DESIGN GUIDELINE 2.4.2
DOCUMENT STANDARDS & METHODS FOR ELECTRONIC DOCUMENT SUBMISSIONS

Scope

This section provides guidance and instructions, to the Design Professional, for preparing and submitting all required issued and final AEC Project documents electronically to the University of Michigan. These documents should be submitted at the time of completion/issuance. This guideline will be referenced and referred to in other relevant design guidelines sections that govern the content of the files.

The current University of Michigan electronic file transfer method shall be utilized for submitting documents. The Design Manager, in coordination with the Facilities Information Center (FIC), will provide instructions and a link to the Project transfer location. Flash drive submissions are not permitted.

Related Sections

U-M Design Guideline Sections:
DG 2.4 Document Standards and Procedures for Project Deliverables

Electronic Submission Requirements

File Format Sizes

Small Format Documents refers to document sizes:

- Letter, 8.5” by 11”, ANSI A
- Tabloid, 11” by 17”, ANSI B

Large Format Documents refers to document sizes:

- 12” by 18”, Arch B or ½ sized Arch E
- 24” by 36”, Arch D
- 30” by 42”, Arch E1
- 36” by 48”, Arch E

Small Format Files

Small Format Scope

- Small format files may include but are not limited to:
    - OPR/BOD
    - Specifications for Bid, Construction and Record
    - O&M manuals
        - Do NOT include Contractor Markups (aka As-Builts) in the O&M, see Section Contractor Mark-up for guidance
    - Warranties
    - Testing Reports
    - Commissioning Manuals
    - Final LEED Scorecard/Certification

Small Format File Creation & Formatting

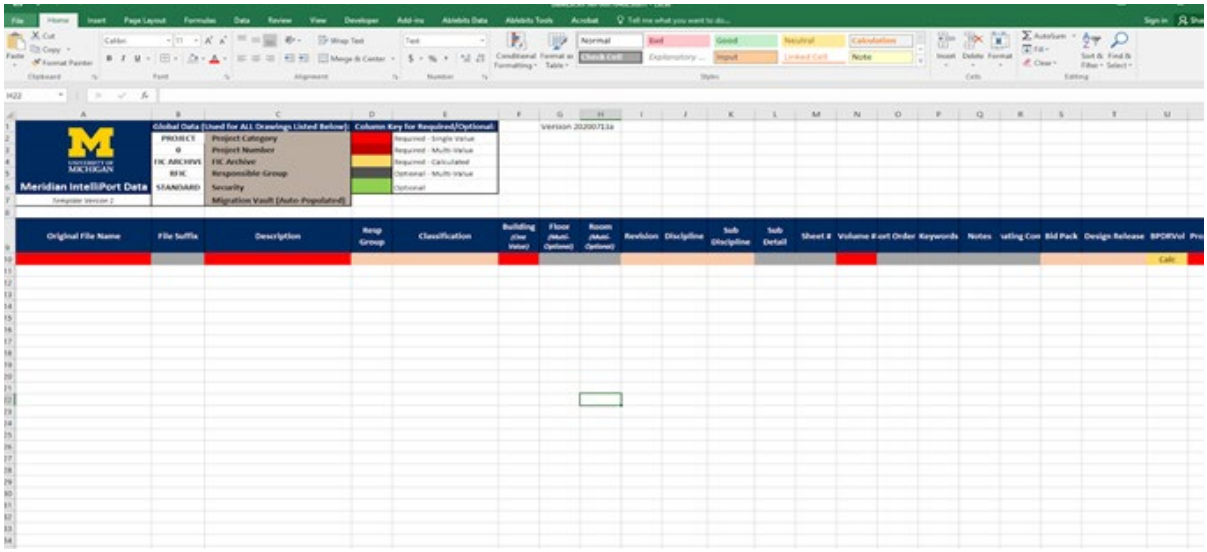
- All small format files are to be generated as an OCR'd PDF
    - The files must not be in Portfolio format and they must not have any security or passwords applied
- The document shall be in color if appropriate
- The document shall be set up/formatted to allow for double sided printing
    - Each new section shall start on the right hand page.
- Volumes shall be used when the document contains more than 1200 pages

  (i.e. a total of 600 double sided sheets)
    - Each volume should include an index/cover page
    - Volumes should be broken between disciplines whenever possible

Small Format File Delivery

- When delivering/submitting small format files include a Document Transmittal Spreadsheet (aka Intelliport sheet)
    - This is an excel file that itemizes the documents being submitted
- For small format documents the fields to be completed are:
    - Required

        - Project Number
        - Original File Name (name of the electronic file, ex. 12345678-A-01.pdf)
        - Description (O&M manual for . . . / Arch Specifications, etc.)
        - Building/Block # (UM 7 Digit Building/Block Number)
        - Bid Pack Number
        - Volume (## if applicable, default 01)
        - Originating Company (Document Author)
    - Need if Applicable/Appropriate
        - Floor
        - Room Number
- Complete a new version of the excel file each time you submit materials



- The current University of Michigan electronic file transfer method shall be utilized for submitting documents. The Design Manager, in coordination with the Facilities Information Center (FIC), will provide instructions and a link to the Project transfer location. Flash drive submissions are not permitted.

Large Format Files

Large Format Scope

- Large format files may include but are not limited to the following:
    - Surveys
        - Soil Borings/Geo-Techincal
        - Legal Boundary
        - Site / Utilities
    - Review Drawings
    - Coordination Drawings
    - Bid Drawings
    - Shop Drawings
    - Construction Drawings
    - Contractor Mark-Ups
    - Record Drawings
    - City Submission/Approved Drawings
    - BFS Submission/Approved Drawings

Large Format File Creation & Formatting

Large Format Static Files (PDF)

Note: UM will NOT accept PDF Portfolios or PDFs with security(passwords) applied to them.

Bid Drawings & Design Review Drawings

- Provide a single Combined Flattened OCR'd PDF.
    - The files must not be in Portfolio format and they must not have any security or passwords applied
- Each set shall include a cover sheet
- Each set shall include an index of all sheets in the set
- Volumes will be used when the Drawing sets contain more than 175 individual sheets.
    - Each volume shall be a single PDF.
    - Each volume shall include a cover sheet
    - Each volume shall include an index of the sheets making contained in the volume (index of drawings can be included on the cover sheet)
    - Volumes should be broken between disciplines whenever possible.

- Provide individual discipline PDF
- Format size will be full size drawings.
- The orientation shall match how the document will be viewed, typically landscape
- The title page and title block shall clearly denote Bid Set **with Date coordinated with UM Project Controls**

Construction Drawings

- Provide a single Combined Flatted OCR'd PDF.
    - The files must not be in Portfolio format and they must not have any security or passwords applied
- Each set shall include a cover sheet
- Each set shall include an index of all sheets in the set
- Volumes will be used when the Drawing sets contain more than 175 individual sheets.
    - Each volume shall be a single PDF.
    - Each volume shall include a cover sheet
    - Each volume shall include an index of the sheets making contained in the volume (index of drawings can be included on the cover sheet)
    - Volumes should be broken between disciplines whenever possible.
- Format size will be full size drawings.
- The orientation shall match how the document will be viewed, typically landscape
- The title page and title block shall clearly denote Construction Set.

Contractor Mark-up Set

- The Design Professional shall provide the Final Contractor Mark-up set(s) as a color scanned single combined PDF at 300 DPI with optical character recognition.
    - Sets combined by individual subcontractors are acceptable

As-constructed Record Drawings

Single Combined As-constructed Record Drawings Set

- Provide a single Combined Flatted OCR'd PDF
    - The files must not be in Portfolio format and they must not have any security or passwords applied
- Each set shall include a cover sheet
- Each set shall include an index of all sheets in the set
- Volumes will be used when the Drawing sets contain more than 175 individual sheets.
    - Each volume shall be a single PDF.

    - Each volume shall include a cover sheet
    - Each volume shall include an index of the sheets making contained in the volume (index of drawings can be included on the cover sheet)
    - Volumes should be broken between disciplines whenever possible.
- Format size will be full size drawings.
- The orientation shall match how the document will be viewed, typically landscape
- The title page and title block shall clearly denote As-constructed Record Drawings

Individual As-constructed Record Drawings Sheets

- Provide a Single Flattened OCR'd PDF for each sheet of the CAD drawing set.
- File name should be in compliance with the National CAD standards including UM data (prefixed) below. These file names should directly match the names of the CAD files below aside from the file extension.
- Filename: UMprojectNo_3DigShtNo_PDF_NCSdwgNo.
    - Ex) P00001234_001_PDF_A-102.pdf
- PDF size should be full size drawings
- The orientation shall match how the document will be viewed, typically landscape
- The title page and title block shall clearly denote As-constructed Record Drawings

Dynamic Record Files (CAD & BIM)

U of M Standard Details and CAD Requirements

Universal Dynamic File Guidelines

The following are University of Michigan Architecture Engineering and Construction (AEC) drawing/CAD standards. At the beginning of the project, coordinate specific project requirements with the Design Manager.

Standard sheet size

- Standard sheet size shall be
    - Arch D - 24 inches wide by 36 inches long or
    - ARCH E1 – 30 inches wide by 42 inches long (with U-M DM approval).
    - Other drawing sizes require the approval of the Manager of U-M Space Information (arranged through the Design Manager).
- All Civil drawings shall be Arch D - 24 inches wide by 36 inches long, as required for City of Ann Arbor plan submittals.
    - Civil drawings shall be formatted such that Arch-E1 sheets can fit within the Arch-D sheet size with all drawing content still fully legible and scalable.
- Format sheets with a minimum of 1-1/2 inch left-hand margin for binding.

File Naming Standards

- Base all file names on the current National CAD Standards - Uniform Drawing System (UDS) Level 1 or Level 2.
- Index of sheets should be the first file in the set and easily identified by its filename. Ex) G-001.dwg or GI001.dwg (UDS Level 1 or 2).
- Sheet files must be named consistently with the Index of sheets and should be easily identifiable.
- Model files must be named consistently with the National CAD standards and be easily identifiable using UDS naming conventions; and must include UM data below. These file names should directly match the names of the PDF files above aside from the file extension.
    - Filename: UMprojectNo_3DigShtNo_CAD_NCSdwgNo.
        - Ex) P00001234_001_CAD_A-102.dwg

AutoCAD Files

- Provide a complete set of all original AutoCAD dwg files and all associated electronic files (dependencies, references, drawings, data, images, models, etc.) required for the Owner to fully reproduce the drawings via AutoCAD within a single folder.
- All referenced links within drawing files shall have relative paths, never absolute; and bound within the CAD file for Record Drawings.
- Provide a single CAD file for each sheet of the drawing set; all sheet files shall be eTransmitted (see E-Transmit process for AutoCAD dwg files).
- Layout View:
    - A ready to print layout view shall be present for each CAD document.
    - All drawings shall be orientated for ease of reading, typically landscape.
- Each sheet shall be saved displaying only layers as printed on the delivered PDF set.
- Prior to delivery, all dwg files shall be purged of content that is deemed unnecessary for the reproduction of Record Drawings (excess data, peripheral unused design iterations, unused linked references, unused layers, blocks, etc.).
- File name should be in compliance with Universal File Naming standards in this document.
- In writing, provide Project Data, Location Data and Metadata for the CAD file including but not limited to:
    - Name and version of the software with which the model was developed (i.e. AutoCAD 2020)
    - Full dwg file name
    - Associated AEC Project Number
    - 7-digit UM building number(s)

    - Each dwg file's design discipline (i.e. Architectural, Mechanical, Electrical, etc.)
    - Special detailed instructions for opening or using the files, if necessary
- Files that cannot be opened or that do not allow the Owner to fully and easily reproduce the Record Drawings to match their corresponding PDF sets will be rejected.

E-Transmit process for AutoCAD dwg files

- Standard settings for E-Transmitting sheet files:
    - Transmittal Package Type: Zip
    - File Format: Most current, or as determined by the Design Manager
    - Transmittal File Name: Use Sheet name per file naming requirements
    - Path Options: Place all files in one folder
    - Actions:
        - Uncheck Send-email with transmittal
        - Check set default plotter to none
        - Check Bind external references
        - Check Purge drawings
        - Check Remove Design Feed
    - Include Options:
        - Check Include fonts
        - Uncheck Include textures from materials
        - Check Include files from data links
        - Uncheck Include photometric web files
        - Uncheck Include unloaded file references (unless there are referenced files necessary/required as part of the record drawings)

Other CAD Files (Microstation, and all other CAD applications)

- Provide a complete set of all original CAD files and all associated electronic files (dependencies, references, drawings, data, images, models, etc.) required for the Owner to fully reproduce the drawings via designated CAD program within a single folder.
- Provide a single CAD file for each sheet of the drawing set.
- Layout View:
    - A ready to print layout view shall be present for each CAD document.
    - All drawings shall be orientated for ease of reading, typically landscape.
- All referenced links within drawing files shall have relative paths, never absolute; and bound within the CAD file for Record Drawings.
- All referenced files should be bound/merged into the main sheet file.

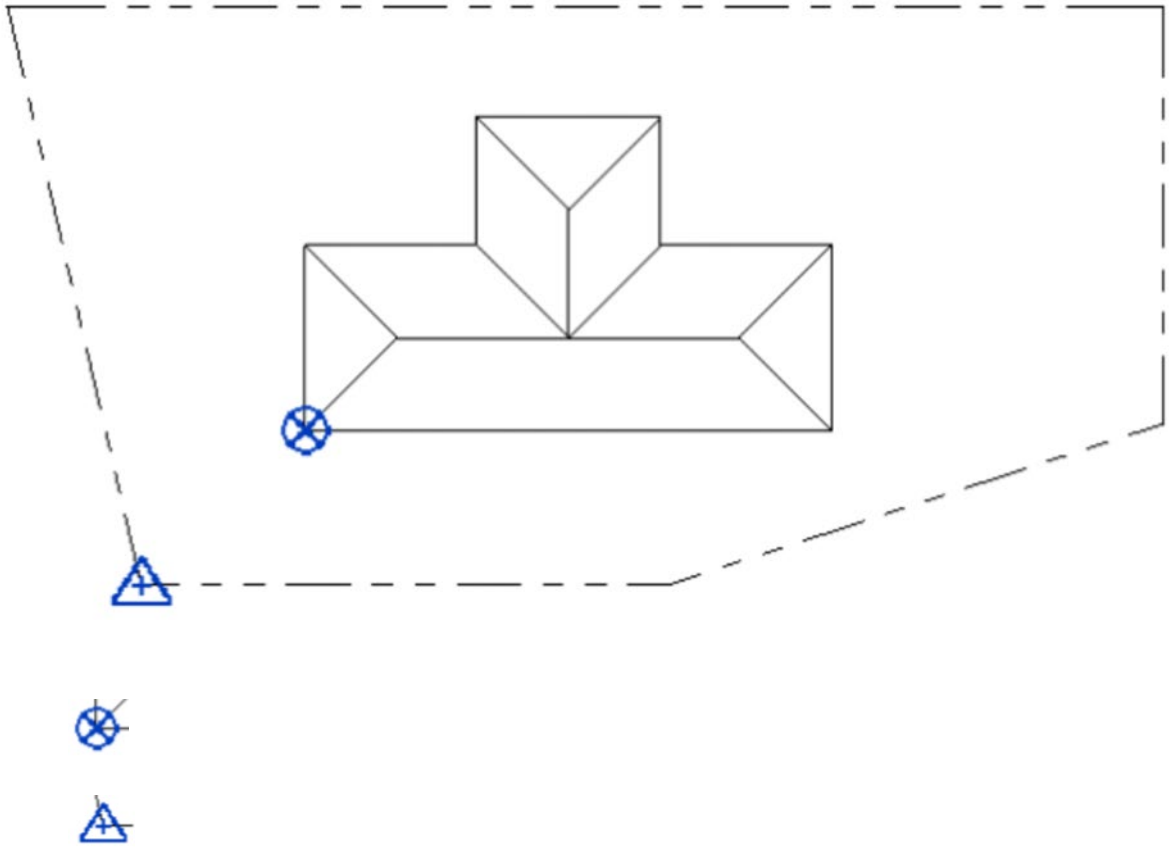
- Prior to delivery, all CAD files shall be purged of content that is deemed unnecessary for the reproduction of Record Drawings (excess data, peripheral unused design iterations, unused layers/levels, unused linked references, unused blocks/cells, etc.).
- File name should be in compliance with Universal File Naming standards in this document.
- In writing, provide Project Data, Location Data and Metadata for the CAD file including but not limited to:
    - Name and version of the software with which the model was developed (i.e. Microstation Connect, SketchUp, etc.)
    - Full CAD file name
    - Associated AEC Project Number
    - 7-digit UM building number(s)
    - Each CAD file's design discipline (i.e. Architectural, Mechanical, Electrical, etc.)
    - Special detailed instructions for opening or using the files, if necessary
- Files that cannot be opened or that do not allow the Owner to fully and easily reproduce the Record Drawings to match their corresponding PDF sets will be rejected.

BIM Models

- BIM models shall be created using Autodesk's Revit software. For any and all BIM models not utilizing Revit software, please contact the manager of Space Information for evaluation and further instruction.
- The Design Manager shall determine the singular version of Revit that will be used by all members of the design team for the duration of the project. All Revit files used by the Design Team shall be created and saved using this same version to eliminate the need for intermittent version upgrades.
- Revit models should utilize only basic, out-of-the-box software features without the need for any proprietary upgrades or additional software.
- All Revit files shall have organized project browsers with a clear and unambiguous categorization and taxonomy of views, sheets, schedules, legends, groups and families.
- All referenced links within Revit files shall have relative paths, not absolute.

- Provide a complete set of all Revit files and all associated electronic files (dependencies, drawings, references, data, models, etc.) required for the Owner to fully reproduce the drawing set via Revit within a single folder.
- Provide all Revit models for every discipline involved with the project.
- Prior to delivery:
    - All Revit models and their dependent Revit files shall be upgraded to the correct version as specified by the Design Manager.
    - Purge all Revit models of unused families and other content deemed unnecessary for the reproduction of Record Drawings.
    - The Design Professional shall verify that all project Revit models open properly and referenced models linked correctly.
    - The Design Professional shall verify that all sheets, views, content, visibility settings, worksets, filters, phases and design options are calibrated/toggled correctly to reproduce Record Drawings just as they appear in their corresponding PDFs without the need for any special action or proprietary knowledge by the Owner.
    - In writing, provide Project Data, Location Data and Metadata for the Revit model including but not limited to:
        - Name and version of the software with which the model was developed (i.e. Revit 2020).
        - Full model file name
        - Itemized list of all Revit files and all referenced files included
        - Associated AEC Project Number
        - 7-digit UM building number(s)
        - Model's design discipline (i.e. Architectural, Mechanical, Electrical, etc.)
        - Special detailed instructions for opening or using the files, if necessary
    - All Revit Models for Renovations shall contain all necessary coordinates for the Survey Point and Project Base Point as provided by the Records Management Services Team.
    - All Revit Models for New Buildings and/or Additions affecting the building footprint shall contain all necessary survey and coordinate data for importing to GIS including:
        - Survey Point coordinates
        - Project Base Point coordinates (typically a prominent building corner at grade, if this point has not already been provided by the Records Management Services Team)
        - Units: United States Customary when possible.

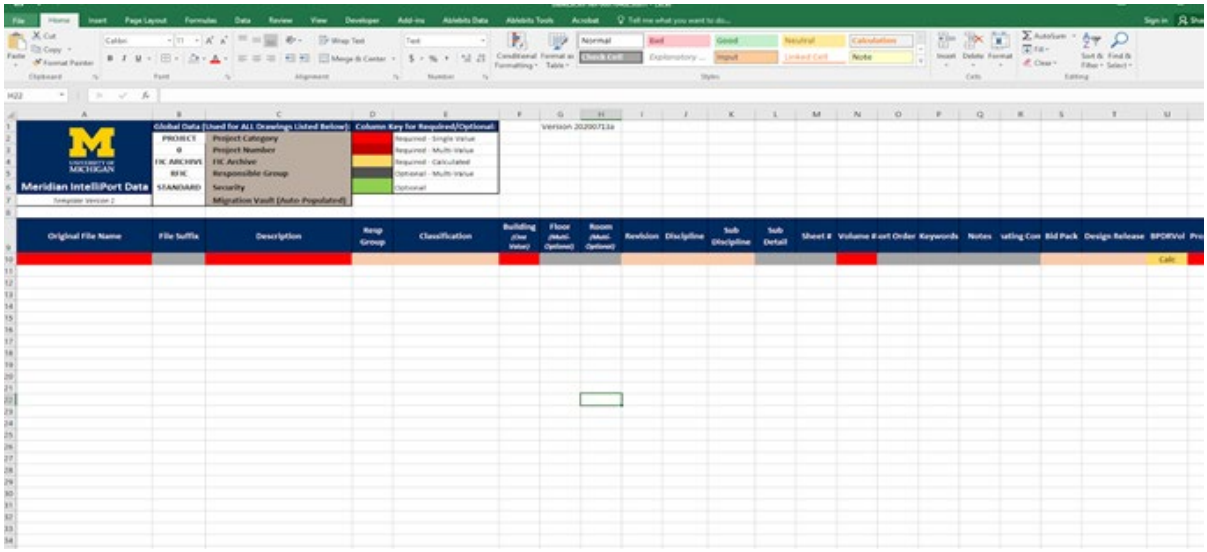
- All Revit models included with the project should align perfectly with these points. Submittals including any Revit models that don't properly align when imported will be rejected.



- The project Revit models shall be delivered to the Owner once they are prepared for delivery, by using Revit's Transmit method, with all appropriate settings used to satisfy all required standards for BIM-models.
- Files that cannot be opened or that do not allow the Owner to fully and easily reproduce the Record Drawings to match their corresponding PDF sets will be rejected.

Large Format File Delivery

- When delivering/submitting large format files include a Document Transmittal Spreadsheet (aka Intelliport sheet)
    - This is an excel file that itemizes the documents being submitted
- For large format documents the fields to be completed are:
    - Required
        - Project Number
        - Original File Name (name of the electronic file, ex. 12345678-A-01.pdf)
        - Description (Sheet title/Mech Revit Model)
        - Building/Block # (UM 7 Digit Building/Block Number)
        - Volume (## if applicable, default 01)
        - Bid Pack Number
        - Originating Company (Document Author)
        - When providing individual sheets
            - Sheet Number
            - Sort Order
    - Need if Applicable/Appropriate
        - Floor
        - Room
- Complete a new version of the excel file each time you submit materials



- The current University of Michigan electronic file transfer method shall be utilized for submitting documents. The Design Manager, in coordination with the Facilities Information Center (FIC), will provide instructions and a link to the Project transfer location. Flash drive submissions are not permitted.