

Design Professionals Guide to Creating and Processing Electronic Construction Documents

INTRODUCTION

Advances in technology have made electronically created documents commonplace in today's construction industry. Computer Aided Design (CAD), Building Information Modeling (BIM), word processing (Word), Portable Document Format (PDF) management and other computer programs are familiar to most design professionals, contractors, and building code officials. A paperless online building permit process is now possible through advances in technology and updated state statutes and licensing regulations.

Utilization of electronic documents in the building permit process provides opportunities for cost savings for all parties through improved work flow efficiency, reduced printing costs, eliminating archiving costs, reducing shredding cost and fewer trips by the contractor's representative to the building department. While personal contact will always be important, the reality is that building department employees can be more productive without a customer sitting at their desk while they are processing permit documents.

The building permit process builds an official public record of construction activity that relies on the authenticity of information. Certain documents must bear the mark of the person, persons or agency that created, reviewed or authorized them. Legislation and associated administrative rules mandate signatures, notarized signatures, and in the case of architects and engineers, an encrypted signature and seal must be affixed. It is the authenticity of these documents that must be safeguarded in an electronic building permit process.

For these electronic documents to be used for permitting construction projects, design professionals, contractors and code officials must learn how to electronically secure, sign, and seal various documents to guarantee that the documents are authentic and cannot be altered.

The BOAF/AIA-Florida/FES Joint Task Force has developed this document to provide guidance for design professionals, contractors, and code officials regarding the best practices recommended for the creation and handling of secure electronic documents, used in the building permit process.

COST/BENEFIT

COSTS- Architects and engineers will need to submit drawings for permitting as PDF files. Depending on the CAD software being used it may be necessary to purchase or upgrade a PDF management software program, such as ADOBE Professional or BlueBeam, to be able to convert drawings from .DWG or other file formats to a secure .PDF format.

The most secure form of signature verification is the use of a third party process, such as VeriSign, GeoTrust or others. Any third party signature verification method used will result in additional costs.

Architects or engineers may choose to maintain an online file exchange service to deliver electronic documents to the contractor for permitting. This may be a feature of the design professional’s website or a subscription to a third party service.

BENEFITS-

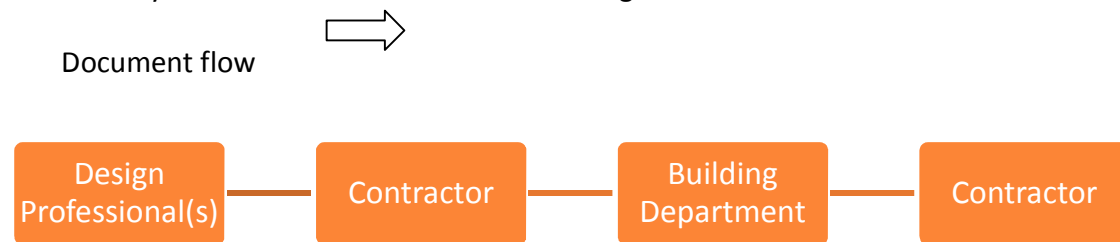
- 1. Electronic signatures are easier to affix to documents than impression seals or wet seals
- 2. Documents can be signed as soon as they are complete, saving time spent waiting on the printer
- 3. Document printing cost is reduced or eliminated
- 4. Documents can be transmitted to the contractor once they are electronically signed

Re-work or revision drawings can be electronically delivered directly to the building department when corrections or changes are required for plan review.

CREATING CONSTRUCTION DOCUMENTS FOR PERMITTING

Construction documents required for permitting are assembled into an application package by the contractor. *For the purpose of this document the term “contractor” is used to represent the “applicant”.* While the contractor is ordinarily the applicant, in some circumstances the applicant could be a design professional or the owner. Drawings, calculations, and specification documents, in electronic format, prepared by Florida licensed architects and/or engineers are required to be signed and sealed with an encrypted electronic signature. Documents not prepared by an architect or engineer should contain an information block that identifies who created the document, and contact information if there are questions about the document.

Electronic construction documents can be delivered to the contractor, and in turn to the building department, using a storage device (CD, DVD, flash drive) or internet document exchange portal. The contractor must take great care not to alter any document signed with an encrypted signature, because any alteration will void the document signature.



The following sections will explain the responsibilities of design professionals when electronic construction documents are used in the permitting process.

TECHNOLOGY REQUIREMENTS

Design professionals will need basic hardware, software, and internet service to create and assemble documents for permitting.

Hardware

1. Computer
2. Internet connection
3. Scanner

Software

1. CAD program (Create drawings)
2. PDF Management (Convert drawings to PDF format, and digitally sign documents)
3. E-mail

Internet

1. Internet service
2. Mail exchange
3. Third party signature verification provider (Optional)

FORMATING DOCUMENTS

Electronic construction documents can be created by any software as long as the documents produced can be saved in a file format that can be opened by the building department. Always check with the local building department before preparing plans for permitting. While some building departments may have sophisticated file management software that can open a variety of file types, it is recommended that files be saved to a common file type that does not require special or expensive software to view and manage. It is recommended that most documents be saved in a PDF format.

Check with the local jurisdiction for direction regarding signing and sealing document pages individually or as sets. Keep in mind that when the submittal is accepted as a signed and sealed multiple page PDF set, all future submittals will require the resubmittal of the entire updated set.

DIGITAL SIGNATURES BY ARCHITECTS AND ENGINEERS

Seals and signatures are used by state of Florida licensed Architects and Engineers to identify authentic documents. An electronic or digital signature serves the same purpose as wet seals and impression seals. An electronic or digital signature is an approved method of authenticating a document as long as it complies with applicable rules.

Currently, Architects and Engineers must comply the respective licensing board's rule and with Florida Statute 668 when using an electronic signature. The statute requires that an electronic signature be unique to the signee, be under the control of the signee, be created using an "asymmetric cryptosystem", and be recognizable through the use of a process called "Key pair" technology.

As mentioned earlier, when the requirements of FS 668 are met, both the signee and the recipient can be assured of the authenticity and integrity of the electronic signature. An electronic signature is password protected and cannot be copied or used by anyone except the signee.

An important feature of an electronic signature is that it can be verified as authentic when it is attached to an electronic file in a PDF format. Construction drawings or documents bearing an electronic signature may only be submitted to a jurisdiction in an electronic format for use in permitting a project. An electronic signature on a printed copy of an electronic document cannot be verified as authentic, and is not valid as a permit submittal. Electronic documents bearing an electronic signature may be printed for use in the field only after the jurisdiction has electronically stamped and secured the document.

Electronic signatures used by Architects and Engineers shall comply with the “Electronic Signature Act of 1996 (ss.668).” The legislature’s intent in creating this legislation is to:

- (1) Facilitate economic development and efficient delivery of government services by means of reliable electronic messages.
- (2) Enhance public confidence in the use of electronic signatures.
- (3) Minimize the incidence of forged electronic signatures and fraud in electronic commerce.
- (4) Foster the development of electronic commerce through the use of electronic signatures to lend authenticity and integrity to writings in any electronic medium.
- (5) Assure that proper management oversight and accountability are maintained for agency-conducted electronic commerce.

Terms defined in the act:

- (1) “Certificate” means a computer-based record which:
 - (a) Identifies the certification authority
 - (b) Identifies the subscriber
 - (c) Contains the subscriber’s public key
 - (d) Is digitally signed by the certification authority
- (2) “Certification authority” means a person who issues a certificate
- (3) “Digital signature” means a type of electronic signature that transforms a message using an asymmetric cryptosystem such that a person having the initial message and the signer’s public key can accurately determine:
 - (a) Whether the transformation was created using the private key that corresponds to the signer’s public key.
 - (b) Whether the initial message has been altered since the transformation was made.

A “key pair” is a private key and its corresponding public key in an asymmetric cryptosystem, under which the public key verifies a digital signature the private key creates. An “asymmetric cryptosystem” is an algorithm or series of algorithms which provide a secure key pair.

- (4) “Electronic signature” means any letters, characters, or symbols, manifested by electronic or similar means, executed or adopted by a party with an intent to authenticate a writing. A writing is electronically signed if an electronic signature is logically associated with such writing.

Unless otherwise provided by law, an electronic signature, as described above, may be used to sign a writing, and shall have the same force and effect as a written signature.

The head of each agency shall be responsible for adopting and implementing control processes and procedures to ensure adequate integrity, security, confidentiality, and audit ability of business transactions conducted using electronic commerce.

Read the Architect's rule 61G1-16.005 at:

<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=61G1-16>

Read the Engineer's rule 61G15-23.003 at:

http://www.fbpe.org/images/phocadownload/legal/61G15_as_of_8.20.12_for_website.pdf

The biggest obstacle to the use of electronic documents for permitting is a lack of understanding regarding digital, encrypted, electronic signatures using PKI or Public Key Infrastructure. The irony of that statement is that it is not a difficult process for either the signee or the recipient. An encrypted signature that complies with the requirements of the licensing boards can be created in one of two methods:

1. Use tools built into your design or PDF management software (AutoCAD, Adobe Acrobat Pro, BlueBeam, etc.) to create a visible and embedded signature file. This also requires the online purchase of a certificate from a Certificate Authority (eTrust, GeoTrust, Verisign, etc.)
2. Purchase a signature and Certificate online from a third party verification service (eTrust, GeoTrust, Verisign, etc.)

There is plenty of information online about this subject. Start with the tutorials provided by your current software company, and the information provided by the third party services, before you attempt to create your signature.

Additional information can be found at the Fiotech website. Fiotech is a membership association dedicated to solving process problems through technology. Their white paper on developing a strategy for implementing digital signatures provides valuable context to understanding digital signature technology.

http://www.fiotech.org/images/stories/techprojects/project_deliverables/Updated_project_deliverables/APracticalDeploymentStrategyforDigitalSignaturesandSeals.pdf

DOCUMENT SECURITY SETTINGS

Electronic documents created by a design professional will by necessity pass through the contractor, and perhaps the owner, before being delivered to the building department. The documents will need to be saved, marked by the building department and possibly printed by the contractor. When a PDF file is created there is an opportunity to set the rights others will have when handling it. It is acceptable to lock the pages that include a digital signature so that the information cannot be altered (a digital signature does not lock the document); however, it will be necessary for the building department to establish the security settings policy it needs to be able to verify that the document is authentic, mark the drawings as the official documents, and return the job copy to the contractor for use on the job.

FOLDER STRUCTURE

An orderly submittal of drawing files will assist the building department in determining the folders that contain drawing files from the folders that contain support information files. The folder structure is applicable when submitting files on a portable storage device or uploading them directly via the internet or FTP site. Upon permit approval, the building department will provide approved documents to the contractor using a similar folder structure.

Submittal Folder Structure

The submittal folder structure is the format used by the design professional to organize and submit their documents to a building department. This format is applicable to the first submittal; subsequent rework submittals will only contain reworked documents.

First Submittal (Current)

- Master Folder (Project Name)
 - Sub-Folder (Permit Application)
 - Sub-Folder (Plan Drawings)
 - Sub-sub-folder – Civil/Site
 - Sub-sub-folder – Architectural
 - Sub-sub-folder – Structural
 - Sub-sub-folder – Plumbing
 - Sub-sub-folder – Mechanical
 - Sub-sub-folder – Electrical
 - Sub-sub-folder – Fire Sprinkler
 - Sub-sub-folder – Fire Alarm
 - Sub-Folder (Structural Calculations)
 - Sub-Folder (Energy Calculations)
 - Sub-Folder (Product Approvals)
 - Sub-Folder (Specification Cut-sheets)

Rework Submittal

- Master Folder (Process Number)
 - Sub-Folder (Reworked Plan Drawings)-YYMMDD
 - Sub-Folder (Reworked supporting documents)-YYMMDD

Revision Submittal

- Master Folder (Master Permit Number)
 - Sub-Folder (Revised Plan Drawings)-YYMMDD
 - Sub-Folder (Revised Supporting documents)-YYMMDD

As-built Submittal

- Master Folder (Master Permit Number)
 - Sub-Folder (As-built Plan Drawings)-YYMMDD
 - Sub-Folder (As-built Supporting documents)-YYMMDD

FILE NAMING PROTOCOL

File Naming/Format

File Naming refers to the name given to each individual electronic file which contains a drawing. Each plan page shall be saved as a separate PDF. CAD drawings shall be saved into a PDF file formatted in single layer Black and White (Monochrome) setting. At a minimum, a file name should intuitively indicate the file contents. Abbreviations shall be used to classify and group related drawings.

Documents such as Structural Calculations, Product Approvals, Energy Calculations, and Specification cut-sheets may be provided as a single multiple-page PDF and named accordingly.

Drawing Abbreviations:

CS	Cover Sheet / Index
G	Government Sheet
SP	Site Plan
C	Civil
L	Landscape
IR	Irrigation
DE	Demolition
A	Architectural
M	Mechanical
E	Electrical
P	Plumbing
S	Structural
FS	Fire Sprinkler
FA	Fire Alarm
LS	Life Safety

The design professional may elect to further describe a file by adding to the minimum naming convention a description of the page.

Examples of optional drawing file naming:

- A101-Ground Floor.pdf**
- A102-Reflected Ceiling.pdf**

Reworks

Reworks are classified as corrections made to plans during the current review process prior to approval. The same file naming convention should be used with the addition of “rwk” and the date of the rework following the file naming example below. When sorted all reworked pages of similar types will group and ordered by date.

Example of rework files naming:

- A101-rwk-YYMMDD.pdf** (YYMMDD is the two digit year, month and day format)

Permitted

This establishes the documents that the permit was based on.

Example of permit files naming:

A101-per-YMMMDD-agency.pdf (Where “AGENCY” is a 6 letter acronym for the issuing entity)

Revisions

Revisions are classified as changes made to the scope of work after permit issuance. Revised drawings are submitted following the same naming convention established with the addition of “rev” and the date of the revision following the file naming example below. When sorted all revised pages of similar types will group and ordered by date.

Example of revision files naming:

A101-rev-YMMMDD.pdf (YMMMDD is the two digit year, month and day format)

As-built (Final Updated Plans)

These documents represent the as-built plans.

Example of as-built file naming:

A101-asb-YMMMDD.pdf (YMMMDD is the two digit year, month and day format)

FILE TRANSFER METHODS

Digital documents may be delivered using any of the following methods;

- 1) Internet via electronic file transfer
- 2) Delivered to the building department
 - a. CD,
 - b. DVD,
 - c. Flash drive, or
 - d. Other storage device,