



**U.S. ARMY CORPS
OF ENGINEERS**

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As-built Guidance

For Contractors

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PURPOSE

The purpose of this document is to provide guidance on the preparation of high quality as-built drawings that exhibit as-built conditions of the project. As-built drawings are an official record of the project at the time construction is completed. The original “as-designed” contract drawings and specifications are revised to show all additions, deletions and other changes made during construction of the project. Accurate as-built drawings are very important for project operation and maintenance and future modifications particularly for project features which are hidden from view.

This document is not intended to supersede or replace any as-built requirements set forth in the contract specifications, but is intended to provide guidance on meeting these requirements. For complete contract requirements, see the General Requirements Section (01.78.00) of the contract specification.

REFERENCES

The following references will be required in the development of as-built drawings. Specific versions of the referenced documents to be used will be provided in the Contract Specifications.

United States National CAD Standard

The CAD/BIM Technology Center A/E/C CAD Standard

Local CAD Standard(s) required by the Contract Specification

DEFINITIONS

CAD Standards

For the purpose of this document, CAD Standards refer to those standards listed in the contract specifications requirements section. These are the standards to be used when updating/creating electronic CAD drawing files. Please see the contract specification for details on the currently required CAD Standards.

Government Furnished CAD Files (As-Designed CAD Files)

The government furnished CAD files are the as-designed electronic CAD drawings in the format of the software specified in the contract specification. This set of CAD drawings will reflect all bid amendments. Government Furnished CAD Files will also include CAD drawings developed during construction for the purpose of modifying the original as-designed drawings. All Government Furnished CAD Files shall be provided to the contractor as stated in the contract specification.

Working Hardcopy Drawings

Working Hardcopy drawings are the printed, hardcopy sets of drawings that are revised by markup during the execution of the project to show the current as-built conditions. Please see the contract specification for the requirements related to Working Hardcopy Drawings.

Working CAD Drawings

Working CAD Drawings are the electronic CAD Files that are revised in tandem with the Working Hardcopy Drawings during execution of the project to show current as-built conditions. Please see the contract specifications for the requirements related to Working CAD Drawings. (New Contract Specification Paragraph required)

Shop Drawings

A shop drawing is a drawing or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator. Shop drawings are typically required for pre fabricated components such as elevators, structural steel, trusses, pre-cast, air handling units, millwork, etc. The shop drawing is the manufacturer's or the contractor's drawn version of information shown in the Contract Documents. The shop drawing normally shows more detail than the Contract Documents. It is drawn to explain the fabrication and/or installation of the items.

Final Hardcopy Drawings

The Final Hardcopy Drawings are the completed Working Hardcopy Drawings including all markup revisions which reflect final as-built conditions.

Final CAD Drawings

The Final CAD Drawings are the completed Working CAD Drawings that incorporate all changes shown on the Final Hardcopy Drawings and reflect the final as-built conditions of the project. Contract Specification requires printed sets and PDF of the Final CAD Drawings to be submitted prior to Project closeout. The C-ANNO-REVS layer should not be displayed on the PDF and printed sets. Please refer to contract specifications for all requirements.

As-built Drawings

The As-built Drawings will consist of the completed Final CAD Drawings and the completed Final Hardcopy Drawings which include modification during construction, field requested changes, shop drawings and contractor designs required during construction. If the Working CAD Drawings and Working Hardcopy Drawings are properly maintained during construction, when project construction is complete, the As-built Drawings should be near completion.

GENERAL PROCEDURE FOR DEVELOPMENT/DELIVERY OF AS-BUILT DRAWINGS

1. Provide Government Furnished Materials - At the Preconstruction Meeting, Government Furnished Materials will be provided to the Contractor.
2. Revision of Working Drawings - During Construction, the contractor will use the Government Furnished Materials to make revisions (changes, additions or deletions) reflecting as-built conditions. Revisions will include markups of Working Hardcopy Drawings as well as edits to the Working CAD Drawings.
 - a. The Contractor will mark-up Working Hardcopy Drawings as required by the Contract Specification.
 - b. Based on mark-up of the Working Hardcopy Drawings, the Contractor will update the electronic Working CAD Drawings to meet contract requirements.
3. Quality Assurance of Working Drawings - The Resident Engineer or designee will review the Working Hardcopy Drawings and the electronic Working CAD Drawings as described in the Contract Specification.
4. Submittal of As-built Drawings - Upon completion of the Project, the Contractor will submit the As-built Drawings (Final Hardcopy Drawings and Final CAD Drawings) that show the as-built conditions of the project.
5. Review of As-built Drawings - The Resident Engineer and/or District Office personnel will perform a review of the As-built Drawings (Final Hardcopy Drawings and Final CAD Drawings). From the review, the Resident Engineer will consolidate Government comments identifying issues that need to be resolved prior to Government acceptance.
6. Resolve Issues with As-built Drawings - Contractor will address, resolve and document all issues identified by the Government during review.
7. Acceptance of As-built Drawings - When the Government determines that the Contractor has met the requirements of the Contract Specifications; the As-built Drawings will be accepted. It should be noted that it may be necessary to perform several iterations of the review, comment and resolution process prior to acceptance. Upon acceptance, the Government will release any retained payments.

GOVERNMENT FURNISHED MATERIALS

At the Preconstruction Meeting, Government Furnished Materials will be provided to the Contractor. This will include at a minimum an optical Disc (CD or DVD) which contains the Government Furnished CAD Files. In addition, the Government will provide two (2) hardcopy prints of the electronic CAD files which reflect the as designed drawings and all bid amendments.

For modifications during construction that require additional or significantly altered drawings, the Government will provide the new or modified drawing to the Contractor along with instructions for updating the Working Hardcopy Drawings and Working CAD Drawings.

REVISION OF WORKING DRAWINGS

General Working Drawings Revision Guidelines (Hardcopy and CAD)

During Construction, the contractor will use the Government Furnished Materials to make revisions (changes, additions or deletions) reflecting as-built conditions. Revisions will include markups of the Working Hardcopy Drawings as well as edits to the Working CAD Drawings. Revisions to the working drawings will include, but not be limited to, the following list.

- Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if revised from the Contract Plans.
- The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
- The actual location of existing and new sub-surface utility lines including valves, splice boxes, etc.
- The location of unusual or uncharted obstructions that are encountered in the contract work area during construction.
- Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.
- Changes in the design, dimensions, specifications or location of project features and equipment.
- Actual location of anchors, construction and control joints, etc., in concrete.
- Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor, including but not limited to, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, irrigation systems, etc.
- If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.
- Layout and schematic drawings of electrical circuits and piping.
- Correct dimensions and details transferred from shop drawings.
- Changes or modifications that result from the final inspection.

Shop Drawings

All shop drawings will be incorporated into the as-built drawings. Incorporation of a shop drawing may require revising Working Drawings to reflect the correct dimensions and details of a project feature.

Typically, Shop Drawings will be provided in electronic CAD file format and conform to the CAD Standards required in the Contract Specification. Hand drawn or printed paper shop drawings will not be accepted in place of electronic CAD drawings. Contract Specification may, however, require submittal of

printed hardcopy shop drawings in addition to electronic CAD drawings. If Contract Specification allow for the acceptance of shop drawing which are smaller than the CAD Standard sheet size (i.e. 8.5"x11" or 11"x17" etc.) the sheets will be referenced into the standard size border sheet used in the Government Furnished CAD Drawings. The Contract Specification may also allow PDF Shop Drawings not prepared by the contractor to be referenced into the standard size border sheet. Please refer to Contract Specification for complete requirements and Shop Drawing acceptance.

Typically, shop drawings will be drawn at the same scale as similar drawings in the Government Furnished CAD Drawing set (e.g., fire alarm systems shall be drawn to the same scale as the plumbing or electrical drawings). Sheet Identification Number, Detail and View Identification Numbers, etc. will link details and views to existing drawings. The Index of Drawings will also need to be revised to show the additional sheet(s) with the appropriate Sheet Title and Identification Number.

REVISION OF WORKING HARDCOPY DRAWINGS

General Working Hardcopy Drawing Revision Guidelines

The number of Working Hardcopy Drawing sets that must be maintained and the frequency at which they must be revised is provided in the Contract Specifications. Typically, revision of the Working Hardcopy Drawing set will be performed on a weekly basis. At a minimum, at least one Working Hardcopy Drawing set will be on-site at all times.

Markups will be completed on black line (Grayscale) prints of the most current drawing. If a Contract Modification requires revised drawings during construction, an up-to-date print should be included in the Working Hardcopy Drawing set. The Sheet Index will be revised to reflect the addition, deletion or renaming of any sheets in the set.

Revisions to the Working Hardcopy Drawings will include legible written explanations to assist in the conveyance of the graphical intent and to clarify any ambiguities. The Contractor will ensure all handwritten text is clear and concise. When revisions are made to drawing sheets, the contractor will ensure that all associated views (e.g., sections, details, plans, profiles, elevations, etc.) are revised accordingly, including those on other drawing sheets. In addition, it may be necessary to revise legends, schedules, notes and call-out designations. When revisions require deletions, ensure that all features and associated data and captions that relate to the revision are marked accordingly.

It may be necessary to make revisions on small scale drawings where space may be restricted. In this event, it may be necessary to develop large scale sketches with leaders to the location where applicable. When attached prints or sketches are included with markup, indicate whether the existing Working CAD Drawing requires revision, an additional Working CAD Drawing should be added to the set or the print or sketch has been provided for further details and is for reference only. When prints or sketches are

required, please ensure that adequate detail is provided to allow for revision of the existing Working CAD Drawing or the development of an additional Working CAD Drawing.

The following guidelines should be followed when revising Working Hardcopy Drawings.

Three base colors should be used to markup the drawings to show as-built conditions. If additional colors are used, provide a legend to explain their use.

- Red – Deletions: Deleted graphics shall be marked with red, and shall include red text in notes and red leaders.
- Green – Additions: Added items shall be green with green text in notes and green leaders.
- Blue – Special: Items requiring special information shall be blue with blue text in notes and blue leaders.

To identify revisions, markups will include a delta triangle (equilateral triangle approximately 3/8" per side) near the revised section of the drawing for all changes. When several items in a table or drawing view (e.g., sections, details, plans, profiles, elevations, etc.) are changed or completely redrawn, a single delta triangle may be placed near the title for the table or drawing view. This same method may be used for general revisions to entire drawing sheets when a major portion of the drawing is changed. When only a few items are revised, added or deleted, a delta triangle will be placed near each item requiring revision. Each delta triangle will contain an identification number that corresponds to an entry in the issue block that describes the revision.

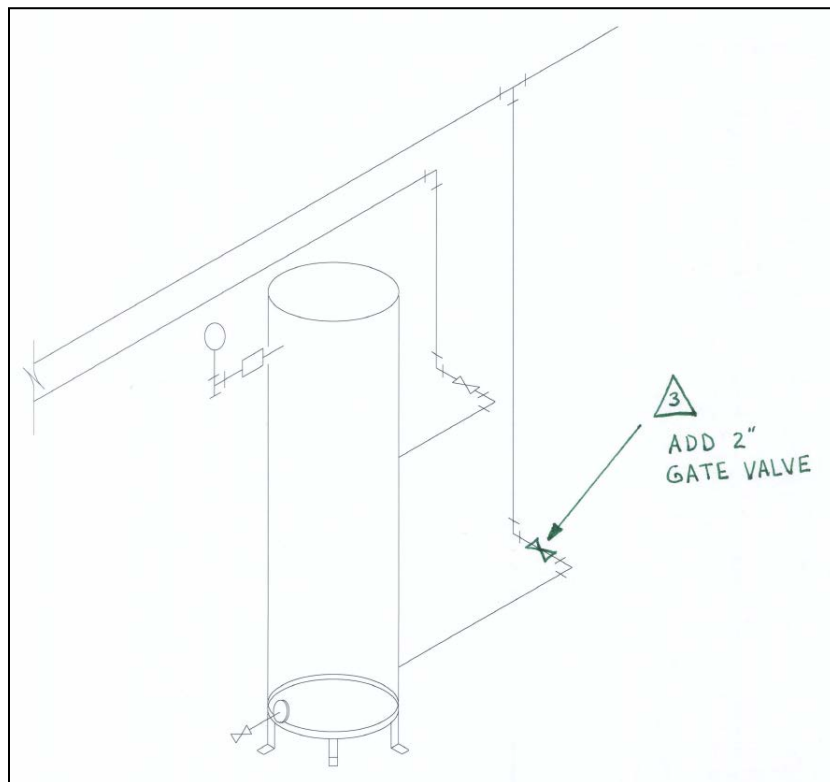


Figure 1 - Use of Delta Triangles

Working Hardcopy Drawing Deletions

To indicate that a feature was not constructed, installed or implemented, red markups will be used to identify the associated graphics and text as deleted on the Working Hardcopy Drawings. Graphics and text associated with deleted features will be crossed out (X) or marked through. To show a drawing view (e.g., sections, details, plans, profiles, elevations, etc.) or design option is not being used, draw a red box around the drawing view or design option, place an “X” across the box and write “NOT USED” within the box. In addition, a numbered delta triangle will be provided inside the box along with notes as needed to describe the deletion. Deletions will be documented in the Issue Block with a red numbered delta triangle and description of the deletion if necessary.

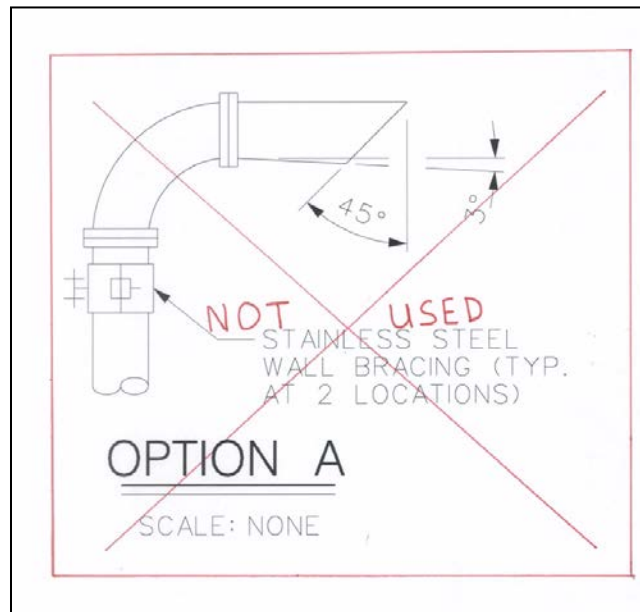


Figure 4 - Working Hardcopy Deletion

Relocated Features on Working Hardcopy Drawings

Relocated features will be identified on the Working Hardcopy Drawings. There are two acceptable methods to identify a relocated feature. The first method to identify a relocated feature will consist of a deletion of graphics and/or text from a drawing, followed by an addition of the same graphics and/or text in the revised location on the drawing. If this method is used, the Issue Block will be revised to reflect a deletion and an addition of the feature. See the previous section for specific guidance of additions and deletions.

The second method to identify a relocated feature is to draw a blue box around the entire feature and provide a note including specific details to describe the new location of the feature. Within the box, the text “RELOCATED” will be written and a numbered delta triangle will be provided in blue. If this method is utilized to identify relocated features, the relocation will be documented in the Issue Block with a blue numbered delta triangle.

If necessary, all connections for the relocated feature (e.g., wiring, piping, duct work, utilities) will be revised on the drawing(s) to accommodate the relocation.

REVISION OF WORKING CAD DRAWINGS

CAD Standards

USACE requires that standard professional engineering drafting practices be utilized in modifying the electronic CAD drawings to show as-built conditions. All revisions to the Government Furnished CAD Files, including any additional sheets added, shall conform to all CAD Standard requirements outlined in the contract specifications. Typically, contract specifications will require adherence to several standards including, but not limited to, the U.S. National CAD Standard, the CAD/BIM Technology Center's A/E/C CAD Standard and/or CAD Drafting Standard, and possibly local CAD Standard Supplements or Project Specific Requirements. Please review the contract specifications thoroughly for complete understanding of required CAD Standards.

The CAD Standards listed in the contract specification will include details on Drawing File Organization, Graphic Concepts, Level/Layer Assignments, and Standard Symbolology. Drawing File Organization will include the relationship between model files and sheet files, drawing sheet assembly and file naming conventions. Graphic Concepts will include details on the use of standard line work, text, dimensions, Scales and Border Sheets. CAD Standards will provide specific level/layer names and assignments for both sheet and model files. Finally, the CAD standards will prescribe and provide the use of Standard symbolology. The following sections provide a summary of content provided in the CAD Standards.

Drawing File Organization

Design Area

In development of the Final CAD Drawings, the Design Area setup used for the Government Furnished CADD Drawings will be maintained. This setup of the Design Area is described in the CAD Standards and includes file accuracy (units), global origin and unit definitions.

Model Files and Sheet Files

Model Files contain the physical components of a project (e.g., columns, walls, topography, channels, etc.). Model files are drawn at full scale in true geographic space and typically represent plans, elevations, sections, etc. Typically, the development of Final CAD Drawings requires the update of multiple model files. A sheet file is synonymous with a plotted CAD drawing file. A sheet file is a selected view or portion of referenced model files within a border sheet. The addition of sheet-specific information (e.g., text, dimensions, and symbols) completes the development of the document. In other words, a sheet file is the "ready-to-plot" Final CAD Drawing.

Drawing Sheet Assembly

The A/E/C CAD Standard provides guidance on assembling Drawing Sheets. In addition to drawing sheet assembly, the A/E/C CAD Standard also provides an order for organizing sheets into a drawing set. For development of Final CAD Drawings, it is important to maintain the same drawing assembly method and drawing set order used in the Government Furnished CAD Files.

Electronic Drawing File Naming Conventions

The A/E/C CAD Standard provides details for naming both electronic Model Files and Sheet Files. The standard naming convention mandates a Project Code at the beginning of file names. The Project Code will be available on the Government Furnished CADD Drawings and will be available from the Contracting Officer Representative. For development of Final CAD Drawings, it is important to maintain the same file naming convention used in the Government Furnished CAD Files. Examples of Model File and Sheet File naming conventions are provided below.

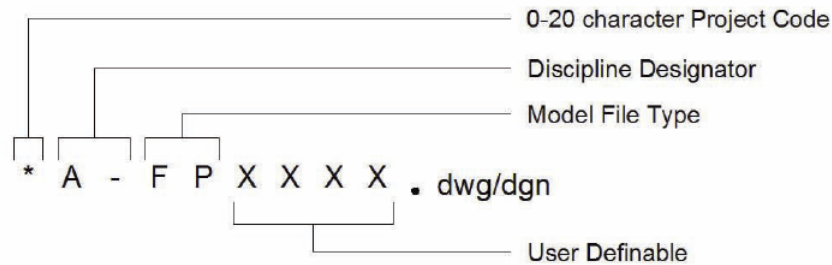


Figure 5 - Standard CAD Model File Naming Convention

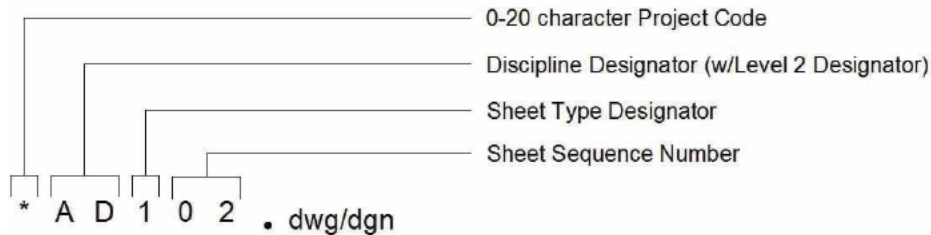


Figure 6 - Standard CAD Sheet File Naming Convention

Graphic Concepts

The A/E/C CAD Standard provides guidance on width/weight, types/styles, and color of line work. In addition, guidance on use of text including fonts, size and placement is provided. For development of Final CAD Drawings, it is important to match both line work and text attributes with those provided in the Government Furnished CAD Files. Line work, text styles, dimension

styles and their associated attributes (width/weight, style/type, and color) are often preconfigured using standard configuration files. These standard configuration files should be provided with the Government Furnished Items and can be used to easily adhere to the standard.

Any new CAD Drawings must utilize the title block and drawing border provided with the Government Furnished CAD Drawings. The title block will be a vertical block on the right hand side of the border sheet. At a minimum it will contain a Designer Identification Block, Issue Block, Management Block, Project/Sheet Title Block and a Sheet Identification Block.

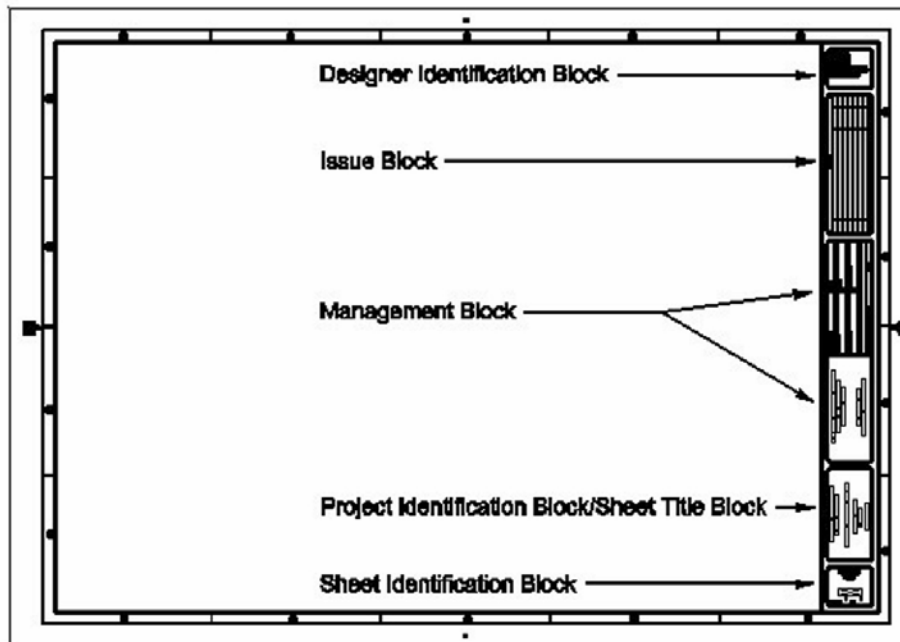


Figure 7 - Sample Border Sheet

Level Layer Assignments

Level/layer assignments and level/layer naming conventions should match those provided in the Government Furnished CAD Drawings. Guidance is provided on the naming of levels/layers in the A/E/C CAD Standard. In addition, the A/E/C CAD Standard provides Model File and Sheet File Level/Layer Assignment Tables which provide a list of the various levels/layers which can be used for each discipline and the associated attributes (width/weight, style/type and color). Level/layer assignments and associated attributes are often preconfigured using standard configuration files. These standard configuration files should be provided with the Government Furnished Items and can be used to easily adhere to the standard.

Standard Symbology

Standard symbology can be described as a group of graphical elements that can be manipulated as a single entity. Typically standard symbology is generated for graphical items that will be used regularly such as manholes, fire hydrants, bar scales, etc. In the development of Final CAD Drawings, the standard symbology should match that provided in the Government Furnished CAD Drawings and will be provided with the Government Furnished Materials.

General Working CAD Drawing Revision Guidelines

The Working CAD Drawings are the electronic Government Furnished CAD Files that are revised during construction to show current as-built conditions. Revisions to the Working CAD Drawings are based on markups of the Working Hardcopy Drawings that are transferred to the CAD files as required in the Contract Specification. Typically, revision of the Working CAD Drawing set will be performed on a weekly basis. All revisions to the Government Furnished CAD Files, including any additional sheets added, shall conform to all CAD Standard requirements outlined in the contract specifications.

When revising the Working CAD Drawings, care should be taken to maintain the same folder structure, file structure, file format, file naming convention and CAD Standard that was utilized for the files on the optical disc containing the Government Furnished CAD Drawings.

In order to revise the Working CAD Drawings, the entire folder structure and files provided on the Government Furnished CAD Drawing disc should be copied to a Windows computer system where the revisions will be performed. The folder structure and file location of the Working CAD Drawings on this computer should then be maintained throughout all revisions such that they match the original disc. If a revision requires additional Sheet and/or Model files, the new files will be added to the folder structure in the appropriate location. Conversely, if a revision requires the deletion of existing Sheet and/or Model files, these files should be permanently removed from the Working CAD Drawing folder structure or moved to a folder named "Deleted".

It is very important to ensure that the Sheet and Model reference relationships provided with the Government Furnished CAD Files is maintained when revising Working CAD Drawings. In addition, the Contractor will ensure that there are no broken reference links and that only the required Model files are referenced to the Sheet files. If a revision requires the addition of Sheet and/or Model files, the reference relationship for new files will remain consistent with the folder structure used in the Government furnished CAD files. If it is necessary to delete Sheet and/or Model files, reference relationships should be updated to reflect these changes (e.g., remove the reference to the Model files from the Sheet Files if they are no longer needed).

The file naming convention used in the Government Furnished CAD Files will be maintained when revising the Working CAD Drawings. Any additional Sheet or Model files required for a revision will utilize the same file naming convention as the original CAD files. The Project Code portion of the file name provided with the Government Furnished CAD Files will be used unless instructed otherwise by

the Contracting Officer Representative. Examples of the Model and Sheet file naming conventions are located in the CAD Standards section of this document.

Drawing content including graphics such as line work, dimensions, symbology and text will maintain the same attributes (width/weight, style/type, color) and level/layer assignment as included in the Government Furnished CAD Files. If a revision requires the addition of a new level/layer, the level/layer added will follow the same naming convention and assigned attributes as defined by the CAD Standards.

Revisions to the Working CAD Drawings will be performed to the same level of detail as the original Government Furnished CAD Drawings. When changes to existing drawing contents are required, the same level of line work, symbology, dimensions and text (including notes) will be applied to the revision as was applied in the Government Furnished CAD Drawings. If an existing feature or detail contained in the working hard copy drawing was not constructed then it shall be deleted from the working CAD drawing. This same level of detail will also be applied to any new/additional drawings required for a revision.

All as-built "triangle" changes shall be on a separate single level, using a single color, with an associated medium pen width placed:

Level Number: 63

Level Name: ANNO-REVS

Level Description: Revisions

The level ANNO-REVS shall be turned off and not displayed in the Final CAD Drawings for printed and PDF set.

When the government issues a modification and provides CAD drawings to the Contractor. The text changes will be made in the sheet file and feature changes will be made in the in the model file, on the appropriate level based on A\E\C CADD Standards. The revision marks will be made on level ANNO-REVS. As the contractor updates the Working CAD Drawings with any additional changes that may occur during construction, the government revision marks shall be removed by the contractor.

The Final CAD Drawings, submitted by the Contractor shall only contain revision marks on the level ANNO-REVS that originated from the Contractor. For instance if the contractor adjusted the grading for a ditch in the field, that differed from the original design. This will assist the government with reconciling and checking for any revisions made by the Contractor.

Preparation of Final CAD Drawings

The As-Built Drawings will consist of the Final CAD Drawings (completed Working CAD Drawings) and the Final Hardcopy Drawings (completed Working Hardcopy Drawings). If the Working CAD Drawings and Working Hardcopy Drawings are properly maintained, when project construction is complete, the As-Built Drawings should be near completion.

It is the Government’s intent that the Final CAD Drawings reflect only the as-built conditions of the Project. Therefore, prior to the submittal of the Final CAD Drawings to the Government, several items will need to be addressed by the Contractor to finalize and complete the Working CAD Drawings.

Finally, any drawing text reflecting pre-existing conditions or changes to be made during construction will be updated to reflect the as-built condition. For example, if the Government Furnished CAD Files included text stating “MODEL TO BE DETERMINED” for a pump, this text should be updated to reflect the actual model for the pump. Another example would be if the Government Furnished CAD Files included text stating “SHALL BE REMOVED”, this text should be deleted and the graphics should be updated to reflect this removal.

When the above revisions have been completed on the Working CAD Drawings, the Cover Sheet (Title Sheet or First Drawing in the set) will be labeled with the words "RECORD DRAWINGS / AS-BUILT CONDITIONS". Below this text, the Contractor name and the words “CONTRACT NUMBER” followed by the actual Contract Number will be added to the Cover Sheet. This text will be at least 3/16 inch high and will maintain the text attributes provided in the Government Furnished CAD Drawings. See the following example for size and location of “RECORD DRAWINGS / AS-BUILT CONDITIONS” text.

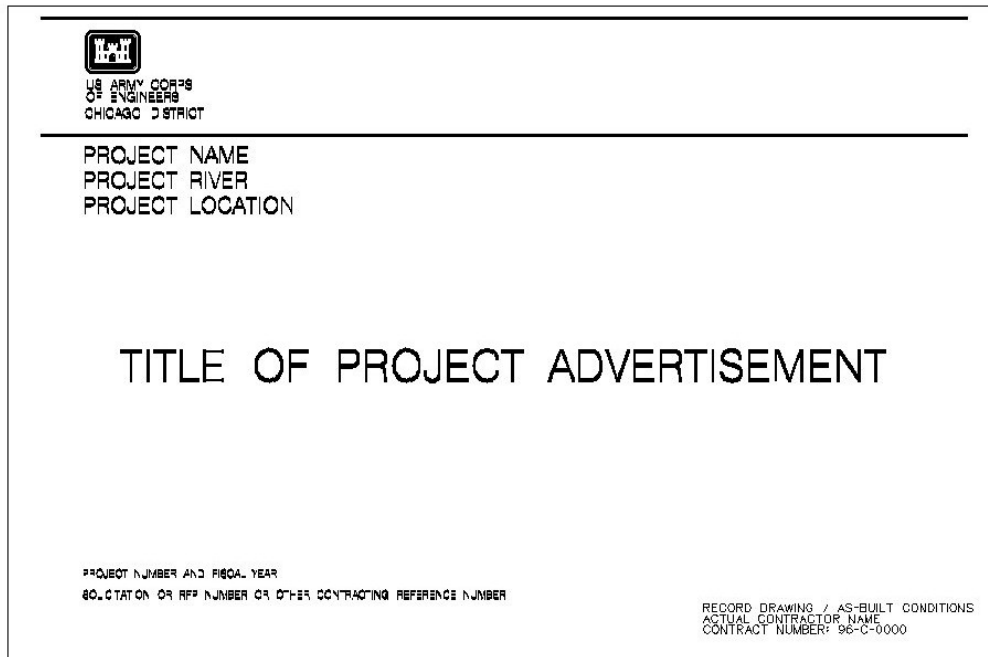


Figure 8 - Cover Sheet "Record Drawing / As-built Conditions" Stamp

All subsequent sheets in the set will be labeled with the text “AS-BUILT” denoting no revisions on the sheet, or “REVISED AS-BUILT” denoting one or more revisions.

Level Number: 64

Level Name: ANNO-REVS-1

Level Description: As-built Stamp

It should be located inside the drawing Border in the lower right corner of the drawing. This text will be at least 3/16 inch high and will maintain the text attributes provided in the Government Furnished CAD Drawings. See the following example for size and location of "AS-BUILT" text.

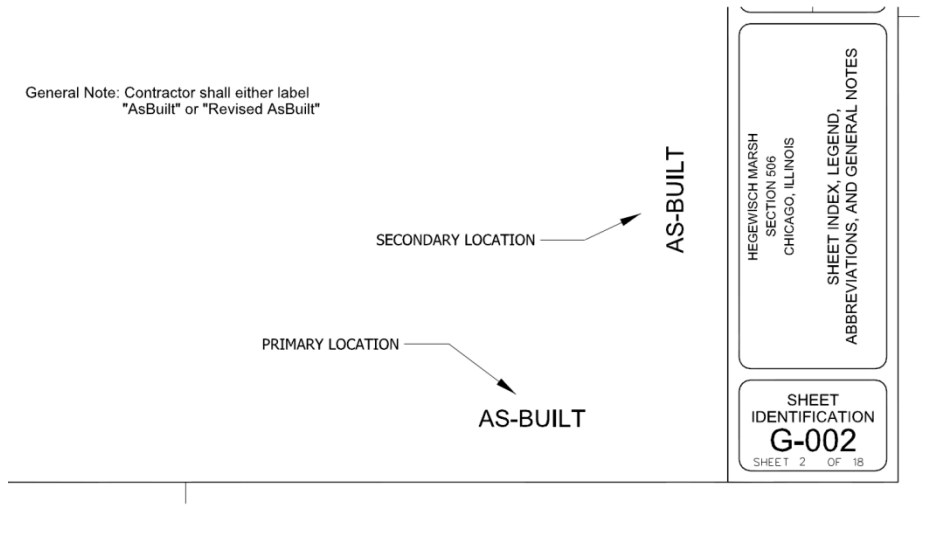


Figure 9 - Typical Drawing "AS-BUILT" Stamp

QUALITY ASSURANCE AND REVIEW

Quality Assurance of Working Drawings

The Resident Engineer or designee will review the Working Hardcopy Drawings and the electronic Working CAD Drawings as described in the Contract Specification. The Resident Engineer will maintain a log of the monthly meetings held between the Project Office's Staff and Contractor's Staff. The log will include any notes of deficiencies. If the deficiencies are not addressed in a reasonable time frame (stated in the Contract Specifications), a portion of the monthly payment may be retained by the government until the deficiencies are corrected.

The Contractor will mark-up Working Hardcopy Drawings as required by the Contract Specification. At a minimum, one (1) set of Working Hardcopy Drawings will be available on-site at all times. Based on revisions of the Working Hardcopy Drawings, the Contractor will update the electronic Working CAD Drawings as needed to meet contract requirements.

Reviews of Working Drawings will be performed at regular intervals as required by the Contract Specifications. Typically reviews will be performed on a monthly basis. During these reviews, Working Drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer

Representative and the Contractor before submission of each pay estimate. Each review, at a minimum, will include all sheets revised since the previous review, and any new drawing sheets added.

Review of Working Hardcopy Drawings

The review of the Working Hardcopy Drawings will ensure that revisions to the hardcopy drawings are being performed in accordance with Contract Specifications. This review will include ensuring that all required revisions since the last review have been addressed by markup on the Working Hardcopy Drawings. Items to be reviewed include, but are not limited to, the following:

- Proper use and placement of delta triangles
- Adequate details and notes have been provided to convey revision intent
- Complete and accurate population of the Issue Block describing revisions
- Adherence to Contract Specifications and guidance relating to markups (e.g., markup colors, additions, deletions, relocations, etc.)
- Addition or replacement of new or substantially revised drawings due to Contract Modifications into the appropriate location in the Working Hardcopy Drawing set
- Correct dimensions and details transferred from shop drawings
- Index, Sheet Identification numbers, Detail and View Identification numbers, etc. updated to reflect any changes to the Working Hardcopy Drawing set

Review of Working CAD Drawings

The review of the Working CAD Drawings will ensure that revisions to the electronic CAD files are being performed in accordance with Contract Specifications. Review of electronic CAD files will ensure that the revisions to the Working Hardcopy Drawings have been appropriately transferred to the Working CAD Drawings. Items to be reviewed include, but are not limited to, the following:

- Adherence to CAD Standards required by the Contract Specifications. (e.g., file naming, level/layer usage, attribute usage, symbology, etc.)
- Addition or replacement of new or substantially revised drawings due to Contract Modifications into the appropriate location in the Working CAD Drawing set
- Correct dimensions and details transferred from shop drawings
- Index, Sheet Identification numbers, Detail and View Identification numbers, etc. updated to reflect any changes to the Working CAD Drawing set

SUBMITTAL AND ACCEPTANCE OF AS-BUILT DRAWINGS

Intermediate Review Submittals

There will be three review submittals required for each contract, as defined in the specifications. Two intermediate reviews occurring at the 25% and 75% percent complete and a Final Submittal once the project is complete. Each of these review periods will require the electronic files to be submitted on an Optical Disk to the Resident Engineer. The intent of the intermediate reviews is to assure the electronic files are properly being maintained and to correct deficiencies early in the process rather than repeating the same mistakes.

Final As-built Drawings

Upon completion of the Project, the Contractor will submit the As-built Drawings (Final Hardcopy Drawings and Final CAD Drawings) that show the as-built conditions of the project to the Resident Engineer for Review. The Final CAD Drawings will be provided to the Government on Optical Disc (CD or DVD). Submitted Disc should maintain the original folder structure and utilize the same file format as the Government Furnished CAD Files. Contract Specifications may also require submittal of printed sets of the Final CAD Drawings to the Resident Engineer. The Optical Disk shall be labeled with the Project Name, Date it was created, Contract Number, Contractor's Name

Review of Final As-built Drawings

The Resident Engineer and/or District Office personnel will perform a review of the As-built Drawings (Final Hardcopy Drawings and Final CAD Drawings). From the review, the Resident Engineer will consolidate Government comments identifying issues that need to be resolved prior to Government acceptance.

Resolve Issues with Final As-built Drawings

Contractor will address, resolve and document all issues identified by the Government during review.

Acceptance of Final As-built Drawings

When the Government determines that the Contractor has met the requirements of the Contract Specification, the As-built Drawings will be accepted. It should be noted that it may be necessary to perform several iterations of the review, comment and resolution process prior to acceptance. Upon acceptance, the Government will release any retained payments.