Developing, Implementing and Maintaining CAD and CAFM Standards

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Vice President

Bill Jordon
Director of Services

AMS
CAD + CAFM SOLUTIONS

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Background

AMS CAD + CAFM Solutions

Founded 1987
Autodesk Reseller / Training Center / Developer
FM:Systems Certified Business Partner

Project Experience

International CAFM Implementation
CAFM Software Consolidation
CAFM System Verification

Dan & Bill

Dan Lorenz - Vice President
15+ Years AutoCAD Manager/Trainer/Developer
6 Years Implementing CAFM Solutions
Expertise in Reporting Writing (CR, MSRS, COGNOS)

Bill Jordon - Director of Services
27 years Facilities Management Experience
20 years AutoCAD Manager/Trainer
12+ Years Implementing Multiple CAFM Solutions
**Scope**

- **What we are covering**
  - CAD & CAFM Standards related to Facilities Management
  - Benefits & cost savings
  - Available resources
  - How best to implement
  - Examples
  - Maintaining standards moving forward

- **What we are not covering**
  - Detailed CAD Standards
  - Details of the differences between space measurement standards (IFMA, BOMA)
  - Details on International Standards
  - What’s right and wrong or better
Why implement CAD/ CAFM Standards?

• Benefits
  - Uniformity
    • Branding (everything looks the same)
      - Drawings
      - Reports
    • Agreement at all levels
      - Director of Facilities
      - CAFM Administrator
  - Promotes teamwork
    - All levels bring value to the table
    - Goals are identified at higher levels
    - Issues raised at lower levels
Why implement CAD/ CAFM Standards?

• Benefits
  – Justification
    • Accuracy of data
      – Area Calculations
      – Headcount & Vacancies
    • Terminology
      – What does “usable area” mean?
      – What’s the difference between primary and secondary circulation and more importantly, why do I care?
  • Calculation Methods
    – Rentable area
    – Chargebacks
Why implement CAD/ CAFM Standards?

- **Benefits**
  - Cost Savings
    - More Productive (less questions, less interruptions)
      - Hand-off (anyone can continue the work)
      - Reports Writing
    - Less CAD Rework
      - Standards to supplying vendor
  - Quicker Project Completion
    - CAD Turnaround Time
      - Floor plan changes
      - Polylining
  - Reduced Lag Time
    - Drawings from supplying vendor are ready to go.
    - “Clean Up” period is eliminated
    - Transferring from one to another is immediate
Developing Standards

“The nicest thing about standards is that there are so many of them to choose from.”

Ken Olsen, founder of Digital Equipment Corp., 1977
Developing - Where do you start?

• The “Plan”
  – Get buy-in and visibility
  – Assemble a team
  – Establish goals
  – Meet
  – Assign tasks
  – Draft
  – Review
  – Approve
  – Implement
Where do you start?

• Get buy-in and visibility
  – Get upper-management involved
  – Must have enforcement power & support
  – Identify benefits
  – Ensure recognition
Where do you start?

• Assemble a Team
  – Facilities personnel
    • Operations
    • Planning
    • Management
    • Other Groups (Research)
  – Real Estate/Finance
  – CAD/Engineering
    • Internal groups
    • External primary vendor
  – Include upper-management
    • At minimum, for approval step
  – Assign a good leader
    • Open to ideas
    • Encourage teamwork
    • Maintain progress
Where do you start?

• Establish Goals
  – Short Term
    • Often Initiative-Driven
      – Chargebacks
      – Headcount
      – Forecasting & Planning
    • Foundation Standards
      – Space Measurement
      – Real Estate Terms & Definitions
      – Space Classification
      – Space Allocation
Poll - Where are your priorities?

• Which goal are you **most** interested in achieving by implementing standards?
  – Better Visibility into Real Estate Portfolio
  – Department Allocation/Chargebacks
  – Headcount & Vacancies
  – Forecasting & Planning
  – Better Reporting
Where do you start?

• Establish Goals
  – Long Term
    • Technical
      – CAD
      – CAFM
    • Processes
      – Moves/Adds/Changes (MAC)
        » Move Management
        » Project Relocations
        » Onboarding & Offboarding
      – Maintenance Requests
    • Fill in the gaps
      – Space Standards/Entitlement
      – Occupancy & Vacancy
Get Going!

• Meet
  – Weekly or bi-weekly
  – Meeting agenda
  – Meeting minutes
  – No ideas are dismissed

• Assign tasks
  – Involve everyone
  – Outlined in minutes

• Draft Deliverables
  • Documentation
  • Media
    – Manual
      » Word
      » Excel
    – Graphic
      » Visio
      » AutoCAD
    – Web-based
      » Intranet
What do you need?

• CAD Standards
  - Floor Plans/Xrefs
  - Layering Standards
  - File Naming Conventions
  - Drawing Set Organization
    - Discipline Designators
    - Sheet Numbering
  - Sheet Organization
    - Drawing Identification
  - Title Block Standards
  - Drafting Conventions
  - Terms & Abbreviations
  - Symbols
  - Annotations
    - Text Styles
    - Dimension Standards
  - Code Conventions
  - Plotting Standards
    - Lineweight Standards
    - Color Standards

• CAFM Standards
  - Real Estate Terms & Definitions
  - Space Measurement
  - Layering Standards
  - Space Types/Classification
  - Space Standards/Entitlement
  - Space Allocation
    - Building Code Conventions
    - Floor Code Conventions
  - Room Numbering Conventions
  - Reporting Conventions
  - Benchmarking Conventions
  - Business Process Procedures
  - Reports

• General Standards
  - File Transfer Procedures
  - Network File / Folder Structure
  - Network Folder Organization
  - Project/Team Rooms
  - Project Files
  - Processes
What resources are available?

- American Institute of Architects (AIA)
- International Facilities Management Association (IFMA)
- Building Owners Management Association (BOMA)
- Open Standards Consortium for Real Estate, Inc., (OSCRE)
- Enterprise Real estate Network of International Engineers (ERNIE)
What standards are available already?

- National CAD Standards
- AIA Layering Guidelines
- BOMA Standard Measurement for Measuring Floor Area
- IFMA ASTM Standard Classification for Building Floor Area Measurements
- Unified Approach to Measuring Office Space (IFMA/BOMA Collaborative)
What else can I use?

- The Internet
- Your peers
  - Chapter meetings
  - Industry events
    - AUGI / AU
    - NFM&T / World Workplace
- Consultants
  - Planning
  - CAFM Implementers/Vendors
  - Trusted Advisors
- Don’t be afraid to be ignorant
CAD Standards to Consider

- Floor Plans/Xrefs
- Layering Standards
- File Naming Conventions
- Drawing Set Organization
  - Discipline Designators
  - Sheet Numbering
- Sheet Organization
  - Drawing Identification
  - Title Block Standards
- Drafting Conventions
- Terms & Abbreviations
- Symbols (Assets)
- Annotations
  - Text Styles
  - Dimension Standards
- Code Conventions
- Plotting Standards
  - Lineweight Standards
  - Color Standards
CAD Standards - Examples

<table>
<thead>
<tr>
<th>Layer Name</th>
<th>Description</th>
<th>CAFM Color</th>
<th>CAFM Linetype</th>
<th>Plot?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-AREA</td>
<td>Polyline Boundaries for Space</td>
<td>Magenta</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td>A-AREA-ANNO</td>
<td>Annotation of any CAFM field</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
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<tr>
<td>A-AREA-EXTR</td>
<td>Exterior Gross Area Labels and the</td>
<td>Polyline</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>L1 Space Polyline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-AREA-IDEN</td>
<td>Room Identifier</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
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<tr>
<td>A-AREA-INTR</td>
<td>Interior Gross Area Labels and the</td>
<td>Polyline</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>L1 Space Polyline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-AREA-L2</td>
<td>Polylines for L2 Space</td>
<td>Orange/30</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td>A-AREA-L3</td>
<td>Polylines for L3 Space</td>
<td>Green</td>
<td>Continuous</td>
<td>No</td>
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<tr>
<td>A-AREA-L4</td>
<td>Polylines for L4 Space</td>
<td>Magenta</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td>A-AREA-L4PC</td>
<td>Polylines for - Primary Circulation/</td>
<td>Blue</td>
<td>Continuous</td>
<td>No</td>
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<tr>
<td></td>
<td>Main Hallways, To &amp; From Egressions</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A-AREA-L4SC</td>
<td>Polylines for - Secondary Circulation Routes with specific names / No's.</td>
<td>Brown/42</td>
<td>Continuous</td>
<td>No</td>
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<tr>
<td>A-AREA-LABL</td>
<td>Floor Label</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
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<tr>
<td>A-AREA-MVGR</td>
<td>Future Org ID Hatching</td>
<td>Varies</td>
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<td>Future Org ID Rollup Hatching</td>
<td>Varies</td>
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<tr>
<td>A-AREA-NOTES</td>
<td>Floor Plan Notes</td>
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<td>Continuous</td>
<td>Yes</td>
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<tr>
<td>A-AREA-PATT</td>
<td>Org ID Hatching</td>
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<td>Continuous</td>
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<tr>
<td>A-AREA-QURY</td>
<td>Space Query Hatching</td>
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<td>Continuous</td>
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<td>A-AREA-TYPE</td>
<td>Space Type Hatching</td>
<td>Varies</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-BORD</td>
<td>Title Block/Border</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
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<tr>
<td>A-BORD-IMG</td>
<td>Logo or Graphics</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-BORD-KEY</td>
<td>Key plan</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
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<tr>
<td>A-BORD-SYM</td>
<td>North Arrow</td>
<td>White</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-DOOR</td>
<td>Doors</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-EQPM</td>
<td>Equipment (fixed on a wall)</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-EQPM-LAB</td>
<td>Equipment: Lab (i.e. freezers)</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-EQPM-TEXT</td>
<td>Equipment: Text</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-FLOR-CASE</td>
<td>Floor: Casework (fixed)</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-FLOR-COVR</td>
<td>Floor Covering</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-FLOR-CTOP-SHLF</td>
<td>Floor: Casework, countertop</td>
<td>8 Dashed</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>A-FLOR-EVTR</td>
<td>Floor: Elevator cars and equipment</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-FLOR-HRAL</td>
<td>Floor: Handrails, guard rails</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-FLOR-LEVL</td>
<td>Floor: Level changes, ramps</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>A-FLOR-STRS</td>
<td>Floor: Stair treads, escalators</td>
<td>8</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
</tbody>
</table>
CAFM Standards to Consider

- Real Estate Terms & Definitions
- Space Measurement
- Layering Standards
- Space Types/Classification
- Space Standards/Entitlement
- Space Allocation
- Building Code Conventions
- Floor Code Conventions
- Room Numbering Conventions
- Forms
- Reporting Conventions
- Benchmarking Conventions
- Business Process Procedures
- Reports
CAFM Examples

Space Type Standards - Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignable</td>
<td>Space that is always to be assigned an organization ID</td>
</tr>
<tr>
<td>Floor Common</td>
<td>Space that is not usable, but is prorated to occupants on the floor</td>
</tr>
<tr>
<td>Floor Usable</td>
<td>Usable space that is prorated to occupants on the floor</td>
</tr>
<tr>
<td>Building Common</td>
<td>Space that is not usable, but is prorated to occupants in the whole building</td>
</tr>
<tr>
<td>Building Usable</td>
<td>Usable space that is prorated to occupants in the whole building</td>
</tr>
<tr>
<td>Site Common</td>
<td>Space that is prorated to occupants across the campus/site</td>
</tr>
<tr>
<td>Not Allocated</td>
<td>Space that does not get allocated</td>
</tr>
</tbody>
</table>

Prefixes

- C: Under Construction
- P: Personnel
- S: Support for a Division
- SF: Support for Floor
- SB: Support for Building
- SS: Support for Site
- L: Lab
- M: Manufacturing/Engineering
- V: Vivarium
- X: Non-occupiable

Code

- L1: Interior Wall
- L2: Vertical Penetration
- L3: Building Service
- L4: Workspace (Room)

Real Estate Measurement Standards
CAFM Example – Space Measurement

CAFM Space Measurement Standards

Room Area Polyline shall be drawn to the centerline of the walls around the space. However, if a Room Area is adjacent to an Exterior Wall, Vertical Penetration, Building Service Area or Primary Circulation, then only the portion of the polyline that is adjacent to these areas shall be drawn to the inside face of the Room Area Wall. If the Room Area is adjacent to another Room Area, Workstation or Secondary Circulation, then the polyline shall be drawn to the centerline of the walls between the spaces.

Workstations shall be polyline to the centerline of the panels around the space. Any tagged circulation spaces that are adjacent to Workstations shall also be drawn to the centerline of the panels between these spaces.
## CAFM Example - Space Classification

### CAFM Space Type Standards

<table>
<thead>
<tr>
<th>Space Type</th>
<th>Description</th>
<th>Proration</th>
<th>Space Sub Class</th>
<th>Space Class</th>
<th>Color</th>
<th>Polyl ine Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-OFFC</td>
<td>Construction/Renovation Office</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
<td>131</td>
<td>L4</td>
</tr>
<tr>
<td>C-WKS</td>
<td>Construction/Renovation Workstation</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
<td>131</td>
<td>L4</td>
</tr>
<tr>
<td>L-BENCH</td>
<td>Lab Bench</td>
<td>Assignable</td>
<td>Lab</td>
<td>Lab</td>
<td>31</td>
<td>L4</td>
</tr>
<tr>
<td>L-CHEM</td>
<td>Chemical Storage</td>
<td>Assignable</td>
<td>Building Support</td>
<td>Building Support</td>
<td>21</td>
<td>L4</td>
</tr>
<tr>
<td>L-CHILL</td>
<td>Chill Room</td>
<td>Assignable</td>
<td>Lab Support</td>
<td>Lab Support</td>
<td>21</td>
<td>L4</td>
</tr>
<tr>
<td>L-COLD</td>
<td>Cold Room</td>
<td>Assignable</td>
<td>Lab Support</td>
<td>Lab Support</td>
<td>21</td>
<td>L4</td>
</tr>
<tr>
<td>L-EHS</td>
<td>Environmental Health &amp; Safety Space</td>
<td>Assignable</td>
<td>Building Support</td>
<td>Building Support</td>
<td>21</td>
<td>L4</td>
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<tr>
<td>L-LAB</td>
<td>Laboratory Space</td>
<td>Assignable</td>
<td>Lab</td>
<td>Lab</td>
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<tr>
<td>L-OFFC</td>
<td>Lab Office</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
<td>131</td>
<td>L4</td>
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<tr>
<td>L-SUPT</td>
<td>Lab Support Space</td>
<td>Assignable</td>
<td>Lab Support</td>
<td>Lab Support</td>
<td>21</td>
<td>L4</td>
</tr>
<tr>
<td>L-WKS</td>
<td>Lab Workstation</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
<td>131</td>
<td>L4</td>
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<tr>
<td>L-WSTHZ</td>
<td>Hazardous Waste Storage</td>
<td>Assignable</td>
<td>Building Support</td>
<td>Building Support</td>
<td>21</td>
<td>L4</td>
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<tr>
<td>L-WSTRA</td>
<td>Radioactive Waste Storage</td>
<td>Assignable</td>
<td>Building Support</td>
<td>Building Support</td>
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<td>L4</td>
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<tr>
<td>M-SUPP</td>
<td>Manufacturing Support Room/Area</td>
<td>Assignable</td>
<td>Process Support</td>
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<td>181</td>
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<tr>
<td>M-PROD</td>
<td>Production Room/Area</td>
<td>Assignable</td>
<td>Process</td>
<td>Process</td>
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<td>L4</td>
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<tr>
<td>P-OFFC</td>
<td>Office</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
<td>131</td>
<td>L4</td>
</tr>
<tr>
<td>P-WKS</td>
<td>Workstation</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
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<td>L4</td>
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<tr>
<td>P-WRKRM</td>
<td>Personnel Work Room/Area</td>
<td>Assignable</td>
<td>Office</td>
<td>Office</td>
<td>131</td>
<td>L4</td>
</tr>
<tr>
<td>S-BRKRM</td>
<td>Private Break Room/Coffee Area</td>
<td>Assignable</td>
<td>Office Support</td>
<td>Office</td>
<td>151</td>
<td>L4</td>
</tr>
<tr>
<td>S-COMPTR</td>
<td>Private Computer Room</td>
<td>Assignable</td>
<td>Office Support</td>
<td>Office</td>
<td>151</td>
<td>L4</td>
</tr>
<tr>
<td>S-CONF</td>
<td>Private Conference Room</td>
<td>Assignable</td>
<td>Office Support</td>
<td>Office</td>
<td>151</td>
<td>L4</td>
</tr>
<tr>
<td>S-COPY</td>
<td>Private Copy/Fax Room</td>
<td>Assignable</td>
<td>Office Support</td>
<td>Office</td>
<td>151</td>
<td>L4</td>
</tr>
<tr>
<td>S-FILE</td>
<td>Private File/Media Room or Area</td>
<td>Assignable</td>
<td>Office Support</td>
<td>Office</td>
<td>151</td>
<td>L4</td>
</tr>
</tbody>
</table>
General Standards to Consider

- File Transfer Procedures
- Network File / Folder Structure
- Network Folder Organization
- Project/Team Rooms
- Project Files
- Processes
Finalizing

• Review & Approve
  – Review draft documents
  – Revise
    • Encourage challenging standards
    • “What if?” scenarios and the 5%
    • Don’t leave open items
  – Approve
    • Require signature acceptance
    • More than one party
    • Must include upper management
Implementing

“Nothing is particularly hard if you divide it into small parts. “

- Henry Ford
Implementing

• Centralize Documentation
  • Make easily available to all
    • Printed
    • Team Room
    • Intranet
    • Identify training requirements

• Update Systems
  • CAD System
  • CAFM System

• Involve Vendors
  • CAD Standards
  • Deliverables
  • Reporting
  • Terminology
  • Formatting

• Track Changes
  • Before and after numbers
  • Recurring Reports
  • Snapshots of data
Maintaining

- Your Standards are a living, breathing document.
- Establish Change Control Procedures, and use them.
- If something doesn’t work, fix it immediately.
- Create Mandatory Periods of Reassessment and Review.
- Create and include a schedule of changes in Standards Manuals.
- Include a Revision Number on Cover Page and Manual name.
- Add missing standards as needed (as they present themselves).

“…no one can say what is good or bad, although you can be sure that everyone will.”

John Kenneth Galbraith (1908 - 2006)
Realize the Value

• **Time**
  - Help eliminate the guesswork
  - Minimize time spent creating reports
  - Less time implementing vendor changes in CAD

• **Visibility**
  - Truer picture of your space (before & after comparison)
  - Calculations are consistent
  - Detailed department space reports help clean up data

• **Strong Foundation**
  - Positioned to defend numbers
  - Positioned to perform strategic facilities planning
  - Be the true “gold source” of space information
AMS Best Practices

• Documented Standards
  TOC
  Introduction
  General Standards
  CAD Standards
  CAFM Standards (if applicable)
  Appendices (as required)

Printed Version
Electronic Version
On-line Version

• Support
  Ongoing Consulting
  Standards Updates
  Procedure Updates
  Documentation Updates
Contact Info:

Thank You for Your Time.