

Appendix B

Rock Island District Scope of Work for Development of Real Estate Tract Files Using COGO

This scope of work was developed by the Rock Island District and used with the contractor to accomplish a pilot project for the development of digital tract GIS files, metadata, and related data files for Corps tracts along eight pools of the Illinois Waterway. This appendix is referenced in the Rock Island District Case Study, Chapter 4 of this report.

SCOPE OF WORK
ARCHITECT/ENGINEER SERVICES
Creation of Coverages from
Real Estate Tracts
Illinois Waterway

1. GENERAL DESCRIPTION OF WORK:

- a) The A/E shall provide all necessary design services required in producing attributed ESRI coverages for the Real Estate boundary tracts as described herein. The work will consist of the development and attribution of the tract boundaries as described herein.
- b) Boundary Tracts: The work will consist of featuring and attributing the tracts as specified in the Spatial Data Standards 2.0. All work will be done through using either ArcView 3.2a or greater, or ArcInfo V8.02 or greater. The delivered product will be an attributed ArcInfo coverage for each Illinois Waterway pool containing the tract boundaries as provided by the Government.

2. PROJECT LOCATION:

The project will be completed using available information provided by the Government and other public resources that are readily available to the Contractor. All meetings will be held at the Rock Island District HQ in Rock Island, Illinois.

3. PROJECT PARTNERING MEETING:

A project partnering meeting will be held within three working days after the contract award. The intent of this meeting is to review the scope of work and introduce POC's for the project. The Government will also identify in writing to the contractor those 10 tracts that are to be used for the 10% submittal at this meeting.

4. WORK TO BE PERFORMED:

- a) The Contractor shall convert all the tract information contained on the delivered section maps, descriptions and deeds into ArcInfo coverages. All tract boundaries will be developed as outlined below. These tracts shall be imported into or developed in ArcInfo v8.02 or greater to create polygons within the guidelines prescribed in Section 7, QUALITY ASSURANCE. Each tract polygon will be attributed to the Info database. One coverage will be created for each pool. The attribution table shall consist of four entries; PROJECT_ID, PARCEL_NO, CAPTURE_METHOD and PLACE_STAT. Each of these attribute fields will be a 20 character text field. All the attribute data will be provided by the Government, except the CAPTURE_METHOD. This field will be determined by the methodology used to determine the point of origin of each tract (survey or graphical).
- b) All intermediate files used to create the final coverage will be included in the final submittal. This would include COGO data files and intermediate graphics files (such as shapefiles and MicroStation design files).

- c) Tract data will be obtained from Tract Descriptions, Deeds, and/or other applicable documents and maps, copies of which will be furnished by the Government.
- d) The tract descriptions contained in the furnished documents will be carefully read to ascertain the Points of Commencement, Points of Beginning and closing lines or points, to note the relationship between all elements of the tract described and the relationship of that tract to the adjoining tracts. Reference to existing maps may be necessary to ascertain the relationship of the tracts and other features called for in the tract descriptions. Knowledge of the intricacies of the Public Land Survey System is required for interpreting the descriptions.
- e) The mathematical data from the descriptions will be entered into a surveying, traversing or coordinate geometry program, as appropriate, to produce a closed traverse/polygon that represents the tract described. Closure of the traverse/polygon must be reviewed. The unadjusted linear error of closure must be greater than 1:5000. Because these documents relate to work already accepted and filed for record, we believe the closures have been previously checked and adjusted as necessary. If closure adjustments have not been previously done, the prescribed Corps of Engineers method for traverses of that era is the Compass Rule (the Bowditch method) after the angles have been adjusted in equal increments. Minor closure problems due to rounding-off of angular values may exist.
- f) Courses in descriptions that have calls for adjoiners may require careful review of other tracts and/or Real Estate Segment Maps or other maps furnished by the Government.
- g) Resolution of problems with closure and interpreting calls for adjoiners or other non-geometric calls may be referred to the Contracting Officer's Representative.
- h) The bearings in all descriptions are thought to be referred to true (astronomic) north. Since no coordinate system is apparent in the descriptions, careful selection of coordinate system origin is important to tie all the tracts together and fit in the system GIS. Individual tracts may be computed on a local assumed system and then rotated, scaled, and otherwise transformed to fit the system-wide scheme.
- i) Product deliverables will also include all data files created in the GIS conversion process along with a stand alone point coordinate file for all tract boundary corners/angle points for non-GIS users.
- j) A text file will also be created for each tract to preserve the dual description call system (words and numbers) for appropriate use in the final GIS as evidence of the intent of the mathematical data plotted for resulting maps.
- k) Complete FGDC compliant metadata will be developed using the SMMS utility. Particular attention shall be given to the process description section of the metadata.
- l) Each ArcInfo coverage will contain complete projection information provided by using the ArcInfo command PROJECTDEFINE.

m) The Contractor shall notify the Government in writing if the point of origin of a particular tract cannot be determined from the available information using approved mathematical techniques. The Corps will provide the Contractor with a point of origin for these tracts within 10 working days of the receipt of such notification. The Contractor shall, where practical, make these submissions in groups of not less than 10 tracts.

5. ATTRIBUTION:

a) All tracts shall be attributed with the following items:

- 1) PROJECT_ID
- 2) PARCEL_NO
- 3) PLACE_STAT
- 4) CAPTURE_METHOD

b) All attribution will be done in upper case. The data required to attribute these tracts will be provide in Microsoft Access format by the Government.

6. MATERIAL PROVIDED BY THE GOVERNMENT:

a) Digital othophotos in TIF world format of the Illinois Waterway. These orthophotos were developed in Illinois East and West State Plane Coordinate Systems, NAD 1983 US survey foot. The orthos were produced at two different resolutions for some pools. Use the highest resolution for your work in all cases.

b) Approximately 400 tracts on section maps and property descriptions delivered in PDF format.

c) The contractor will be responsible for obtaining the Spatial Data Standards and AEC CADD Standards information required for this project from the CADD\GIS Technology Center in Vicksburg, Mississippi (<http://tsc.wes.army.mil>).

7. QUALITY ASSURANCE:

a) GENERAL. Clean line work is generally understood as essential for quality GIS production. This level of quality consists of creating correctly closed graphic shapes or boundary features, placement of all centroids for area features, removal of overlapping or dangling linear features, edge-matching of graphic tiles, correct feature coincidence, and correct performance all graphic-to-database associations. The following paragraphs outline quality assurance steps and reporting requirements. The contractor shall provide the process report for all of the following QA steps on one of the CD-ROM disks in a directory called \QA.

b) QUALITY ASSURANCE TOOLS. Specific quality assurance tools are described by product name in the following sections. The contractor may prefer to use other COTS quality assurance tools which are compatible with their own GIS data development software tools. In this case, the contractor, at the pre-work conference, will correlate their software's functionality against the referenced tools' capabilities and demonstrate how they will report performance of these quality assurance checks using their own preferred tools.

- c) **TOPOLOGICAL ACCURACY.** All digital map products should be topologically clean and free of errors. The topology of all required map products must be verified and free of overshoots, undershoots, slivers, open polygons (boundaries), unlabeled polygons, and unresolved line segment intersections. The digital representation of all coincident, common boundaries must be exactly the same. Coincident features are those which are in common between two or more data layers.
- d) **FEATURE CHECKING.** All files shall be processed to flag and to correct any invalid features, attribution, and graphics symbology.
- e) **DATABASE RECORD CHECKING.** All database records in the GIS shall be validated for meeting a series of validity checks. There shall be no orphaned records that have no associated graphics, have a NULL mapid value, have an invalid mapid value, or refer to an associated map file that cannot be opened.
- f) **POLYGON DEVELOPMENT:** These polygons shall:
 - 1) Be input using double precision;
 - 2) By definition, all close;
 - 3) The ArcInfo utility build will be run on each coverage;
 - 4) Be fully attributed in accordance with Section 5.
 - 5) In addition:
 - i. Polygons with common borders shall share a common line.
 - ii. No sliver polygons or other artifacts shall be formed as a result of adjacent polygons.
 - iii. The shape files will contain only polygon feature types.
 - 6) At the 10% review (see Appendix A, pg B8), the contractor shall specify in writing the methodology used to create and QC the coverages. This methodology shall include at a minimum:
 - i. A detailed listing of the major steps involved with creating the coverages.
 - ii. The assumptions made, if any, in their creation.

8. **DELIVERABLES:**

- a) Store all finalized GIS data on CD-ROM format disks in directories named after the pool to which they represent. Each directory shall contain separate sub directories for GIS coverages, and survey data and calculations. Directories will also be made for intermediate products as defined in Section 4. An index in MicroSoft Excel of all the files in the CD shall be included with each CD. This index will include the file name, its location on the CD and a brief description of that file's contents. These CDs, upon completion of work, shall become the property of the Government.
- b) All items provided by the Corps are considered non-expendable and shall be returned upon completion of this delivery order.
- c) All submittals shall be accomplished in accordance with Appendix B (pg B9).

9. QUALITY CONTROL PLAN:

The A/E shall submit a plan outlining the measures to ensure quality throughout the contract period. The quality control plan is to be submitted prior to the Partnering Meeting. The plan shall include as a minimum:

- a) Project description.
- b) Names and disciplines of all project team members.
- c) Data development criteria and assumptions.
- d) Review process procedures.
- e) Complete schedule from concept design through construction contract award.
- f) Responsibilities of the A/E and the Corps.

10. COMMUNICATIONS AND DOCUMENTATION:

- a) A free flow of communications is essential between the A/E and the Corps. The A/E and the Corps shall each assign a single point of contact. The Corps single point of contact through the design phase will be Roger Perk. Other points of contact will be established during the Design Partnering Conference. The A/E is responsible for appointing a project engineer/architect to act in a similar capacity. Mr. Perk's title and phone number:

Roger Perk, PE
Civil Engineer, Project Engineering Section
309-794-5475

- b) The A/E shall communicate regularly by E-mail, phone, and FAX. Mr. Perk's e-mail address and FAX number:

Roger.A.Perk@usace.army.mil
309-794-5698

- c) The A/E shall document all meetings and records of pertinent conversations, beginning with the pre-proposal meeting and continuing throughout the design process.
- d) The A/E shall provide minutes of all meetings within five business days to the Corps via E-mail.

11. INFORMATION MEETINGS AND REVIEW CONFERENCES:

All meetings will be held at the Rock Island District Headquarters in Rock Island, Illinois. The following is the anticipated schedule:

12. SCHEDULE:

The following schedule begins with the A/E contract award date. The 400 tracts on this project are

equally divided (as reasonably possible) amongst the submittals.

- a) Project Partnering Meeting – Fifteen working days after contract award. Discussion of Contract issues. The Government will provide all information as required by this work order.
- b) 10% Review – 30 working days after contract award. This review shall include a CD submission of the first ten tracts in final format. The information and materials to be provided at this submission is outlined in Appendix A.
- c) 10% Review Meeting– 35 working days after contract award. This meeting will take place by teleconference/or at the Rock Island District HQ as determined by the nature of the comments.
- d) 90% of T. J O’Brien and LockPort submitted – 50 working days after contract award.
- e) Review Comments Returned on T. J O’Brien and LockPort submittal - 55 working days after contract award.
- f) Final of T. J O’Brien and LockPort submitted – 60 working days after contract awarded.
- g) 90% of Dresden, Marseilles, Starved Rock and Brandon Road submitted – 75 working days after contract award.
- h) Review Comments Returned on Dresden, Marseilles, Starved Rock and Brandon Road Submittal - 80 working days after contract award.
- i) Final of Dresden, Marseilles, Starved Rock and Brandon Road submitted – 85 working days after contract awarded.
- j) 90% of Lockport, Peoria and LaGrange submitted – 100 working days after contract award.
- k) Review Comments Returned on Lockport, Peoria and LaGrange #1 Submittal - 105 working days after contract award.
- l) Final of Lockport, Peoria and LaGrange submitted – 110 working days after contract awarded.
- m) Completion - The completed work shall be delivered to the COR by 110 working days after the contract is awarded.
- n) Packaging of each final submission shall be accomplished such that the materials will be protected from handling damage. Each package shall contain a transmittal letter of shipping form, in duplicate, listing the materials being transmitted.

Appendix A

Requirements for 10% Submittal

The following items shall be submitted for review at the 10% submittal.

1. 3 Sets of CD'S for the first 10 tracts identified to the contractor at the project partnering meeting.
2. These CD's shall be named "Creation of Coverages from Real Estate Tracts, Illinois Waterway, 10% Submittal."
3. The CD's shall contain the directory structures, information and file formats as described for each final submission.
4. The submittal shall be in accordance with Appendix B.

Appendix B

Task Order Format for Deliverables

A. GENERAL.

All design work, coverages, maps, computations, spreadsheets, text documents, project schedules, sketches and other miscellaneous documents to be provided under this task order shall be accomplished and developed using micro-computer based software and procedures conforming to the following criteria.

B. DOCUMENT FORMATS.

CADD data for all drawings shall be supplied in Bentley Corporation, three-dimensional or two-dimensional as appropriate, MicroStation J or later version native electronic digital format (i.e., .dgn, .cel, .i), Windows NT, and version currently used, operating system. The target platform is an Intel based computer using the Windows NT, version 4.x or later, operating system. The contractor shall ensure that all digital files and data (e.g., base files, reference files, cell libraries) are compatible with the Government's target CADD system (i.e., basic and advanced CADD software, platform, database software), and adhere to the standards and requirements specified herein. The term "compatible" means that data can be accessed directly by the target CADD system without translation, preprocessing, or postprocessing of the electronic digital data files. It is the responsibility of the A-E to ensure this level of compatibility.

GIS coverages shall be submitted in ArcInfo v 8.02 or greater format. Shape files shall be delivered in ArcView 3.2a or greater format. The non-graphical database delivered with prepared drawings shall be in Info format. All linkages of non-graphical data with graphic elements, relationships between database tables, and report formats shall be maintained. All database tables shall conform to the structure and field-naming guidance provided by the Government.

Text documents and spreadsheets shall be provided in Microsoft Office Suite 97 or later format. All scheduling should be accomplished using Microsoft Project 98 or later. All documents shall follow a standard naming convention that shall be submitted and approved in writing prior to the initiation of work. All documents that are to be submitted, but are not initially completed in electronic format, shall be scanned and converted to Adobe PDF format version 4.x or later. These documents shall also follow the approved naming convention. All other text or graphics output that is to be submitted that is not addressed in the above paragraphs shall be submitted in Adobe PDF format.

C. DOCUMENT STANDARDS.

All text documents, calculations, computer output as indicated herein and other non-CADD documents should be prepared on 8-1/2"x11" letter size paper and electronic equivalent. Where a letter sized paper is not appropriate sheet, sizes should be maintained at 8-1/2"x14" legal size and "11x17" report size. All units of weight and measure shall be in English units.

D. DELIVERY MEDIA AND FORMAT.

A copy of all GIS data, CADD data, CADD or GIS related files, and all project related submission documents developed under this contract shall be delivered to the Government on electronic digital media with each progress submission. All submittals shall be provided in their native electronic digital format and shall be provided on read-only memory (CD-ROM). The electronic digital media shall be in the format that can be read and processed by the Government's target Intel based computer system. Each

CD-ROM shall have an index file created in Microsoft Excel placed in its root directory named “index.xls” that shall contain as a minimum a list of the filenames, their directory location on the CD-ROM, and a brief description of their content. (i.e. CADD file would have the drawing title listed, a letter would have the subject listed):

The external label for each electronic digital media shall contain, as a minimum, the following information:

- (1) The Contract Number (and Delivery Order Number if applicable) and date.
- (2) The format and version of operating system software.
- (3) The name and version of utility software used for preparation (e.g., compression/decompression) and copying files to the media.
- (4) The sequence number of the digital media.

The files shall be copied to the delivery media using standard DOS copy or xcopy commands, or other methodology approved in writing by the Government, in an orderly directory structure approved by the Government. This directory structure shall be approved at least 5 working days prior to each submittal.

E. SCANNING AND PDF REQUIREMENTS.

All documents, including hand calculations, which are not created in those standard formats as described above, need to be printed or scanned to Adobe PDF format. The PDF file generation settings need to be submitted in writing and approved by the Government. Where necessary, documents shall be scanned at a resolution of 150 dots per inch (dpi) or greater. Files printed from scanned documents shall be as legible as the originals. Care shall be taken to optimize the scanning settings to ensure to avoid excessive PDF file size. All scanned documents shall be assembled into the fewest number of individual files as appropriate and grouped according to project task. All PDF files shall contain indexes that are hot linked to the appropriate sections of the document to facilitate its use. The PDF documents shall open to display a full sheet view of the first page of the document and the necessary bookmarks.

F. HARD COPY TRANSMITTALS.

A transmittal letter containing, as a minimum, the following information shall accompany each submittal to the Government. The transmittal letter shall be dated and signed by the appropriate A-E’s representative. The transmittal letter shall be provided to the Government on 8-1/2-inch by 11-inch paper. An electronic copy of the transmittal letter in a Microsoft Word 97 or later format shall also be provided on the electronic digital media submitted to the Government.

- (1) The information included on the external label of each media unit (e.g., disk, tape), along with the total number being delivered, and a list of the names and descriptions of the files on each one.
- (2) Brief instructions for transferring the files from the media to a server or computer.
- (3) A signed certification document, attachment, that all delivery media are free of known computer viruses. A statement including the name(s) and release date(s) of the virus-scanning software used to analyze the delivery media, the date the virus scan was performed, and the operator’s

name shall also be included with the certification. The release or version date of the virus-scanning software shall be the current version that has detected the latest known viruses at the time of delivery of the digital media.

- (4) A statement indicating that the A-E will retain a copy of all delivered electronic digital media (with all files included) for at least one year and, during this period of time, will provide up to two additional copies of each to the Government, if requested, at no additional cost.

G. OWNERSHIP.

The Government, for itself and such others as it deems appropriate, will have unlimited rights under this contract to all information and materials developed under this contract and furnished to the Government and documentation thereof, reports, and listings, and all other items pertaining to the work and services pursuant to this agreement including any copyright. Unlimited rights under this contract are rights to use, duplicate, or disclose text, data, drawings, and information, in whole or in part in any manner and for any purpose whatsoever without compensation to or approval from the A-E. The Government will at all reasonable times have the right to inspect the work and will have access to and the right to make copies of the above-mentioned items. All text, electronic digital files, data, and other products generated under this contract shall become the property of the Government. By reference, the following DFAR clauses are included in this contract as a part of the requirements herein:

- a. DFAR 252.227-7013, "Rights in Technical Data and Computer Software."
- b. DFAR 252.227-7018, "Restrictive Markings on Technical Data."
- c. DFAR 252.227-7019, "Identification of Restricted Rights Computer Software."
- d. DFAR 252.227-7028, "Requirement for Technical Data Representation."
- e. DFAR 252.227-7037, "Validation of Restrictive Markings on Technical Data."