

FEBRUARY 2011
DESIGN DRAWING STANDARDS



RELIABLE. ANSWERS.



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INTRODUCTION

PURPOSE

Duke Realty Corporation (“Duke Realty”) constructs, leases, and manages industrial, office, and health care properties in markets across the country. Additionally, many clients and tenants do business with Duke Realty in multiple markets. Therefore, fostering a consistent reputation of quality and reliability that spans our various markets is of primary importance. This document sets forth standards for any design and construction drawings prepared on Duke Realty’s behalf. It is intended to provide guidance to third party design professionals regarding Duke Realty’s requirements for both the functional content and the aesthetic form of the drawings. Adherence to these standards will:

- Assist the design professional in the efficient production of their drawings;
- Provide for a smoother closeout procedure at a project’s completion;
- Create consistency of drawings from project to project, market to market;
- Promote Duke’s Realty’s national reputation as a quality and reliable partner with which to do business.

Duke’s expertise and commitment to quality have cemented our position as one of the largest publicly traded owners, managers, and developers of commercial properties in the United States. The Design Drawings Standards ensure that drawings produced by and for Duke uphold our reputation as premier company in the real estate and construction industry.

GENERAL INFORMATION

ADHERENCE TO STANDARDS

The Design Drawing Standards shall be utilized in the production and archival of all sets of preliminary design drawings, construction documents, and record drawing sets created for Duke Realty. The Design Drawing Standards provide a convenient and consistent method of drawing management for use in the generation of various drawings. Design professionals shall not deviate from the Design Drawing Standards without receiving prior approval from the applicable Duke Realty Project Manager. Unauthorized deviations from these standards may cause additional re-work for the design professional, delays in project closeout, and shall constitute grounds for Duke Realty to delay final payment for services until such deviations are resolved.

FILE LOCATIONS

The Duke Realty Design Drawing Standards and standardized Title Block CAD files may be found on Duke Realty’s Construction website www.dukeconstructiononline.com under the “Consultants/Subcontractors” tab located in the banner [Figure 1 and 2].



[Figure 1]

Duke REALTY
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CONSTRUCTION

WHO WE ARE | WHAT WE DO | CONTACTS | CAREERS | CONSULTANTS/SUBCONTRACTORS

Building Automation Systems
Niagara AX Standard Station

Jobsite Rules of Conduct

Design Drawing Standards
Design Drawing Standards User Guide
AutoCAD Fonts
AutoCAD Border Templates

Subcontractor Safety Information Survey

Interior Finish Master Specifications

Master Mechanical/Electrical Specifications
Master Mechanical Specifications
Master Electrical Specifications

ConstructionConnect

Interested Trade Contractors
Please register in Duke Realty's Supplier Management System

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[Figure 2]

Duke REALTY
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WHO WE ARE | WHAT WE DO | CONTACTS | CAREERS | CONSULTANTS/SUBCONTRACTORS

Presentation and Construction Drawing Templates

Atlanta-Savannah <ul style="list-style-type: none"> • Presentation • Construction 	Baltimore-Linden-Norfolk <ul style="list-style-type: none"> • Presentation • Construction 	Chicago <ul style="list-style-type: none"> • Presentation • Construction
Cincinnati <ul style="list-style-type: none"> • Presentation • Construction 	Cleveland <ul style="list-style-type: none"> • Presentation • Construction 	Columbus <ul style="list-style-type: none"> • Presentation • Construction
Dallas <ul style="list-style-type: none"> • Presentation • Construction 	Houston <ul style="list-style-type: none"> • Presentation • Construction 	Indianapolis <ul style="list-style-type: none"> • Presentation • Construction
Minneapolis <ul style="list-style-type: none"> • Presentation • Construction 	Nashville <ul style="list-style-type: none"> • Presentation • Construction 	Orlando <ul style="list-style-type: none"> • Presentation • Construction
Phoenix <ul style="list-style-type: none"> • Presentation • Construction 	Raleigh <ul style="list-style-type: none"> • Presentation • Construction 	South Florida <ul style="list-style-type: none"> • Presentation • Construction
St. Louis <ul style="list-style-type: none"> • Presentation • Construction 	Tampa <ul style="list-style-type: none"> • Presentation • Construction 	Washington DC <ul style="list-style-type: none"> • Presentation • Construction

Interested Trade Contractors
Please register in Duke Realty's Supplier Management System

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[Figure 3]

SUPPORT

For all questions or clarifications regarding the Design Drawing Standards or for any technical inquiries or assistance please contact your Duke Realty Project Manager for the project market.

DESIGN DRAWING REQUIREMENTS

SOFTWARE

Duke Realty's standard software for the production of all design and construction drawings is AutoCAD. Prior to preparing drawings, the design professional shall confirm with the Duke Realty Project Manager which release of AutoCAD shall be used for a given project. If your design firm uses a different CAD platform (i.e. MicroStation, or other software), the design professional may still utilize their particular software for the production of design drawings. However, required submissions of electronic files to Duke Realty shall first be converted to clean and usable AutoCAD files that maintain an authentic representation of the original drawing hardcopy. All software conversion issues are the responsibility of the design professional; this includes drawing files generated by any sub-consultants, or for the use as base sheets for design/build subcontractors. Additionally, the Duke Realty project manager may require the submission of electronic design drawing files in alternate formats such as *.PDF or *.TIF formats. All electronic submissions of design drawings shall be coordinated on a case by case basis with the Duke Realty Project Manager.

SHEET FORMAT

TITLE BLOCKS

Duke Realty uses two styles of drawing title blocks: "Presentation" and "Construction". The purpose or intended users for the drawings produced, as indicated in sections below, will determine the appropriate format or style of Title Block. Construction Title Blocks are specific to each Duke Realty location or market of operation, with hard coded Duke Realty Office addresses and phone numbers. Presentation Title Blocks are not location or market specific, and are located in each of the city folders for convenience.

Title Blocks are intended to be inserted into a drawing file as an AutoCAD "block", and this is covered in greater detail below, and in the "DRAWING STRUCTURE" section.

PRESENTATION TITLE BLOCKS

Presentation title blocks are appropriate for conceptual or preliminary drawings, renderings, or displays. Drawings utilizing the Presentation style Title Block are commonly used for:

- Presenting design concepts to potential clients or tenants;
- Inclusion within a Duke Realty proposal;
- Inclusion within Duke Realty marketing materials;

- The creation of displays or panels for use within client, tenant, municipal, or other meetings.

Presentation drawings may be full-sized sheets, or they may be reduced as appropriate for their intended use. The Presentation Title Blocks are available in most standard sheet sizes from 'A' size (8.5"x11") and up, in both horizontal (landscape) and vertical (portrait) formats. The design professional shall coordinate with the Duke Realty Project Manager to determine the size of the Presentation title block to be used for each required drawing.

Text and project specific information should be entered into the Presentation Title Blocks by editing the attributes of the block, **not** by exploding the block and manually inserting text. Following this procedure maintains the formatting of the Title Block's text elements, keeping the font sizes, types, and locations consistent from drawing to drawing.

- **Presentation Title blocks**

DR_Pres_A_8x11h.dwg
 DR_Pres_A_8x11v.dwg
 DR_Pres_B_11x17h.dwg
 DR_Pres_B_11x17v.dwg
 DR_Pres_C_18x24h.dwg
 DR_Pres_C_18x24v.dwg
 DR_Pres_D_24x36h.dwg
 DR_Pres_D_24x36v.dwg
 DR_Pres_E_30x42h.dwg
 DR_Pres_E_30x42v.dwg

Within these names, the single letter and numbers represent the title block/sheet size (i.e. an "E" sized sheet is 30" by 42"). Also within these file names, the "h" and "v" designations represent "horizontal" or "vertical" styles of border. Note that the Presentation style title blocks are not location specific, and do not have separate files for each market city.

Provisions for Consultant and/or Client logo insertion have been made in each Title Block format. This "logo" space has been identified with a rectangle drawn on the DR_NO_PLOT layer. Inserted logos should be contained within the boundary of the "no plot" rectangle. The drawing objects on the DR_NO_PLOT layer may be deleted, or the layer may be 'frozen' or turned 'off' for clarity of the displayed drawing file.

Horizontal Presentation Title Block formats 'B' through 'E', and 'E' size Vertical Presentation Title Block contain elements allowing for a 2nd Consultant's or Client's information to be added (See Figure 4, below). If this information is not needed, then layer DR_CLIENT_2 should be turned 'Off' or 'Frozen'.

- Submittal or Issuance information;
- Sheet-specific information.

These elements (with the exception of client or design professional logos) are “built in” to the title block file. The design professional may easily input the required information within the title block by editing the attributes of the title block after it is inserted into a drawing, **not** by exploding the block and manually inserting text. Following this procedure maintains the formatting of the Title Block’s text elements, keeping the font sizes, types, and locations consistent from drawing to drawing. The editable attributes of the Construction style Title Blocks display the following information (as viewed from the top right side of the Title Block to the bottom):

- Duke Entity (verify information with Duke Realty Project Manager)
- Project Role (intended for consultant and/or client information)
- Project Title
- Project Address
- Sheet Title Large (displays the sheet title in the central area of the title block)
- Revisions(Description/Date)
- Drawing Information
- Drawing/Sheet Title (displays the sheet title in the lower right corner of the title block)
- Sheet Number

The title block contains the following layers that correspond to the different title block entities:

DR_LOGO_BLACK
 DR_LOGO_GREEN
 DR_NO_PLOT (layer for notes or reference lines not intended to be plotted)
 DR_REVISION (*See note)
 DR_TITLEBLK (*See note)
 DR_TITLEBLK_TEXT (*See note)
 Sheet_Title_and_Number (Layer for consultant use for batch plotting.)

*Note that certain information may be common on all sheets within a design professional’s drawing set (i.e. the project name or the design professional’s information), whereas other information may vary from sheet to sheet (i.e. the sheet title and sheet number). This information has been segregated on different layers to provide the design consultant the flexibility to set up their drawing set with certain title block information “pre-filled”, but also to maintain the ability to edit sheet-specific information.

Whenever possible, the design professional should maintain the formatted attribute properties of the border, and not “explode” the border to edit the title block elements.

This is essential to maintaining a consistent look and feel of Duke Realty design drawings, which is a fundamental goal of these Design Drawing Standards.

The Duke Construction website (dukeconstructiononline.com) contains folders for each market in which Duke Realty operates. Design Professionals should download the market title block that is relevant for a given project. Duke Realty's standard title blocks are named as follows:

- **Construction Title Blocks**
 - DR_Cnst_B_11x17_xxx.dwg
 - DR_Cnst_C_18x24_xxx.dwg
 - DR_Cnst_D_24x36_xxx.dwg
 - DR_Cnst_E_30x42_xxx.dwg

Within these names, the single letter and numbers represent the title block/sheet size (i.e. an "E" sized sheet is 30" by 42"), and the last three letters indicate the market city. If 'A' size (Letter 8.1/2" x 11") title blocks are required, the 'B' may be reduced as necessary, and in appropriate proportions as to not distort the Duke Realty logo.

Provisions for Consultant and/or Client logo insertion have been made in each Title Block format. This "logo" space has been identified with a rectangle drawn on the DR_NO_PLOT layer. Inserted logos should be contained within the boundary of the "no plot" rectangle. The drawing objects on the DR_NO_PLOT layer may be deleted, or the layer may be 'frozen' or turned 'off' for clarity of the displayed drawing file.

DRAWING STRUCTURE

Duke Realty requires that the design professional structures their AutoCAD drawings using both "Model Space" and "Paper Space". All design work should be done in Model Space. Title blocks shall be inserted into Paper Space at a 1:1 scale to ensure that they are plottable without the need for scaling. Any saved views or layouts shall be portrayed in paper space within the limits of a "View Port" that fits inside the inserted title block. Scaling of design line work in Model Space may be performed within the Paper Space View Port.

This drawing structure enables Duke Realty end users to plot the drawing at a 1:1 scale without having working knowledge of AutoCAD. If circumstances necessitate, a design professional may seek permission to place all drawings entities within Model Space. In this case, a clearly readable scale must be included on the drawing so the end user can manipulate Duke Realty's viewing software to plot the drawing at the intended scale.

All electronically submitted design, permit, or construction *.dwg files shall be submitted in an "as-plotted" condition. This means they shall be zoomed to a proper "Limits" or "Extents" view. The zoom limit should typically coincide with the outside boundary of any inserted title block. There are to be no stray drawing entities left outside of the drawing's title block.

SHEET NUMBERING AND FILE NAMING

Design professionals shall adhere to the sheet numbering standards described below for all formal design, permit, and construction drawings. Additionally, all AutoCAD files shall contain the sheet number as the first four characters within their respective file names. For example, an Architectural floor plan designated as sheet "A201" would be contained in a drawing file named "A201xxxx.dwg" (where "xxxx" represents additional characters the design professional may use to distinguish the drawing or project). For a given discipline, each series of plan sheets shall be numbered sequentially. Using the above example, A201 would be the first in a series of architectural *plans*, followed by A202, A203, A204 etc.

The design professional shall utilize the following two lists to determine the sequential naming of all design and construction sheets and their corresponding filenames:

- A** Architectural / Interiors (optional, see "I")
- C** Civil / Site – environmental, grading, roads, topo, survey, utilities, etc.
- D** Demolition -- all disciplines: combine the letter "D" with the discipline code
- E** Electrical – power, light, telecommunications, alarms/paging, security, a/v, etc.
- F** Foundation
- FP** Fire Protection
- H** Hazardous Materials, Safety Zoning, Evacuation Plans, Life Safety, etc.
- I** Interiors (optional, see "A")
- L** Landscaping
- M** Mechanical – HVAC, piping, temperature controls (optional, see "T")
- P** Plumbing
- Q** Equipment drawings
- S** Structural
- T** Temperature controls (optional, see "M")
- Z** Shop drawings

- 100 Series** General – cover, index, symbols, legends, general notes, vicinity maps
- 200 Series** Plans
- 300 Series** Elevations
- 400 Series** Sections and Details
- 500 Series** Schedules and Diagrams
- 600 Series** Iso / 3D Drawings
- 700 Series** Signage
- 800 Series** user-defined
- 900 Series** user-defined

RECORD DRAWING REQUIREMENTS

Following the completion of a project, Duke Realty retains the obligation to keep and store accurate copies of all “as-built” or record construction drawings used produced for the project. The design professional is contractually required to submit electronic files of their record drawings to Duke; therefore a design professional’s contract cannot be closed out and final payment issued until electronic record drawings have been submitted. Record drawings shall adhere to the following standards to ensure acceptance by the Duke Realty Project Manager:

SOFTWARE

Consistent with the requirements for design, permit, and construction drawings, Duke Realty requires all record drawings be prepared using AutoCAD software. If your design firm uses a different CAD platform, such as MicroStation, electronic record drawing submissions shall first be converted to clean and usable AutoCAD files that maintain an authentic representation of the original drawing hardcopy. All software conversion issues are the responsibility of the design professional; this includes drawing files generated by any sub-consultants. Additionally, the Duke Realty project manager may require the submission of electronic record drawing files in alternate formats such as *.PDF or *.TIF formats. All electronic submissions of record drawings shall be coordinated on a case by case basis with the Duke Realty Project Manager.

ARCHIVAL FORMATTING

EXTERNAL REFERENCES AND IMAGES

Generally stated, all record drawing CAD files shall be self-contained, stand-alone files, capable of being opened accurately and completely without dependence on any external files, fonts, shapes, or images. All external references (“XREF”s) must be ‘bound’ to the record drawing file. All image files such as *.jpg, *.tif, and *.gif files need to be pasted into and wholly contained within the record drawing file. Duke Realty will not accept drawing files that contain un-bound external references or links. Although a design professional may utilize external references in the design and permitting process, this drawing structure is not acceptable for the archiving of record drawings. If a design professional submits electronic drawing files containing external references or non-pasted image files, the Duke Realty Project Manager will not accept the submission, and will require the design professional to resubmit the record drawings in the required format.

ELECTRONIC DRAWING FORMAT

Consistent with design, permit, and construction drawings, Duke Realty requires that the design professional structures their record drawings using both “Model Space” and “Paper Space”. All design work should be done in Model Space. Title blocks shall be inserted into Paper Space at a 1:1 scale to ensure that they are plottable without the need for scaling. Any saved views or layouts shall be portrayed in paper space within the limits of “View Port” that fits inside the inserted title block. Scaling of design line work in Model Space may be performed within the Paper Space View Port.

This drawing structure enables Duke Realty end users to plot the record drawing at a 1:1 scale without having working knowledge of CAD. If circumstances necessitate, a design professional may seek permission to place all drawings entities within Model Space. In this case, a clearly readable scale must be included on the drawing so the end user can manipulate Duke Realty’s viewing software to plot the drawing at the intended scale.

All finished record drawing files shall be submitted in an “as-plotted” condition. This means they shall be zoomed to a proper “Limits” or “Extents” view. The zoom limit should typically coincide with the outside boundary of any inserted title block. There are to be no stray drawing entities left outside of the drawing’s title block.

DRAWING SUBMISSION

The design professional shall submit electronic, AutoCAD files of each record drawing to the Duke Realty Project Manager upon completion of a project. The electronic drawing file(s) submitted at the completion of a job should be clearly designated “Record Drawing(s)”. The Duke Realty Project Manager retains the right to review all electronic record drawings submitted by the design professional for adherence to the Design Drawing Standards. The Project Manager may, at their sole discretion, accept or reject a record drawing submission. Until electronic record drawings are submitted to and accepted by the Duke Realty Project Manager, neither the project nor the design professional’s contract will be closed out. This may delay final payment due to the design professional.

BUILDING INFORMATION MODELING (BIM)

Duke Realty recognizes that Building Information Modeling (BIM) is an emerging technology in the construction industry. BIM will become an increasingly prevalent requirement for projects of all levels of complexity. The following requirements serve as a framework for BIM deliverables, and may be readdressed and modified as the industry evolves and develops mainstream standards.

Duke Realty's standard BIM software is Revit. Prior to preparing BIM models, the design professional shall confirm with the Duke Realty Project Manager which release of Revit shall be used for the specific project. If your design firm uses a different BIM platform, (such as Bentley, Navisworks, etc.) the design professional may still utilize their particular software for the production of BIM information. However, required submissions of electronic files to Duke Realty shall first be converted to Revit based files, or IFC files as described below. All software conversion, importing, and exporting issues are the responsibility of the design professional.

For all Projects requiring BIM, the design professional will begin modeling during the Design Development phase, and this will proceed through final as-built drawings. Spatial program BIM information required with the A-E Design Development levels through final design concept submissions will be submitted in both the native file format of the BIM authoring tool (Revit) and in Industry Foundation Classes (IFC) format. BIM deliverables will supplement, and not replace, the Duke Realty CAD standards and deliverables. The inclusion of BIM modeling into a given project will ultimately be guided by the direction of the Duke Realty Project Manager. Therefore, the Project Manager retains the authority to modify the provisions of this section for a given project.