FACILITIES & OPERATIONS
ARCHITECTURE, ENGINEERING AND CONSTRUCTION
UNIVERSITY OF MICHIGAN

# DESIGN GUIDELINE 2.4
# DOCUMENT STANDARDS AND PROCEDURES FOR PROJECT DELIVERABLES

## Scope

This section provides guidance and instruction, to the Design Professional, for preparing and submitting documents to the University of Michigan.

Documents include but are not necessarily limited to the following:

- OPR/ BOD (Owners Project Requirements and Basis of Design)
- Area Summary (Gross Sq. Ft.)
- General CAD Drawing Standards
- Life Safety Plans
- Room Numbering Floor Plans
- Specifications
- Bid Sets
- Construction Sets
- Master Floor Plan Documents
- Record Documents
- BIM Model

## Design Guidelines

DG 2.1 OPR and BOD (Owners Project Requirements and Basis of Design)
DG 2.2 Design Deliverables
DG 2.4.2 Document Standards & Methods for Electronic Document Submissions
DG 4.3 Building Commissioning
DG 7.0 Master Specifications

## U of M Standard Details

Line types for Life Safety Plans .DGN format
Line types for Life Safety Plans .DWG format

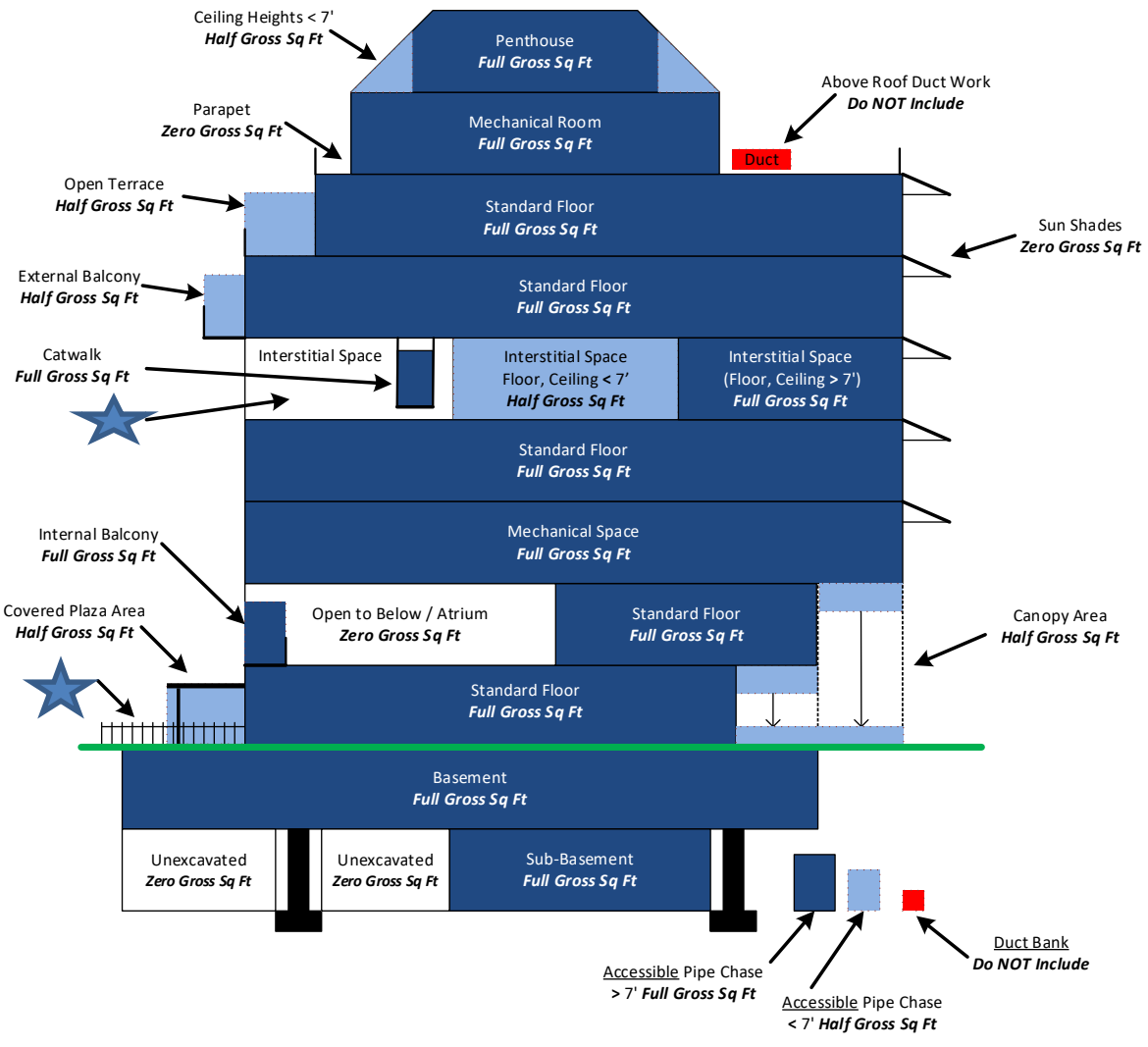
## 2.1 Owners Project Requirements and Basis of Design – OPR/BOD

- Provide BOD/OPR in electronic format
- Reference DG 2.4.2 Document Standards & Methods for Electronic Document Submissions
    - Provide in PDF format, ready to print
    - Document shall be formatted to print 2 sided
    - Start each section on a new odd number, right hand page
    - Provide gutter margin to accommodate binding
    - Headers and footers for each page shall include
        - Project number
        - Building Name and Number
        - Project phase SD, DD, CD
        - Date submitted
        - Page and section designation
    - Document shall be in color
    - Format size 8.5 x 11 or 11 x 17. Confirm with Design Manger their preference for size.
- Provide printed copies, number TBD based on project, as requested by Design Manager

## 2.2 Area Summary (Gross and Net Square Footage)

- The Design Professional shall calculate a Gross Construction Square Footage total as described below.
  - Complete calculation for each phase of the design.
  - Provide a floor plan for each floor with perimeters showing the Full, Half and Zero gross square footages.
    - Include sub-totals for full and half as well as the floor total.
    - Include on the first page the totals for each floor and the grand total for the building.

University of Michigan – Architecture, Engineering and Construction
**Standard Method for Calculating Construction Gross Square Footage of a Building**
Modified after AIA Document D101, 1995 *Methods for Calculating Areas and Volumes of Buildings*



## 2.3 General Project Drawing/CAD Standards

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.

Drawing Information – include the following:

- Complete index to drawings on first or second sheet of the entire set and on first or second sheet of each discipline series and volume.
    - When sheets are added or deleted during the course of construction, final Record Drawing set shall have the index updated to reflect the final documents.
- Complete symbol and abbreviation legend(s) applicable to each series (where a series is a subset such as Architectural, Electrical, etc.) on first or second sheet of each series. (Parts of the legend may be repeated on sheets throughout the sets or series as deemed appropriate by the A/E, but the legend on first or second sheet shall be comprehensive.)
- Locations of all equipment to be shown on all drawings using accepted symbols from the Legend. Do not rely solely on notes. Examples include, but are not limited to: flow control and isolation valves, all types of dampers, turning vanes, access doors, clean-outs, etc.
- Scale indicated by note and by graphic scale bar on each applicable drawing, detail and section. Any numbers or letters associated with the scale bar are to be a minimum 1/8 inch high. Where scale is applicable for entire drawing, scale references to be located near lower right corner of drawing.
- Define font type and size
- North arrows on plan sheets, consistently oriented on all plans, with the north arrow either oriented to the top or to the right of the sheet, with the exception of Civil and site plan sheets. All Civil and site plan sheets shall be oriented with the north arrow to the top or to the left, as is required for City of Ann Arbor plan submittals. Note the north arrow orientation on civil sheets may deviate from architectural plans.
- Tagged column grid on all plan sheets (civil, architectural, mechanical, etc.), at all design phases.
- Room names and numbers on all plan sheets (civil, architectural, mechanical, electrical, etc.) Design Development and Construction Document Phase. Room numbers on plans with a corresponding index on the same page is acceptable.
- Where a portion of a plan or elevation appears on a sheet, a key plan shall be provided in the lower right portion of the drawing area to show the location of that portion relative to the whole.
- Cross-reference all plans, elevations, sections, and details as applicable.
- Floor live load capacities shall be listed on drawings.
- Clearly demarcation between existing, demolition, new, and replacement work.
- Screening, shading, crosshatching, other indications of materials or locations, and text shall not obliterate significant information, and shall be capable of being reproduced without "bleeding" when the document is reduced to half size. Use screen patterns equal to or coarser than 50 percent, 50 line.
- All details shall be numbered.
- Schedules shall be horizontal orientation.
- Basic attributes of mechanical, electrical and plumbing equipment/ fixture shall be scheduled on the drawings.
- Light fixtures shall be scheduled on drawings.
- Number each paragraph in a sequence of operation narrative on drawings.

- Title Block Content:
    - The University will identify the Project Title, Building Number and Project Number, which the A/E shall put on each drawing.
    - Locate at the lower right corner of the sheet.
    - Include the following information
        - University of Michigan building number and building name
        - University of Michigan project number and/or Plant work order number
        - Project title
        - Sheet title: Be as descriptive as possible and unique within the drawing set.
        - Revision history block: Locate above project information. When submitting to the University any sheet with information not previously submitted, a note shall be included on one of the issuance lines on the title block, indicating purpose of submittal and date. This applies to design review and contract issuances as well as addenda, bulletins, etc. All such notations of issue shall remain on each sheet. In addition to the note on the issuance line, sheets which have already been released for bids shall have changes clearly delineated, by "clouding" or similar means.
    - Additional items, professional stamps, Design Professional information, address etc. shall be vertically on the right hand side of the drawing.

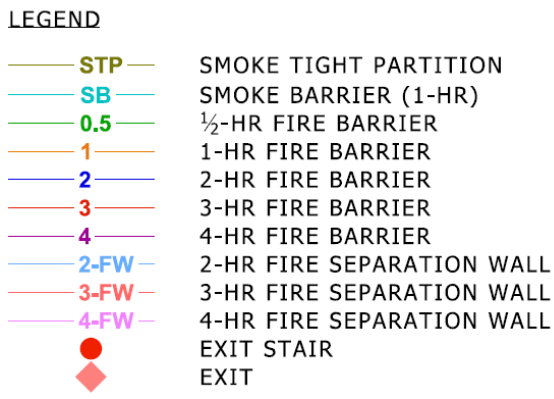
- Plans and specifications issued for regulatory approval shall be sealed by the Architect or Engineer responsible for the work. Each drawing sheet is to include the name and address of the company primarily responsible for it content regardless of whether or not it is the prime design profession for the project.
- The title sheet, or second sheet, shall list all applicable building codes for the project, including but not limited to the building code, the electrical code, the mechanical code, and the plumbing code. The construction document drawings are to include all information required by the applicable codes to be present on the drawings.

- Contact the Design Manager to obtain a copy of AEC's CAD standards and a copy of our CAD seed files (which include AEC Title Blocks) and symbol libraries.

## 2.4 Life Safety Plans

University of Michigan requires consistency in information provided and formatting of line types on Life Safety Plans. The University has standardized the linetypes for smoke tight partitions, smoke barriers, fire barriers and fire separation walls. These partitions shall be delineated on the life safety plans. This information shall be part of the background file not sheet based. The goal is that the linetype is included in the file for use by the University in their various building management systems. Please reference page one of this Design Guideline "Standard Details" for DWG and/or DGN files for linetypes.

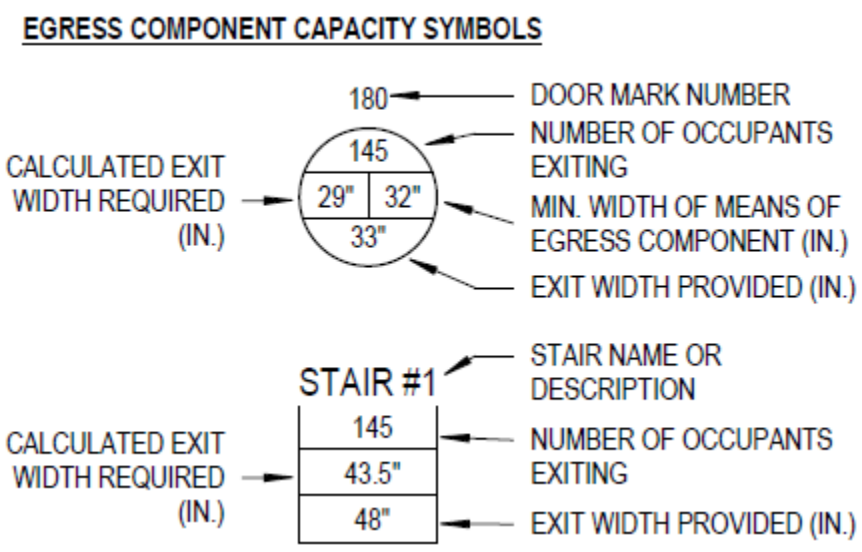
Legend below depicts the line types required for each partition type.




Include the following information, as applicable, on Life Safety Plans submitted to University of Michigan:

1. List of applicable codes, including year
2. Building construction type and occupancy assumptions
3. Plumbing fixtures counts and calculations, by floor
4. Boundary of any BFS compartments
5. Chemical control areas
    a. Include boundaries and anticipated quantities stored in each control area.
6. Egress Component Capacity Symbols:
    a. Egress doors: include symbol referencing egress capacity, planned number of occupants exiting, calculated width required (inches) and width provided (inches), reference exhibit A below.
        i. Building Egress Doors
        ii. Assembly Space Egress Doors
    b. Egress stairs: include symbols referencing egress capacity, planned number of occupants exiting, calculated width required (inches) and width provided (inches), reference exhibit A below.
7. List of codes that are applicable, including year
8. Building construction type and occupancy assumptions
9. Plumbing fixtures counts/ calculations, by floor

**Exhibit A**



## 2.4 Room Numbering Assignment Procedure

Design Professionals shall NOT assign room numbers. UM AEC-Space Information is responsible for all room numbering. The Design Professional shall submit all floor plans for room numbering to the Design Manager. Submittal of the floor plans for official room numbering should be according to the following format and schedule:

- **Schematic Design:** Submit PDF's of all floor plans for initial room numbering assignments. Plans should display only walls, doors, windows, structural, stairs, ramps, elevators and restrooms. Remove all architectural symbols, references, column lines etc. Insert blank room number boxes anywhere room numbers are needed. Include room names on plans if available. If plans include existing space not being renovated, include existing room numbers. These can be obtained by requesting existing plans directly from fo-is-floorplans@umich.edu.

- **Design Development/CD Phase:** Submit revised plans *as often as necessary* showing all architectural changes that result in new, deleted or moved rooms, doors and/or wall openings. Even simple changes may result in revised room numbers. Indicate areas that have been changed with revision bubbles and empty room number boxes wherever new room numbers are needed. Please also show any previously assigned room numbers. PDF should be clean and display only items as described above in the Schematic Design section.

- AEC-Space Information will provide the Design Professional and Design Manager with officially stamped "Approved Room Numbers" PDF document(s) within three (3) business days of the receipt of the request from the Design Manager.

## 2.5 Specifications Requirements

### General

AEC maintains within its Design Guidelines both a Preferred Manufacturers List and Technical Sections. These components of the Design Guidelines reflect the needs and experiences of the University in regards to the specific equipment being addressed. The A/E shall select manufacturers from the list that are able to supply the products needed for the given project and whenever possible, shall include at least three acceptable manufacturers. The Preferred Manufacturers List shall not substitute for the A/E's professional judgment. In the unusual circumstance where the listed products are not suitable, the A/E must present justification for using other products and must obtain the written approval for these products from the Design Manager. The A/E shall incorporate the standards in the Technical Sections in the project specifications.

University Architecture and Engineering maintains a limited Master Specification for use by in-house designers. A/Es may use these specifications, but must edit these specifications to make them project specific. However, they should not substitute these specifications for their professional judgment regarding the requirements of each individual project. Use of these specifications will not relieve the A/E from the obligations of the contract, stated or implied, that pertain to their performance or the performance of their product.

Project manuals shall contain Front End Documents in addition to general requirements (Division 1) and technical specifications (Divisions 2 through 32). See paragraphs below titled "University of Michigan Standard General Conditions" and "Other Standard Documents".

Specification Standard: The University recommends compliance with the principles and practices outlined in the CSI Manual of Practice.

Use of the 3-Part Section Format is mandatory.

Use of the Page Format is encouraged, but is not mandatory.

Use the 2012 CSI MASTER FORMAT Section numbers and titles for organizing Documents and specifications within Project Manuals. Comply with guidelines for contents of each Division and Section of the specifications.

### Language and Terminology

Compliance with the recommendations of Manual of Practice Chapter 4 "Specification Language" is strongly encouraged. The following requirements are mandatory:

Write specifications as if addressed to the General Contractor. Do not address specifications to "This Contractor" or "The subcontractor." Where specific parties must be referred to for clarity, use language similar to the following: "Engage a licensed Professional Engineer to perform calculations," or "Require Installer to examine substrate prior to installation."

Eliminate the term "by others" from drawings and specifications. If work is not part of the Contract, say so directly using (N.I.C.) or similar constructions. If, for example, a mechanical item is shown on an architectural sheet for clarity, use the phrase "by mechanical trades."

Eliminate the term "or equal" from specifications. The University requires Contractors to bid only products specified as "approved." List not less than three alternative, equivalent manufacturers for each generic product specified, unless no other equivalent products exist.

### University of Michigan Standard General Conditions

The University maintains its own Standard General Conditions and Supplemental General Conditions. Obtain a copy of these documents and make sure the specification writer is fully familiar with it.

In general, Special Conditions are not required. However an A/E may wish to modify language concerning shop drawing review or other items. Coordinate use of Special Conditions with the Design Manager.

## 2.5 Submitting Bid Sets

- Reference DG 2.4.2 Document Standards & Methods for Electronic Document Submissions

## 2.6 Submitting Construction Sets

- Reference DG 2.4.2 Document Standards & Methods for Electronic Document Submissions

## 2.7 Floor and Site Plans – Public Use

On occasion users may request thematic floor plans (i.e., room types or assigned departments) and/or site plans to share project information publically (i.e., web page display, presentations, media use, etc.).
Graphics/ Floor Plans may also be requested for the following:

- Regents Graphic Summaries
- Construction plans indicating impact on neighborhoods
- Support for Neighborhood meetings
- Pedestrian Way finding during construction
- Planning Principles

**Floor Plans**

- Floor plans ***should*** contain:
  Walls, Doors, Windows, Stairs, Elevators.

- Floor Plans ***may*** contain:
  - Fixed furniture in class rooms, offices, conference rooms, and laboratories (but ***should not*** contain labels identifying any fixed furniture in these areas)
  - Restroom fixtures
  - Thematic room type floor plans (See Color & Label Guideline below for suggested colors and labels.)
  - Thematic department floor plans, ***with the exception of following***, all of which should be labeled as "Support Departments:"
    - Unit for Laboratory Animal Medicine (ULAM)
    - Plant Operations spaces, such as Mechanical, Maintenance, or Custodial
    - Tele-Communication / Data spaces

- Floor Plans ***should not*** contain:
  - Utility tunnel information (tunnel walls, doors to tunnels, and/or access hatches)
  - Mechanical equipment, piping layouts
  - Card access control system information (card reader and control panel locations, and wiring diagrams)
  - Security system information (security sensor, camera, video recorder and control panel locations, and wiring diagrams
  - Columns and column lines

**Site Plans**

- Site plans ***should*** contain:
  - North Arrow
  - Major street references
  - Contextual campus information
  - Graphic representation of new and existing hardscape surfaces
- Site plans ***may*** contain:
  - Existing tree survey information
  - Pedestrian Paths during construction
  - Locations of nearest bus stop to construction
  - Location of nearest Barrier Free parking
  - Fire Emergency Access Routes
- Site Plans ***should not*** contain:
  - References (visual or textual) to utility tunnels, roof access, or mechanical and electrical spaces.

**Document Format**

- Provide one *pdf* file per floor.
- The original size should be either 8.5" x 11" or 11" x 17"

Direct questions regarding plans for public use to Project Design Manager.

## 2.8 As-Constructed Record Drawings

- As-constructed Record Drawings shall show all significant changes to the Record Bid Set resulting from post-bid addenda, accepted or deleted alternates, field orders, construction change directives, RFIs, bulletins, the Contractor Mark-up Set (Commonly called "As-builts") and/or other data generated by the Contractor(s) during the course of construction of the Project.

  - Provide O & M manuals for all equipment and materials, per DG 4.3 Building Commissioning