance). **In areas where provided dimensions indicate specific patterns (e.g. a series of parcels spaced equidistantly), the dimensioning may take precedence over photogrammetric placement provided the contractor includes detail (in the form of embedded notes) of these discretionary placements. Maricopa County shall reserve the right to review these placements with the Contractor to verify accuracy and process.** The Quality Assurance document provided shall be a Polygon Centroid Displacement report that shows the distance and polar angle from the unadjusted parcel centroid to the adjusted parcel centroid location.

2.8.1.4.4 Each non-COGO'd parcel **that is positioned within ±2 International Feet visual tolerance and additionally agrees with the supplied dimensioning shall be assigned a Confidence Factor of 5. Parcels that are photogrammetrically aligned, but do not agree with the supplied dimensions, will be assigned a Confidence Factor of 5Z. Parcels that are positioned according to supplied dimensioning, but do not agree with the Orthophotography, will be assigned a Confidence Factor of 5N.** ~~adjusted in this manner shall be assigned a Confidence Factor of 5 (parcels that do not photogrammetrically align will be assigned a Confidence Factor of 5N).~~

2.8.1.4.5 Aliquot part parcels within GDACS-controlled PLSS sections shall be adjusted by a combination of photogrammetric alignment (±2 International Feet visual tolerance) and holding dimensions, assisted by mathematical aliquot part computation.

2.8.1.4.6 Each aliquot part parcel adjusted in this manner shall be assigned a Confidence Factor of 4 (parcels that do not photogrammetrically align will be assigned a Confidence Factor of 4N).

2.8.2 PARCEL ADJUSTMENT WITHIN NON-GDACS-CONTROLLED PLSS SECTIONS

2.8.2.1 Best-available PLSS section data shall be provided by the County, and this control network shall be adjusted as necessary to photogrammetrically align to on-ground conditions (e.g., road centerlines). The adjusted PLSS sections will then be used to support the same process as detailed in Section 1, with the following exceptions:

2.8.2.1.1 The tolerance for matching adjusted Assessor centerline nodes to non-GDACS section Hybrid Control Networks shall be ±2 International Feet, rather than ±1 International Foot.

2.8.2.1.2 COGO'd parcels shall photogrammetrically align to the orthophotography within ±5 International Feet, and be assigned a Confidence Factor of 3 (parcels that do not photogrammetrically align will be assigned a Confidence Factor of 3N).

2.8.2.1.3 Non-COGO'd parcels shall photogrammetrically align to the orthophotography within ±5 International Feet, and be assigned a Confidence Factor of 2 (parcels that do not photogrammetrically align will be assigned a Confidence Factor of 2N).

2.8.2.1.4 Aliquot part parcels shall photogrammetrically align to the orthophotography within ±5 International Feet, and be assigned a Confidence Factor of 1 (parcels that do not photogrammetrically align will be assigned a Confidence Factor of 1N).

SMART DATA STRATEGIES, 357 RIVERSIDE DRIVE SUITE 100, FRANKLIN, TN 37064

Terms:	NET 30
Vendor Number:	W000007194 X
Telephone Number:	888/384-6214
Fax Number:	615/764-5310
Contact Person:	Susan Marlow
E-mail Address:	sales@sds-inc.com
Certificates of Insurance	Required
Contract Period:	To cover the period ending **October 31,** ~~2008~~ **2009.**