
DEPARTMENT OF THE ARMY 01700.TD
U.S. ARMY CORPS OF ENGINEERS -----

GUIDE SPECIFICATION FOR MILITARY CONSTRUCTION

NOTE: This section was last modified by C. Diven,
Jun 04; add GIS requirements and added design/build
requirements for final as-built submittal.

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 WARRANTY OF CONSTRUCTION (APR 1984)

1.1.1 General

See Paragraph "Warranty of Construction" in Section 00800 - SPECIAL CONTRACT REQUIREMENTS

1.2 PREWARRANTY CONFERENCE

Prior to contract completion and at a time designated by the Contracting Officer or his representative, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of Paragraph: WARRANTY OF CONSTRUCTION. The Contracting Officer shall establish communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect and reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty.

1.3 AS-BUILT DRAWINGS

1.3.1 General

The Contractor shall be responsible to prepare and maintain the as-built drawings for this project. "As-built" drawings are a specific and distinct deliverable item under the terms of the contract. Failure to maintain and deliver these drawings will be treated by the Government in a manner similar to the failure to provide a specified item of construction material or equipment.

1.3.2 As-Built Drawing Components

There shall be 3 components to the as-built drawings:

- a. Working as-built drawings;
- b. Final as-built drawings (dimensionally stable mylar film);
- c. Digital as-built drawings (digital files saved to approved media).

1.3.3 Scope of As-Built Drawings.

The as-built drawings shall be a record of the construction as installed and completed by the Contractor. They shall include the information shown on the contract set of drawings and a record of deviations, modifications, or changes from those drawings, however minor, which were incorporated into the work, additional work not appearing on the contract drawings, and changes which are made after final inspection of the work. Level of detail provided on as-built drawings shall match that of the original contract drawings. If additional work changes the as-built conditions after submission of the as-built drawings, the Contractor shall furnish revised or additional drawings to depict as-built conditions. Critical shop drawings or other submittal items, which exceed the level of detail of the as-built drawings and which are needed for the proper operation and maintenance of the project, shall be provided in Operations and Maintenance Manuals.

NOTE: INCLUDE THE FOLLOWING PARAGRAPH FOR ALL PROJECTS THAT REQUIRE GIS INFORMATION FOR THE USER. VERIFY REQUIREMENTS OF PARAGRAPH WITH USER AND MODIFY AS NEEDED.

1.3.4 GIS Requirements

The Contractor shall provide the elevation inverts of gravity systems for existing elements to remain and new elements within the project limits, elevations of duct bank, underground electric and elevations of any other exposed underground utilities uncovered during construction. The information shall include horizontal location by coordinate. A description of the utility shall be provided. The information shall be provided as a list or on as-builts or other suitable method as approved by the Contracting Officer. The information shall be in a satisfactory manner to be inserted in the installation's GIS database.

1.3.5 Working As-Built Drawings

The Contractor shall maintain two sets of paper prints which shall show the as-built conditions and which shall be kept current and available on the jobsite at all times. One set shall be maintained in the Contractor's on-site office, and the second set will be maintained in the Corps of Engineers' Resident Office. Changes from the contract plans which are made in the work or additional information uncovered in the course of construction shall be accurately and neatly recorded using red ink as they occur by means of details and notes. The as-built marked prints shall be jointly inspected for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. A representative of the Contractor and a representative of the government shall each sign and date the coversheet of the record drawings when reviewed. Failure to submit the working as-builts for review may be considered as an incomplete pay estimate. The drawings shall show the following information, but not be limited thereto:

- a. The location and description of utility lines or other installations of any kind or description known to exist within the construction area. Exterior utilities shall be located in both the horizontal and vertical planes. Dimensions shall be within an accuracy

of approximately 100 mm or 4 inches. Vertical location shall be referenced to finished grade or floor level and the horizontal location referenced to a permanent structure such as the face of a building or street curb.

b. The location and dimensions of changes within the building or structure. Accuracy of dimensions will match the level of accuracy of the original contract drawings. Items depicted symbolically shall use the same symbology of the original drawings. Items depicted on the original drawings without dimensions shall be shown in their approximate actual "as-constructed" location.

c. Correct grade or alignment of roads, structures, or utilities if changes were made from contract plans.

d. Correct elevations if changes were made in site grading.

e. Changes in details of design or additional information obtained from shop drawings prepared or furnished by the Contractor. Information incorporated into as-built drawings shall be at a level of detail consistent with the original drawings.

f. The topography and grades of drainage constructed or affected as a part of the construction.

g. Changes or modifications resulting from the final inspection.

h. Where contract drawings or specifications allow options, the option selected for construction shall be shown on the as-built drawings.

i. Working as-built drawings of each drawing shall have the words "DRAWING OF WORK AS-BUILT" in letters at least 3/16-inch high placed below the title block between the border and the trim line. The date of completion and the words "REVISED AS-BUILT" shall be placed in the revision block above the latest existing revision notation.

j. The title block for additional as-built drawings shall be similar to that used on the original drawings.

1.3.6 Final Working As-Built Prints for Review and Approval

Two copies of the working as-built marked prints shall be delivered to the Contracting Officer at the time of final inspection for his review and approval. Upon approval, one copy of the as-built marked prints will be returned to the Contractor. If upon review, the drawings are found to contain errors or omissions, they will be returned to the Contractor for corrections. The Contractor will complete the corrections and return the drawings to the Contracting Officer within 10 calendar days.

NOTE: Use the following paragraphs 1.3.7 thru 1.3.8 for VERY SMALL CIVIL WORKS (MOSTLY O&M) PROJECTS. UTILIZES MANUAL DRAFTING

NOTE: THE AREA OFFICE SHALL HAVE THE RECORD AS-BUILT ORIGINAL DRAWINGS SCANNED INTO A RASTER IMAGE FILE AND SAVED TO A CD. SCANNING CAN BE DONE IN THE TULSA DISTRICT OFFICE UTILIZING H&H BRANCH'S

SCANNER. THE RASTER IMAGES SHALL BE SAVED TO A CD AND FORWARDED TO ENGINEERING DOCUMENTS FOR ARCHIVAL. THE ORIGINAL AS-BUILT DRAWINGS WILL BE FORWARDED TO THE USING FACILITY OR MUNICIPALITY.

1.3.7 Final Drawings

Upon approval of the working as-built prints, the Contracting Officer will furnish the Contractor the original set of contract drawings. These drawings shall be modified to bring them into agreement with the working as-built prints. These drawings are part of the permanent records of the project and the Contractor shall be responsible for the protection and safety thereof until returned to the Contracting Officer for approval.

1.3.7.1 Draftsmanship

Only personnel proficient in the preparation of engineering drawings to standards satisfactory and acceptable to the Government shall be employed to modify the original contract drawings or prepare additional new drawings. All additions and corrections to the contract drawings shall be neat, clean, and legible and shall match the adjacent existing linework and lettering being annotated in type, density, size, and style. Any pencil work shall be done with plastic lead on plastic base material, or with graphite lead on paper base material. The Contracting Officer will review all as-built drawings for accuracy and conformance to the above specified drafting standards. The Contractor shall make all corrections, changes, additions, and deletions required to meet these standards.

a. When final revisions have been completed, each drawing shall be lettered or stamped with the words "DRAWING OF WORK AS-BUILT" in letters at least 3/16 inch high placed below the title block between the border and the trim line. The date of completion and the words "REVISED AS-BUILT" shall be placed in the revision block above the latest existing revision notation. All marking highlighting previous revisions shall be removed.

b. Title Blocks: The title block for additional as-built drawings shall be similar to that used on the original drawings.

1.3.7.2 Reproduction

Blue-line prints shall be full size (equivalent to original drawings) image. All blue-line prints shall exhibit good readable print with clear, sharp, dark lines, and shall not be smeared, faded, double-imaged, or have torn or ragged edges.

NOTE: Edit brackets; coordinate no. days with Section 01010 for Design/Build projects.

1.3.8 Final Submittal

Thirty (30) days after receipt by the Contractor of the tracings of the original contract drawings, (but not later than {30} [60] days after the contract completion date), the Contractor shall submit to the Contracting Officer the final as-built original drawings together with the approved

working as-built marked prints and one set of final blue-line prints. Paper prints and reproducible drawings will become the property of the Government upon final approval. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

NOTE: Use the following paragraphs 1.3.9 thru 1.3.10 for all projects at Sheppard, Vance, and Altus AFB. USING AUTOCAD

1.3.9 Final Drawings (CAD)

The original drawings have been prepared by Computer Aided Drafting (CAD). These digital files will be provided to the Contractor upon request. Upon approval of the working as-built prints, the Contractor shall modify the original CAD drawing files to bring them into agreement with the working as-built prints. If additional drawings are required, they shall be prepared in the AutoCAD format. The Contractor shall submit final as-built CAD drawings in AutoCAD Version 13 or later format.

1.3.9.1 Media

Digital Data Format shall be as listed below in order of preference.

- 1. 5-1/4" Read/Write (R/W) Compact Disc (CD) (650, IBM compatible format) (non-compressed).
- 2. Bernoulli Removable Hard Disk utilizing native file format (non-compressed) (40mb or larger, IBM compatible format)
- 3. 3.5-in. High-density diskettes (1.44mb) utilizing Windows Backup or Pkzip software.

1.3.9.2 Draftsmanship

Only personnel proficient in the preparation of digital engineering drawings to standards satisfactory and acceptable to the Government shall be employed to modify the original contract drawings or prepare additional new drawings. All additions and corrections to the contract drawings shall be neat, clean, and legible and shall match the adjacent existing linework and lettering being annotated in type, density, size, and style. The Contracting Officer will review all as-built drawings for accuracy and conformance to the above specified drafting standards. The Contractor shall make all corrections, changes, additions, and deletions required to meet these standards.

- a. When final revisions have been completed, each drawing shall have the words "DRAWING OF WORK AS-BUILT" in letters at least 3/16 inch high placed below the title block between the border and the trim line. The date of completion and the words "REVISED AS-BUILT" shall be placed in the revision block above the latest existing revision notation. All marking highlighting previous revisions shall be removed.

b. Title Blocks: The title block for additional as-built drawings shall be similar to that used on the original drawings.

1.3.9.3 Reproduction

Blue-line prints shall be full size (equivalent to original drawings) image. All blue-line prints shall exhibit good readable print with clear, sharp, dark lines, and shall not be smeared, faded, double-imaged, or have torn or ragged edges.

NOTE: Edit brackets; coordinate no. days with Section 01010 for Design/Build projects.

1.3.10 Final Submittal

Not later than [30][60] days after the contract completion date, the Contractor shall submit to the Contracting Officer two sets of final as-built drawings on acceptable media as described in paragraph MEDIA above together with one set of approved working as-built marked-up prints, one set of as-built reproducible drawings (mylar), and one set of blue line prints, which will become the property of the Government upon final approval. Format for final as-built drawings shall be as specified in the paragraph FINAL DRAWINGS (CAD) above. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

NOTE: Use the following paragraphs 1.3.11 thru 1.3.12 for all projects at Tinker AFB, Ft. Sill Army Post, McAlester AAP and large civil works projects where Tulsa District is the owner of the finished construction. USING MICROSTATION. Use the information in the brackets for Tinker AFB. Use Microstation Version 8 @ Tinker AFB; Version J for all others.

1.3.11 Final Drawings (CAD)

The original drawings have been prepared by Computer Aided Drafting (CAD). These digital files will be provided to the Contractor upon request. Upon approval of the working as-built prints, the Contractor shall modify the original CAD drawing files to bring them into agreement with the working as-built prints. If additional drawings are required, they shall be prepared in the MicroStation format. [Drawing shall conform to the Tri-Services AEC CADD Standards, Version 1.08.] The Contractor shall submit final as-built CAD drawings in MicroStation [Version J][Version 8] or later format.

1.3.11.1 Media

Digital Data Format shall be as listed below in order of preference.

- 1. 5-1/4" Read/Write (R/W) Compact Disc (CD) (650, IBM compatible

format) (non-compressed).

NOTE: Delete No. 2, Bernoulli... for Ft. Sill only.

2. Bernoulli Removable Hard Disk utilizing native file format (non-compressed) (40mb or larger, IBM compatible format)

NOTE: Remove the bracketed information for Ft. Sill only.

3. 3.5-in. High-density diskettes (1.44mb) utilizing [Windows Backup or] Pkzip software.

1.3.11.2 Draftsmanship

Only personnel proficient in the preparation of digital engineering drawings to standards satisfactory and acceptable to the Government shall be employed to modify the original contract drawings or prepare additional new drawings. All additions and corrections shall be neat, clean, and legible and shall match the adjacent existing linework and lettering being annotated in type, density, size, and style. The Contracting Officer will review all as-built drawings for accuracy and conformance to the above specified drafting standards. The Contractor shall make all corrections, changes, additions, and deletions required to meet these standards.

a. Final as-built revisions of each drawing shall have the words "DRAWING OF WORK AS-BUILT" in letters at least 3/16 inch high placed below the title block between the border and the trim line. The date of completion and the words "REVISED AS-BUILT" shall be placed in the revision block above the latest existing revision notation. All marking highlighting previous revisions shall be removed.

b. The title block for additional as-built drawings shall be similar to that used on the original drawings.

NOTE: Edit brackets; coordinate no. days with Section 01010 for Design/Build projects.

1.3.12 Final Submittal

Not later than [30][60] days after the contract completion date, the Contractor shall submit to the Contracting Officer two sets of final as-built drawings on acceptable media as described in paragraph MEDIA above together with one set of approved working as-built marked-up prints, one set of as-built reproducible drawings (mylar), and one set of blue line prints, which will become the property of the Government upon final approval. Format for final as-built drawings shall be as specified in the paragraph FINAL DRAWINGS (CAD) above. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.4 OPERATING AND MAINTENANCE INSTRUCTIONS

1.4.1 General

Operating and maintenance (O&M) instructions shall be furnished for equipment and systems as required in the SPECIFICATIONS. The operating and maintenance instructions shall include two separate manuals, an Operations Manual and a Maintenance Manual, and shall include framed instructions when required by the specific section. Each system or piece of equipment shall be covered in the two separate manuals regardless of the number of suppliers or subcontractors involved. Combining more than one system or piece of equipment into the same manuals may be permitted if the manuals are indexed by section and do not exceed 4 inches in thickness. Data submitted for the manual shall be in addition to that furnished as shop drawings. Unless otherwise specified in the SPECIFICATIONS, the Contractor shall assemble six complete bound Operations Manuals and six complete bound Maintenance Manuals. Operations and maintenance data shall be submitted within 30 days after approval of the equipment or system and not less than 60 days prior to scheduled testing. Operations and maintenance data shall also be submitted and approved by the time the project reaches 90 percent completion. If O & M data cannot be completed until equipment or systems have been tested and balanced, a draft copy shall be submitted within the specified time. The completed O&M data shall then be submitted within 30 days after the completion of such testing and balancing.

Unless otherwise authorized by the Contracting Officer, the Government will not accept the equipment or systems nor will the Government take possession of the associated work until O & M data are submitted and approved.

1.4.2 Manuals

Operations and maintenance manuals shall be assembled in a durable stiff (hard) covered binder for 8-1/2 by 11-inch sheets with slide binding or screwpost fastening for replacement. Loose-leaf ring binders shall not be used. A permanently printed title on the covers shall show the project name, contract number, and the name of the equipment or system. Shop assembly or special drawings for manuals or parts catalogs shall be of a size that requires folding only a left-to-right coordinate. Each sheet shall be numbered and an index shall be provided. All standard catalog cuts, manufacture's data, parts sheets, or illustrations, shall be originals. A warning page shall be provided to warn of potential dangers, such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, or high pressures. The warning page shall be placed inside the front cover or tab page if more than one section is combined, in front of the title page. The title page shall show the name of the preparing firm (designer or contractor) and the date of publication.

All non-applicable data such as descriptions of other models and optional equipment not included shall be marked out or all applicable data shall be distinctly highlighted. If reference is made to other drawings or data, they shall be included. Manuals shall include the following information for each item of equipment or system:

1.4.2.1 Operations Manual

The Operations Manual shall show operating procedures, sequences, and precautions. The Contractor shall coordinate subcontractors, suppliers, and manufacturers to assure complete submittals on interrelated components.

Include adequate illustrative material to identify and locate operating controls, indicating devices and locations of areas or items requiring

operation or adjustments. As a minimum, the manual shall include piping and equipment layout and simplified wiring and control diagrams of the complete system as installed. Describe, in detail, starting and stopping procedures for components, adjustments required to obtain optimum equipment performance, and corrective actions for malfunctions. Catalog cuts describing equipment operating procedures shall not be used as system operating instructions.

1.4.2.2 Maintenance Manual

The Maintenance manual shall provide instructions for routine and preventive maintenance showing lubrication, dismantling, assembly, repair, and adjustment, electric schematic and connection diagrams, hydraulic circuit diagrams with control and relief valve settings, control and interlock system diagrams, and lists of special tools required. Lubrication instructions shall be for service intended and shall include tables indicating items, frequencies, grades, and types of lubricants. Instructions shall include clearances, bolt torques, pressure settings, and other data. The nature and frequency of routine maintenance and procedures shall be indicated. The materials and test equipment that may be required shall be noted. Performance sheets and graphs, as applicable, showing capacity data, efficiencies, electrical characteristics, pressure drops, and flow rates shall be included. Marked-up catalogs or catalog pages shall not be used for this purpose. Performance information shall be presented concisely and shall contain only data pertaining to equipment actually installed.

Spare parts data and catalogs showing identification, nomenclature, part numbers, required parts, recommended spare parts stocked, and spare parts supplied shall be included. Local source of parts and dated current price list shall be included. Data shall match equipment furnished. Standard catalog data may be used only if irrelevant parts are marked out or relevant parts are clearly identified. Repair information shall show diagrams and schematics, guidance for diagnosing problems, and detailed instructions for making repairs. Troubleshooting information shall be provided that includes a statement of the indication or symptom of trouble and the sequential instructions necessary. Test hookups to determine the cause of trouble, special tools and test equipment, and methods for returning the equipment to operating conditions shall be identified. Information may be in chart form or in tabular format with appropriate headings.

1.4.3 Framed Instructions

Framed instructions shall include as-built schematics of all wiring, controls, piping, etc., necessary for the operation of the equipment or system, and condensed, printed description of the system and of the operating procedure. The framed data may include approved shop drawings, layout drawings, riser and block diagrams and shall indicate all necessary interrelationships with other equipment and systems. The operating instructions shall explain equipment or system prestart checkout, start-up and shut-down procedures, safety precautions, preventive maintenance procedures, and normal operations checks for satisfactory performance of the equipment or system. The framed data may be presented in one or several frames, under glass or plexiglas, for clarity and convenience of location. The framed data presentation and outline shall be acceptable to the Contracting Officer and posted at locations designated by the Contracting Officer. The data shall be posted before personnel training or performance testing acceptance for the related items of equipment or

system.

**NOTE: USE THE FOLLOWING PARAGRAPH ON PROJECTS WHERE
 FORMAL TRAINING IS REQUIRED BY THE SPECIFICATIONS.**

1.5 TRAINING

Formal classroom and on-site training shall be provided as required in other sections of these Specifications. If significant changes or modifications in the equipment or systems are made during the term of the contract after instructions have been concluded, additional instructions shall be provided to acquaint the O&M personnel with the changes or modifications.

The Contractor shall videotape all formal classroom and on-site instruction training sessions. The Contractor shall provide equipment, material and trained personnel to record the sessions using VHS audio-video recording format. Upon completion of the training instructions, the recordings shall become the property of the Government. The recordings shall be identified, indexed, and placed in appropriate approved storage containers for submittal to the Contracting Officer."

USE THE FOLLOWING PARAGRAPH FOR ALL JOBS.

1.6 PAYMENT VALUES FOR O&M MANUALS AND AS-BUILT DRAWINGS (SWD LTR 8/2/90 & MEMO ES-Q DTD 1 JUN 94)

1.6.1 O & M Manuals

**USE THE FOLLOWING PARAGRAPH FOR ALL PROJECTS.
 INCLUDE A LUMP SUM AMOUNT IN THE BLANKS TO BE
 DETERMINED BY THE PROJECT MANAGER. THE AMOUNT FOR
 O&M MANUALS SHOULD BE 3-10% OF THE ESTIMATED VALUE
 OF THE MECHANICAL PORTION OF THE WORK. THE AMOUNT
 FOR AS-BUILTS SHOULD BE \$200 PER CONSTRUCTION
 DRAWING IF REQUIRED IN CADD AND \$35 PER DRAWING FOR
 MANUAL DRAFTING.**

The estimated value for O&M manuals is considered by the Government to be \$_____. Payments will be made for this work only upon receipt and approval of O&M data as required in paragraphs "Operating and Maintenance Instructions" and "Training" above. Payment in the amount of 50 percent of the estimated value may be made upon receipt and approval of the draft O&M data as specified in paragraph "Operating and Maintenance Instructions," provided all other submittals have been submitted and approved.

1.6.2 As-Built Drawings

The estimated value of as-built drawings is considered by the Government to be \$_____. Payments will be made for this work only upon receipt and approval of final as-built drawings as required in paragraph

"As-Built Drawings" above.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --