

The **ART** of Managing Construction

Using Technology for Construction Management
Going Paperless and Getting Things Done

SAME Infrastructure Forum
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Remember the days before Computers?



Signs of the Digital Age

- Drawings are produced on computers.
- Documents are offered to bidders online.
- We produce working models for clients to use.
- We share drawings with contractors , vendors and owners.
- “Paperless” document management.
- BIM.
- We e-mail everything.



Benefits

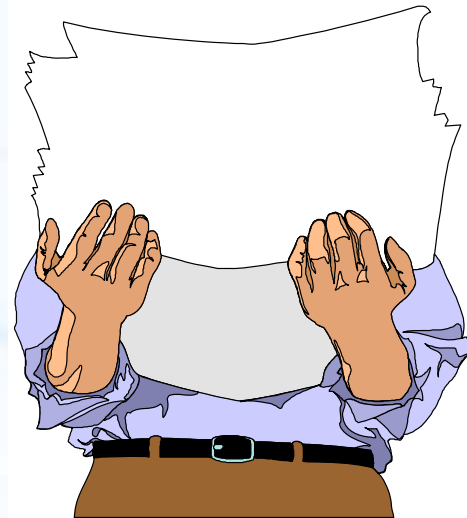
- Goes Green – Saves Paper
- Saves Printing Cost
- Provides Central Set of Documents
- Saves Time
- Improves Coordination / Collaboration
- Provides a Structure for Documentation



Going Paperless

When do we print documents:

- Quality Management Reviews,
- Permit Reviews,
- Bid Documents,
- Issued for Construction Documents,
- Record Documents



Quality Management Reviews

- Reviews with multiple reviewers, disciplines and organizations.
- Response to Comments.
- Follow up on responses (closing the loop).
- Follow up reviews (comparing documents).

Case Studies

- Freese and Nichols Quality Control
- City of Austin Peer Reviews
- DFW Airport – Terminal Renovation and Improvement Program – Quality Reviews

Lessons Learned

- Use documents generated directly from source files.
 - Saves file size
 - Better quality
 - Source paper / printing costs
 - Saves time

Seals

§137.33 (f) (1) The signature and date shall not obscure the engineer's name or license number in the seal.

§137.77(h) All engineering documents released, issued, or submitted by or for a registered engineering firm, including preliminary documents, must clearly indicate the firm name and registration number.



Freese and Nichols, Inc.
TBPE Reg. No. F-2144

Electronic or Digital

- Electronic is seal or graphic representation placed in the document using software.
- Digital signatures use an digital encryption process for authentication, security and integrity.

Why use Digital Seals?

- Signature may not tie signer to the document (no authentication).
- Limits access to only the authorized (password protected).
- Provides notification of tampering.
- Removes validation if altered.
- Speeds time for processing documents.
- Keeps document in digital form.

Why use Digital Seals?

- Use of computers allows documents to be:
 - Produced.
 - Reviewed and approved.
 - Distributed for bidding.
 - Incorporated into digital models.
 - Stored for future retrieval and modification.
- Prevents scanning wet sealed documents:
 - File size.
 - Quality of drawings.

Digital Seals

§137.35 Electronic Seals and Electronic Signatures

- (a) Licensed professional engineers shall maintain the security of their electronic seals and electronic signatures. The following methods are allowed:
- (1) Licensed professional engineers may electronically copy their original hard copy work that bears their seal, original signature, and date and transmit this work in a secure electronic format.
 - (2) An engineer may create an electronic seal and electronic signature for use in transmitting electronically formatted engineering work, regardless of whether the work was originally in hard copy or electronic format.



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Software for Digital Signatures

- Adobe PDF
- Bluebeam PDF Review
- CoSign by Arx
- Banjo
- Microsoft



Lessons Learned

- Use well defined file naming protocols:
 - Allows documents to be sorted to print order.
 - Allows sorting by discipline.
 - Allows comments to be allocated to the document.
 - Allows on screen comparison of documents during the review.

Lessons Learned

- Develop procedures for each process.
- Define the purpose for each review to limit wasted effort.
- Limit which tools are used for consistency in making comments.
- Need to consolidate review documents.
- Create profiles to limit tools to only those used.

Lessons Learned

- Provide training and a coach for new software.
- Supplement on-line tutorial with specific instructions.

Construction Management

- Shop Drawings and Submittals
- Requests for Information
- Schedules
- Applications for Payment
- Contract Modifications
- Punch Lists
- Record Documents
- Operation and Maintenance Manuals

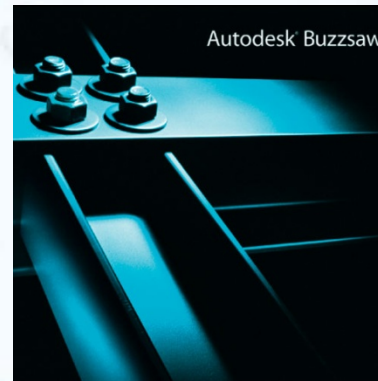


Project Collaboration Tools

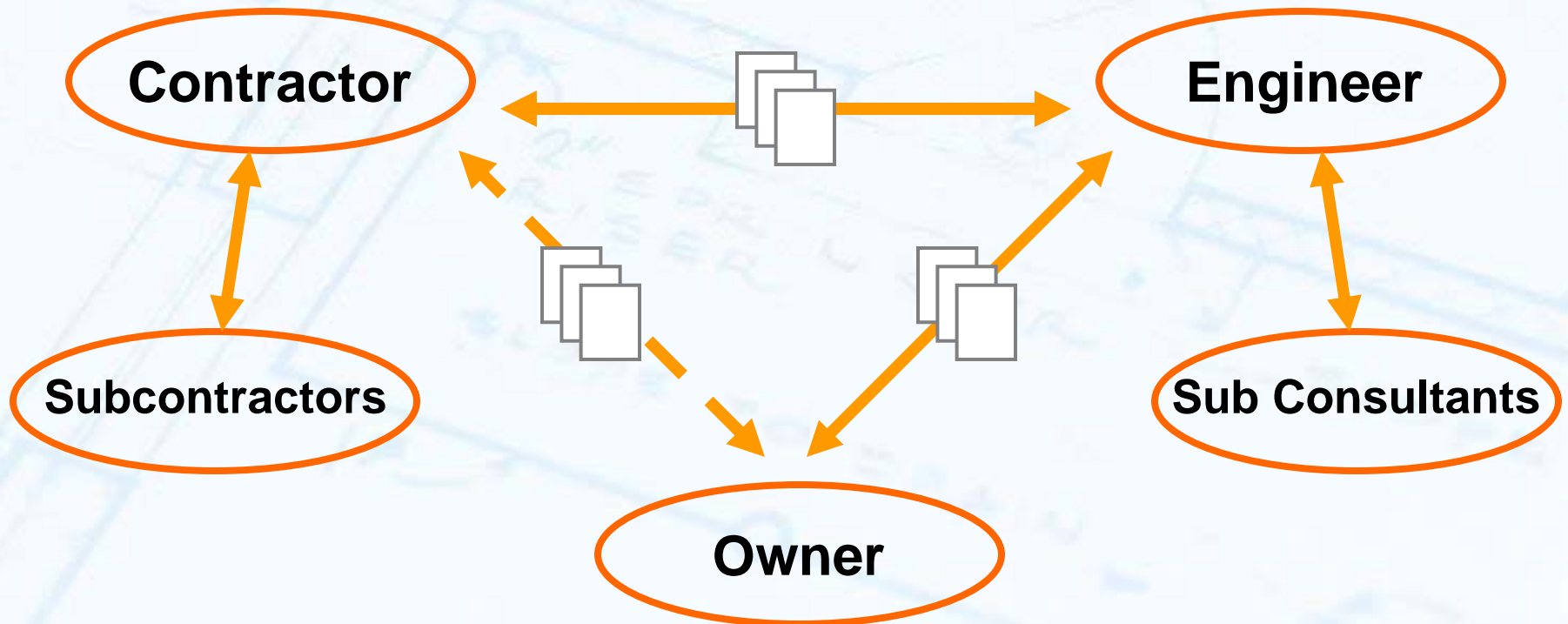
- Automation
- Security
- Repetition
- Ease of use
- Time savings
- Access anywhere
- Timely information



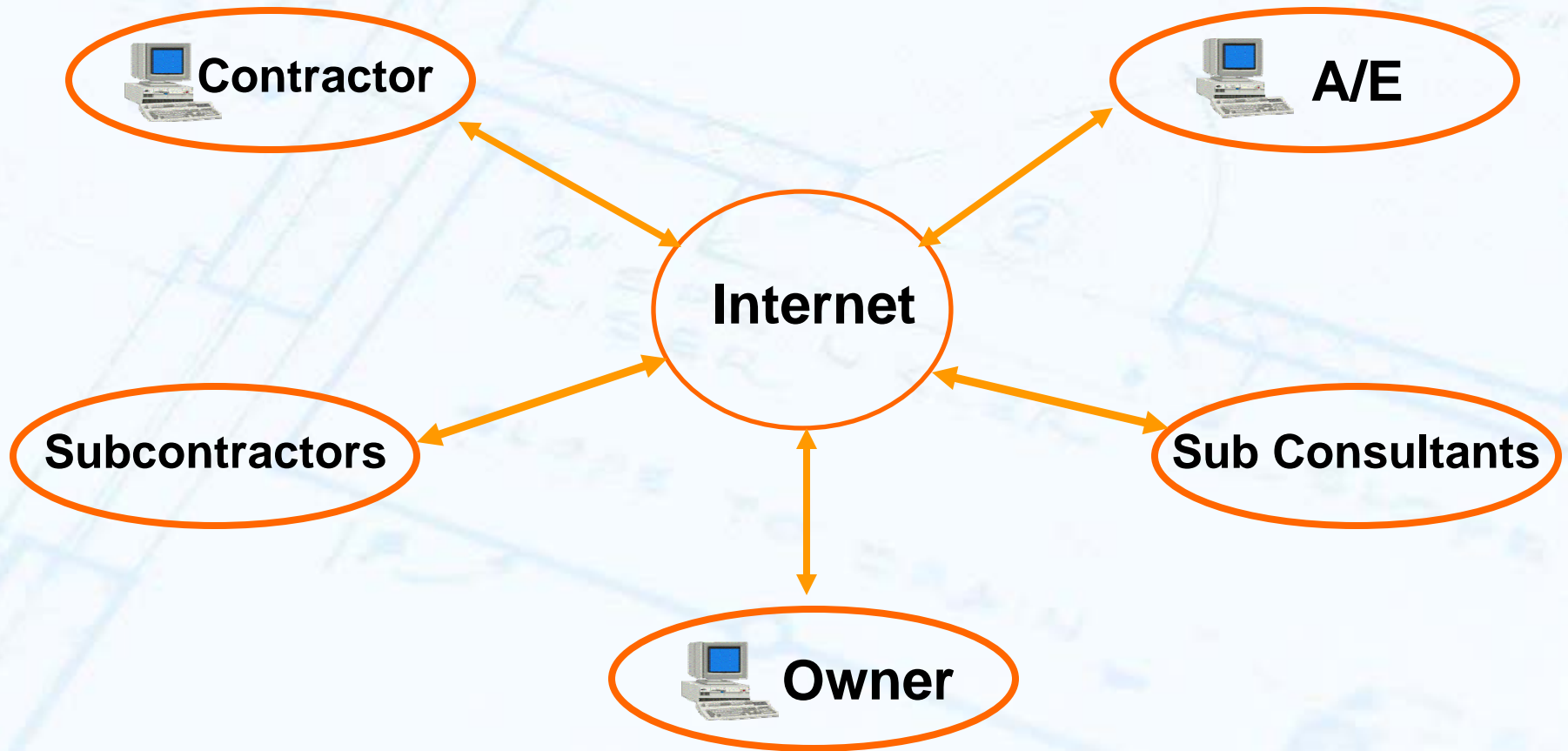
FNManager



Traditional "Paper Trail" Management



Web-based "Paperless" Management



Document Control

Prolog WebSite - Version 6.00 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address http://localhost/pmwebsite6/main.asp

Projects Log off Print PROLOG WEBSITE v.6 Help About

Downtown Medical Center

Project My Action Items Design Documents Project Documents Collaboration

RFI (Own) RFI (All) Meetings Submittal Register (Own) Add New Entry

2 For Review

Submittal Register (All) Punch List (Own) Punch List (All) Discussions Online Conferencing

Schedule Field Administration

Submittal Packages

Entry: 2 Of 2 List View << < > >>

For Review

Add Comments Respond Reviewers Items Link Update

Package Number (1st Part) 001

Package Number (2nd Part) 02150

Revision 0

Description Soldier beam layout

Is Closed No

Importance

Trade Shoring and Underpinning

Number	Revision	Description	Due Date	Notes	Is Closed	Action
00126	0	Plan help	9/10/1998		No	Approve
00127	0	Details	9/10/1998		No	Approve
00128	0	Sections	9/10/1998		No	

e-Manager - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address http://clients.freese.com/construction/FNManager/Submittals/index.asp?ShowItem=All

Welcome, John MyHome | Logout

Project: Central Texas College - Gymnasium Building Renovation

Project Information
Project Home
Project Details
Project Team
Project Calendar

Bid Management
Bid Information
Planholders
Bid Results

Construction Management
Documents
Submittals
Reports
Budget
Schedule
Photographs

Submittals - Log (All)

View Select Category

FN Doc Number	Contractor Ref No.	Spec Section	Description	Date In	Date Out	Days	Status
CO-001	CO-001-03		Change Order No. 1	2/17/2003	2/17/2003	0	Change Order Issued
CO-002	CO-002-03		Change Order No. 2	3/2/2003	3/3/2003	1	Change Order Issued
CO-003	CO-003-03		Pier Relocation	3/23/2003		9	Pending
PR-001	PR001-12		Pay Request	2/10/2003	2/14/2003	4	Approved
PR-002	PR002-01		Pay Request	3/3/2003	3/7/2003	4	Approved
PR-003	PR003-02		Pay Request No. 3	3/22/2003	3/24/2003	2	Filed As Received
RD-001	09905-1A	02220	Trench Safety Plan	3/10/2003	3/24/2003	14	Filed As Received
RD-002	07920-1A	07920	Joint Sealants	3/10/2003	3/14/2003	4	Filed As Received
RD-003	09260-1A	09260	Gypsum Board Assemblies	3/17/2003		15	Pending
RD-004	15083-1A	15083	Pipe Insulation	3/21/2003	3/24/2003	3	Filed As Received

Submittals 1 to 10 of 31

Drawings

FN Manager PRO Version 6.44.1 - Windows Internet Explorer

FNManager_{PRO}

FIELD TABLET TECHNOLOGY DEMO

Main Contact: Chris Jones, P.E. Phone: 817-735-7291

Folder: FIELD TABLET TECHNOLOGY DEMO\BID PHASE\Plans

View Folders Upload Files

Sort by: Filename (A-Z)

- 2-2960 Construction Plans.pdf
7/31/2007 11:13 AM
Dwain Brown
- GR-02.pdf
7/31/2007 11:13 AM
Dwain Brown
- PV-02.pdf
7/31/2007 11:13 AM
Dwain Brown

19

Informative Graphics

Matchline STA. 37+00 MATCHLINE STA. 47+00 MATCHLINE STA. 47+00 MATCHLINE STA. 57+00

Runway 16/34 Grading Plan

Runway 16/34 PAVEMENT REHABILITATION

TEXAS A&M UNIVERSITY SYSTEM
PROJECT NO. 2-2960
EASTERWOOD RUNWAY 16/34
PAVEMENT REHABILITATION

1 of 1

Please Check

Permit Reviews

- Review comments are recorded.
- Comments can be easily extracted for use in current comment tracking software.
- Digital permit stamps can be created.
- Final documents can be certified to eliminate tampering.

Bidding Process

Many consultants and governmental entities are moving to Web based systems for managing Bid Phase Services.

Drivers for Web Based Procurement Management

- Industry is moving to this type of service.
- Outsourcing this service takes advantage of developed technology.
- Reduced cost for bid phase management.
- Eliminates long term cost associated with developing / maintaining in-house systems.

Advantages

- Improved availability and low cost of documents increases bidder interest.
- Documents are readily available to those who want to view in digital format.
- Reduced printing / mailing cost.
- Rapid deployment of addenda.
- Information on planholders can be viewed in real time.

Advantages

- Get out of the printing business.
- No risk of overprinting and associated losses.
- No longer handling funds for plan sales.
- Ability to coordinate efforts from a single point of contract.
- Addenda distribution is instantaneous.

Advantages

- Planholders lists are available to everyone in real time.
- Reduces calls from Suppliers.
- Bid tabulations can be posted on line.
- Notification of award can be posted on line.
- No effort / money wasted on plan rooms.

Advantages for Contractors

- Can view documents without paying plan rooms.
- Do not have to purchase documents to see if they are interested in the project.
- Can download and distribute to suppliers digitally, reduced cost to bid.
- Can download bid forms and other documents for preparing a bid.

Advantages for Contractors

- Questions can be posted online.
- Addenda distribution is instantaneous.
- Receive email notification of any changes made in posted documents or questions.
- No lost time for distribution.
- Suppliers can determine if opportunities exist without calling contractors.

Construction Management

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Master Documents for Construction

- Maintain one master set of documents for construction on collaboration website.
- Use hyperlinks in master set to reference:
 - Addenda
 - Contract Modifications
 - Photographs
 - RFI
 - Details
 - As Built Markups



Record Documents

- Can be checked or addressed from anywhere with access to web server.
- Can be viewed remotely to see that these documents are maintained and up to date.
- Can be used when discussing field issues using “white boarding” features.



Questions?

