

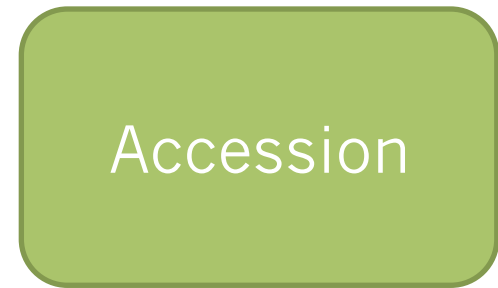
**This is ~~not~~ a test:  
Preserving AutoCAD Files  
at  
The  
University of Montana**

Sam Meister  
Maureen and Mike Mansfield Library

Digital Preservation Interest Group  
ALA Midwinter 2013

January 27, 2013

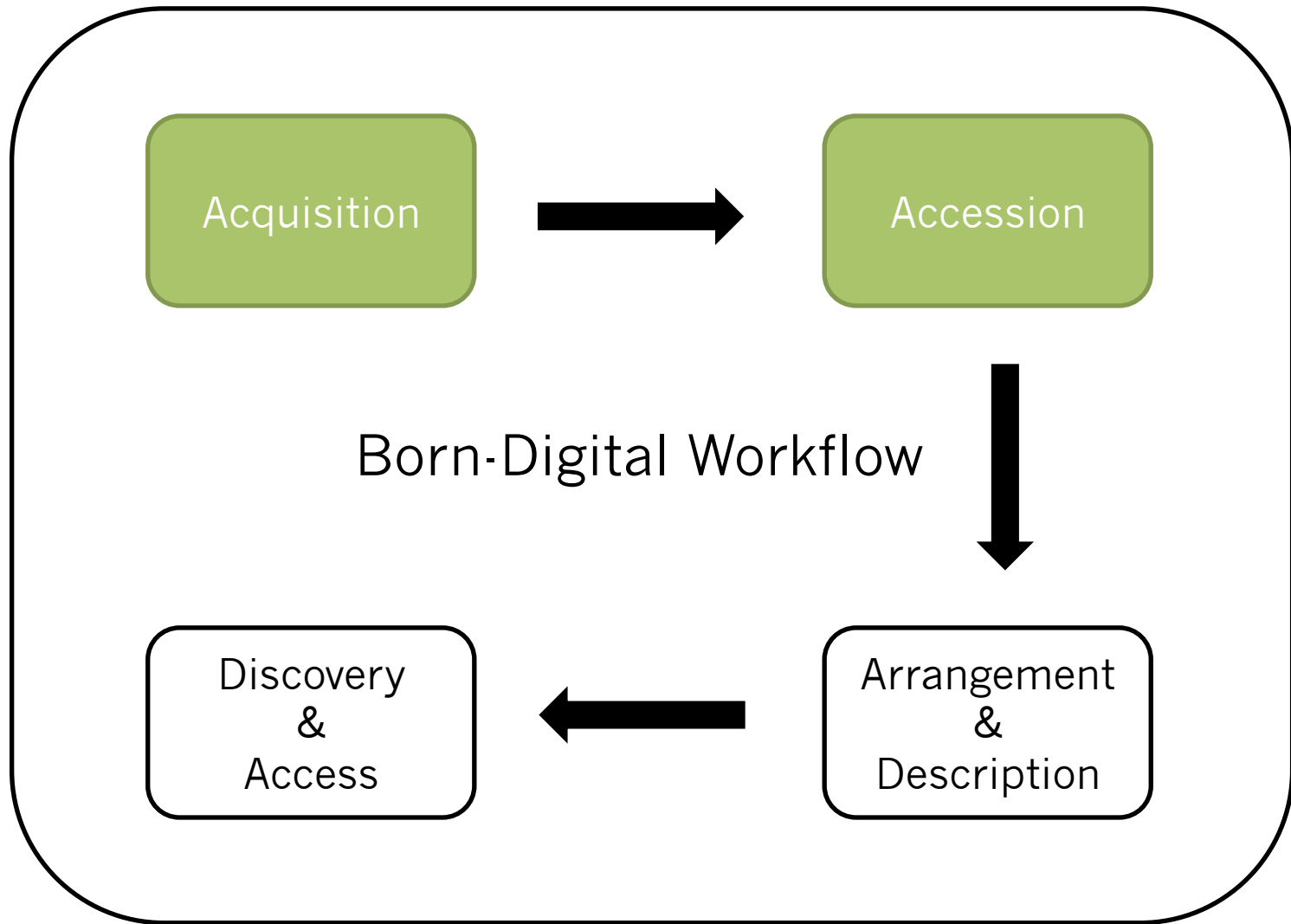
**Context**



Born-Digital Workflow



# Digital Preservation

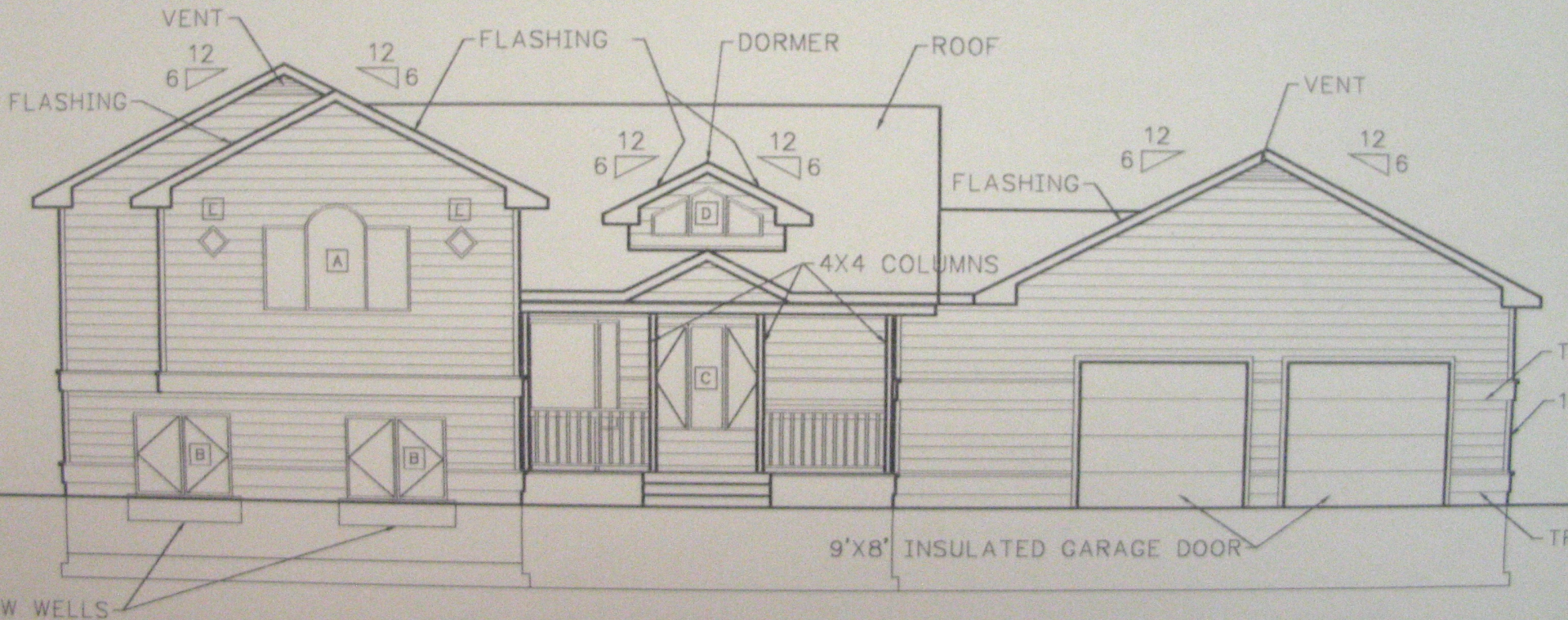


Program



# SOUTH ELEVATION

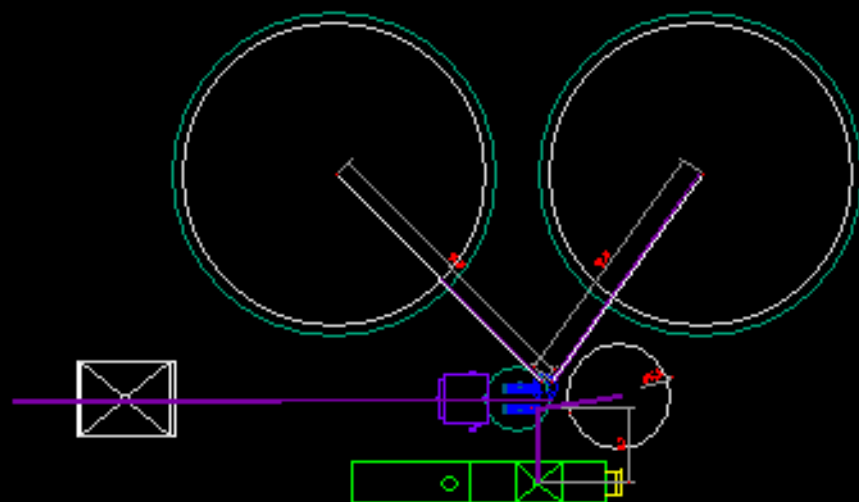
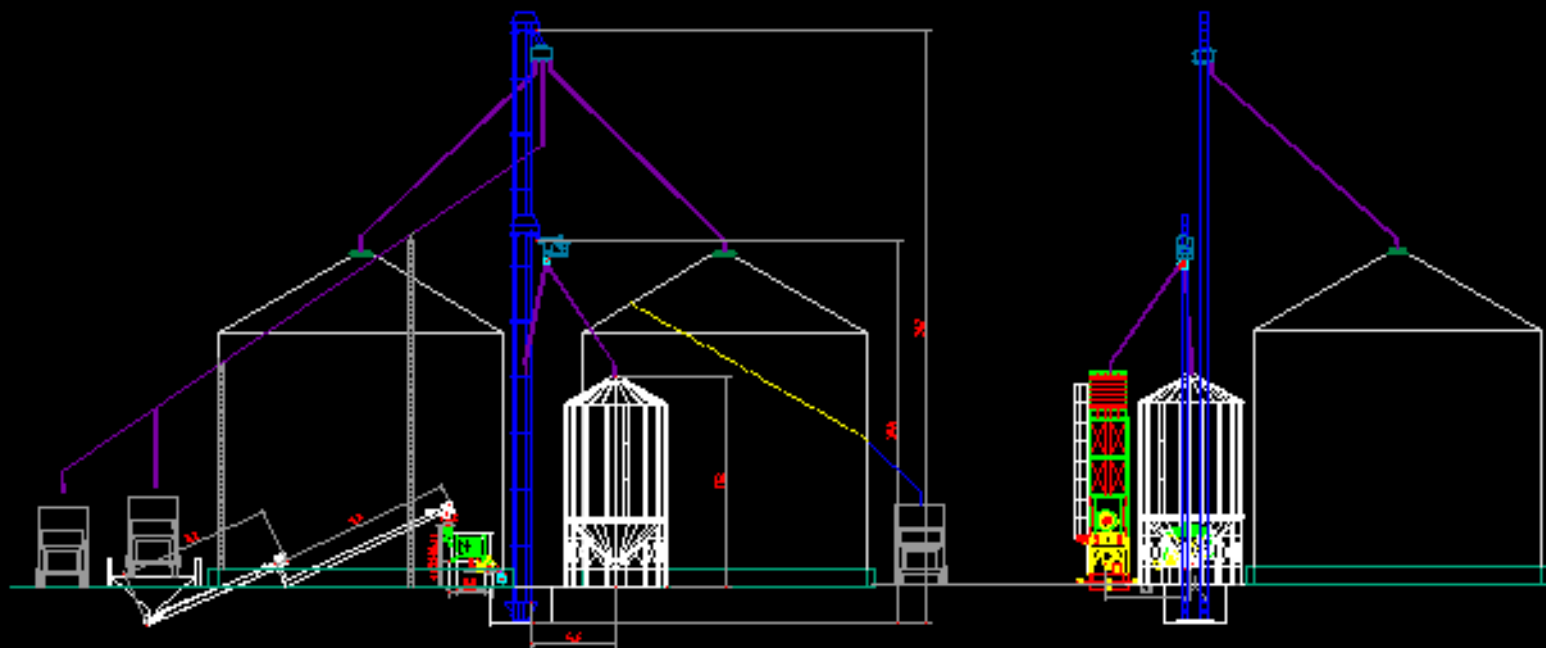
SCALE:  $1/8" = 1'-0"$



# NORTH ELEVATION

SCALE:  $1/8" = 1'-0"$





# Acquisition Process

Donor Survey



Feasibility Assessment



Transfer Agreement

**Donor Survey**  
**Sam Meister**  
**08/16/12**

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**Date: 09/07/12**  
**Donor Name: Joe Crabtree – Art & Architecture Studio**  
**Location: Donor's Residence – Missoula, MT**  
**Accession #: 2012-061**

### **Creation**

Are you the only creator of your digital files? (e.g. does your collection contain email, documents, or other materials produced by others?)

Crabtree ~~Leigland~~ Arch. / Art & Architecture Studio / Crabtree Architecture

If not, who else is involved and what are their roles?

What are the earliest dates of file creation?

1996

What are the latest dates of file creation?

2011



## Feasibility Assessment

Do we have resources to feasibly acquire, preserve,  
and provide access to the digital materials?

**YES\***

Size of collection (~1.4 GB)

**Opportunity to explore preservation strategies for  
complex digital objects**

# Accession Process

Disk Image Donor Hard  
Drive



Package Disk Image and  
Documentation



Transfer to Secure Storage





Barracuda 7200.7

80 Gbytes

Model Number: ST380013AS

Serial Number: 3JVBWDF

P/N: 9W2812-033

HDA P/N: 100316772

Configuration: A9W-01

Firmware: 8.05

Date Code: 05051

Site Code: AMK

Caution. Product warranty is void if any seal or label is removed, or if the drive experiences shock in excess of 350 Gs.

This drive is manufactured by Seagate for OEM distribution. For product information or technical support, please contact your system OEM.

SG-0W3004-12536-47V-YWDF

Rev A00

Made in Singapore

HDD S/N 3JVBWDF

SATA Signal

Power

Signal

Power

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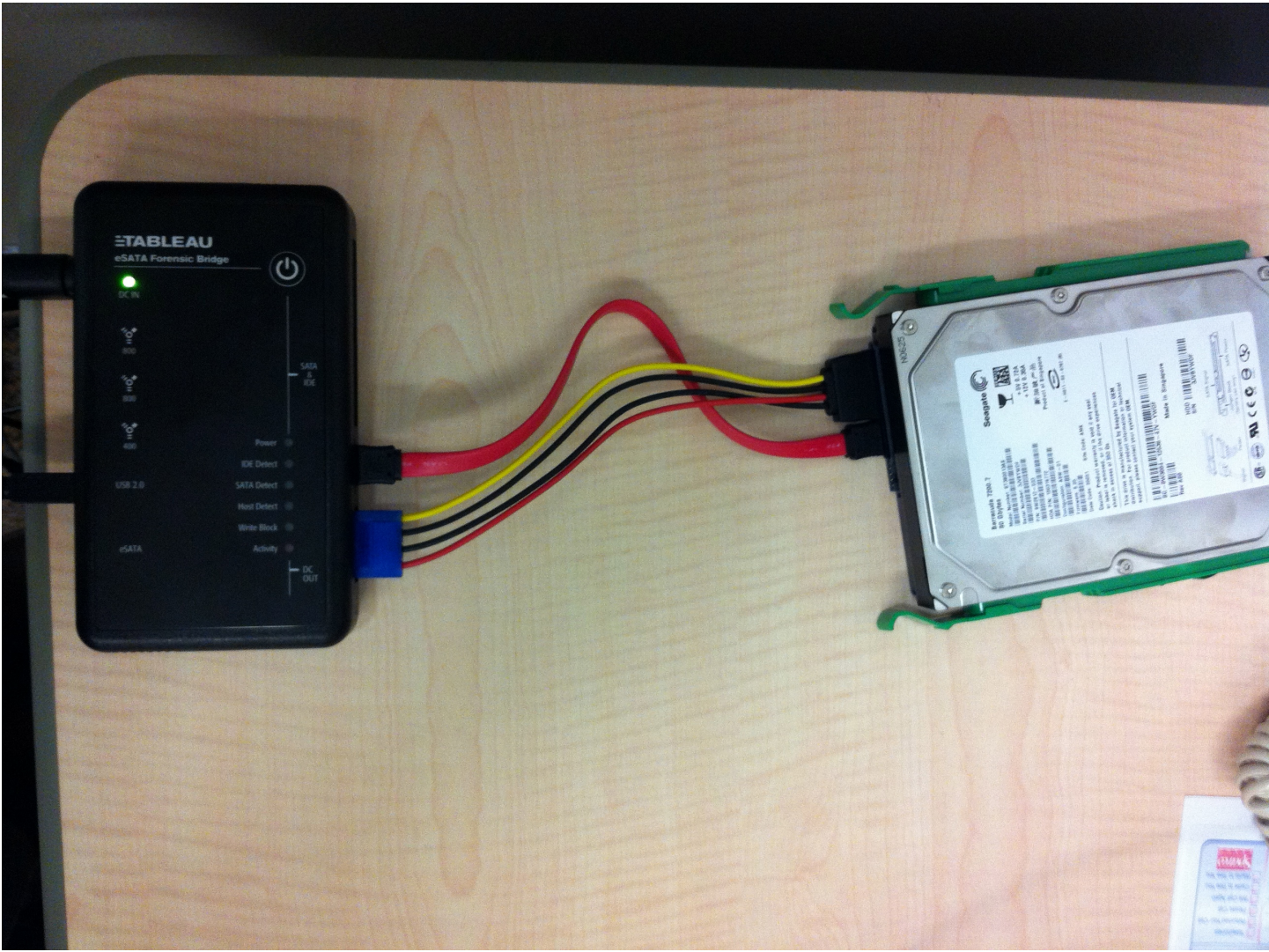
Power

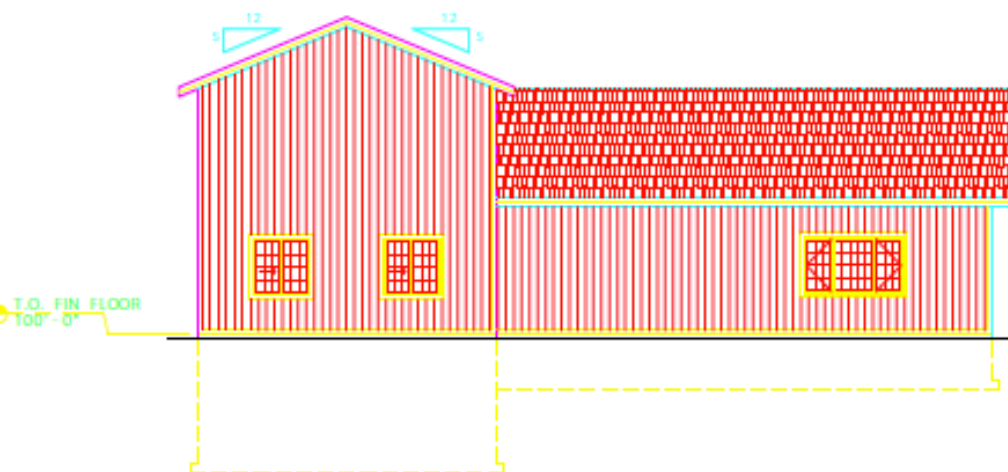
Signal

Power

Signal

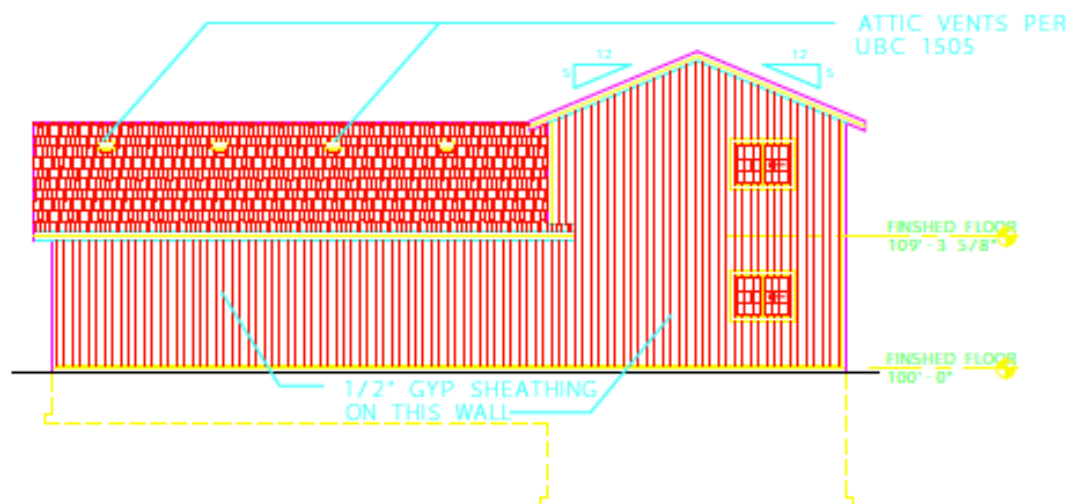






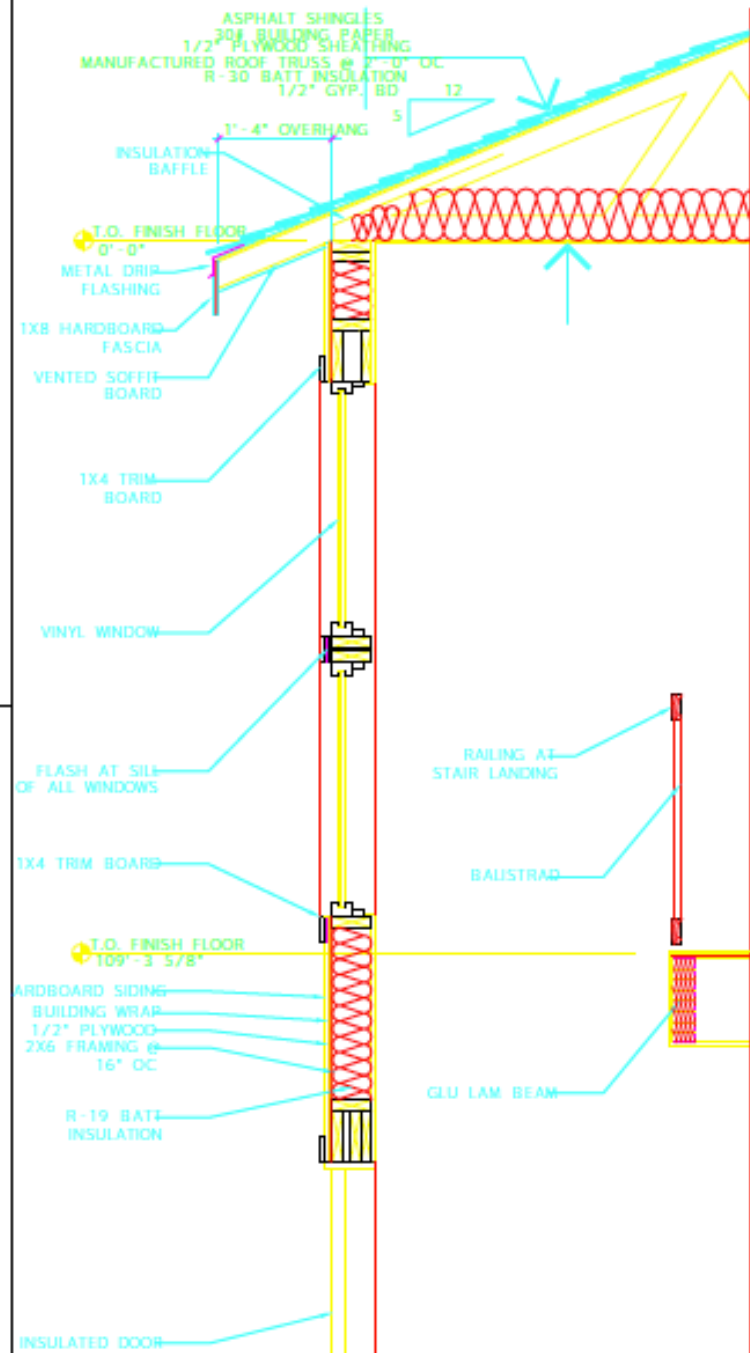
## EXTERIOR ELEVATION

SCALE: 1/8"=1'-0"



## EXTERIOR ELEVATION

SCALE: 1/8"=1'-0"





# AutoCAD Drawings - Characteristics

Proprietary

Undocumented\*

2D drawings

3D models (simple)

# AutoCAD Drawings - Formats

**.dwg**

Drawing

- Vector file
- Interoperable with other major CAD software

**.dwf**

Design Web Format

- Web-specific export for viewing files over the internet

**.dxf**

Drawing Interchange Format

- ASCII file
- Primary format for interoperability and exchange

**Best Practices**

**Standards**

**Recommendations**

# FACADE

Future-proofing Architectural  
Computer-Aided Design  
MIT Libraries  
2006-2009

# FACADE

## **CAD is Problematic**

Highly volatile

Relies on proprietary mathematical algorithms

Packaged in complex, proprietary, rapidly evolving software products

Software is expensive, encrypted, and quickly obsolete



# FACADE – Recommendations

Preservation Strategy



Generate derivative versions  
with greater long-term preservation potential  
than native formats

# FACADE – Recommendations

**Original** = originally submitted version of CAD model

**Display** = easily viewable format for presentation  
(3D PDF)

**Standard** = Full representation in preservable standard  
format  
(IFC, STEP)

**Dessicated** = Simple geometry in preservable standard  
Format  
(IGES)

**IFC ?**

**STEP ?**

**IGES ?**

IFC = Industry Foundation Classes

STEP = Standard for Exchange of Product  
Model Data

IGES = Initial Graphics Exchange  
Specification

# FACADE – Recommendations

## **AutoCAD Files**

Original = AutoCAD DWG

Display = DWF, PDF

Standard = DWF

Dessicated = IGES



# FACADE – Recommendations

Emulation is “a viable *technical* approach for preserving modern CAD software and data, but the issue of legal access to the software via license keys is a significant barrier”

Digital Archive for Architecture System  
(DAArch)  
Art Institute Chicago  
2003 – 2007

# DAArch – Recommendations

Preservation Strategy



1. Bit-stream preservation of native CAD files
2. Generate derivative PDF / TIFF files

3ds Max (.max)  
 ABVENT Art-lantis (.atl)  
 AccuRender (.dwg)  
 Adobe Acrobat (.pdf)  
 Adobe Acrobat Distiller (.ps)  
 Adobe After Effects  
 Adobe Illustrator (.ai)  
 Adobe InDesign (.indd)  
 Adobe PageMaker (.pmd)  
 Adobe Photoshop (.psd)  
 Adobe Premiere (.preproj)  
 Alias Power Animator  
 Alias Sketchbook Pro (.jpg, .tiff)  
 Alias Studio (.wire)  
 AlphaGraphics E-Z Pix (.jpg, .tiff)  
 ARCHIBUS (.dbf – Oracle database)  
 ARRS CAD  
 AutoCAD (.dwg, .dxf)  
 Autodesk Architectural Desktop (.dwg)  
 Autodesk Architectural Studio (.asw)  
 Autodesk Inventor (.idw, .ipt, .iam)  
 Autodesk MAP (.dwg)  
 Autodesk Revit (.rvt)  
 Autodesk VIZ (.max)  
 Camtasia Recorder (.avi)  
 CorelDRAW (.cdr)  
 DESTINI V1.0  
 DOE-2  
 Electric Image Universe  
 Filemaker (.fmp, .fpt)  
 formZ (.fuz)  
 Graphisoft ArchiCAD (.pln)  
 Graphite (.vc6)  
 Lightwave 3D (.lw, .lwo, .lws)  
 Macromedia Director (.dir, .dcr)  
 Macromedia Flash (.fla, .swf)  
 Macromedia Freehand (.flh10)  
 Maya (.ma, .mb)  
 Media 100 (.mov)  
 Microsoft Access (.mdb)  
 Microsoft Excel (.xls)  
 Microsoft PowerPoint (.ppt)  
 Microsoft Word (.doc)  
 MicroStation (.dgn)  
 MicroStation TriForma (.dgn)  
 Nematech Allplan (.000)  
 NoGraf (.bdf)  
 Pro/Engineer (.asm, .prt)  
 QuarkXPress (.qxd)  
 Rhinoceros (.3dm)  
 SketchUp (.skp)  
 Solidworks (.slddrw, .sldprt, .sldasm)  
 Surfware SURFCAM (.dsn)  
 VectorWorks (.mxd)

**.pdf**  
**.tif**

**First Tier**

**Second Tier**

AHDS Preservation Handbook  
Computer Aided Design  
2005



# AHDS – Recommendations

Suitable Preservation Formats:

DXF  
IGES  
STEP

# Digital Preservation Coalition Workshop

## Designed to Last: Preserving Computer Aided Design 2010

Participants:

Royal Commission on the Ancient and Historical  
Monuments of Scotland

Oxford Archaeology

Archaeology Data Service, University of York

DCC/UKOLN University of Bath

# DPC Workshop – Recommendations

We need an open preservation format standard

# **FUTURE:**

DPC Technology Watch Paper  
Computer Aided Design  
Alex Ball  
2013

Smithsonian Institution Archives  
2010-2011

# Digital Dilemma: Preserving Computer Aided Design (CAD) Files

by Greg Palumbo, Electronic Records Intern on December 1, 2011



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As the record keepers of the Smithsonian's past, our responsibilities include archiving information relating to the construction of Smithsonian museums themselves, and other building projects throughout the institution. Architectural plans for these jobs are primarily composed digitally using Computer Aided Design, or CAD, software. These born digital materials are eventually transferred to the Archives where the [Digital Services Division](#) is working on preserving them for long term use.

The Archives receives the majority of its CAD files in accessions from the Smithsonian's Office of Facilities, Engineering, and Operations (OFEO). OFEO is in charge of building, operating, and maintaining all the Smithsonian facilities.



# Smithsonian – Recommendations

Convert 2D drawings to PDF/E

# Recommendations

1. Keep original native formats
2. Generate PDF format
3. Generate industry standards-based neutral formats  
(IFC, IGES, STEP)



# Local Strategies

# Local Strategies

**MIGRATION**

---

**EMULATION**

**MIGRATION**

# MIGRATION

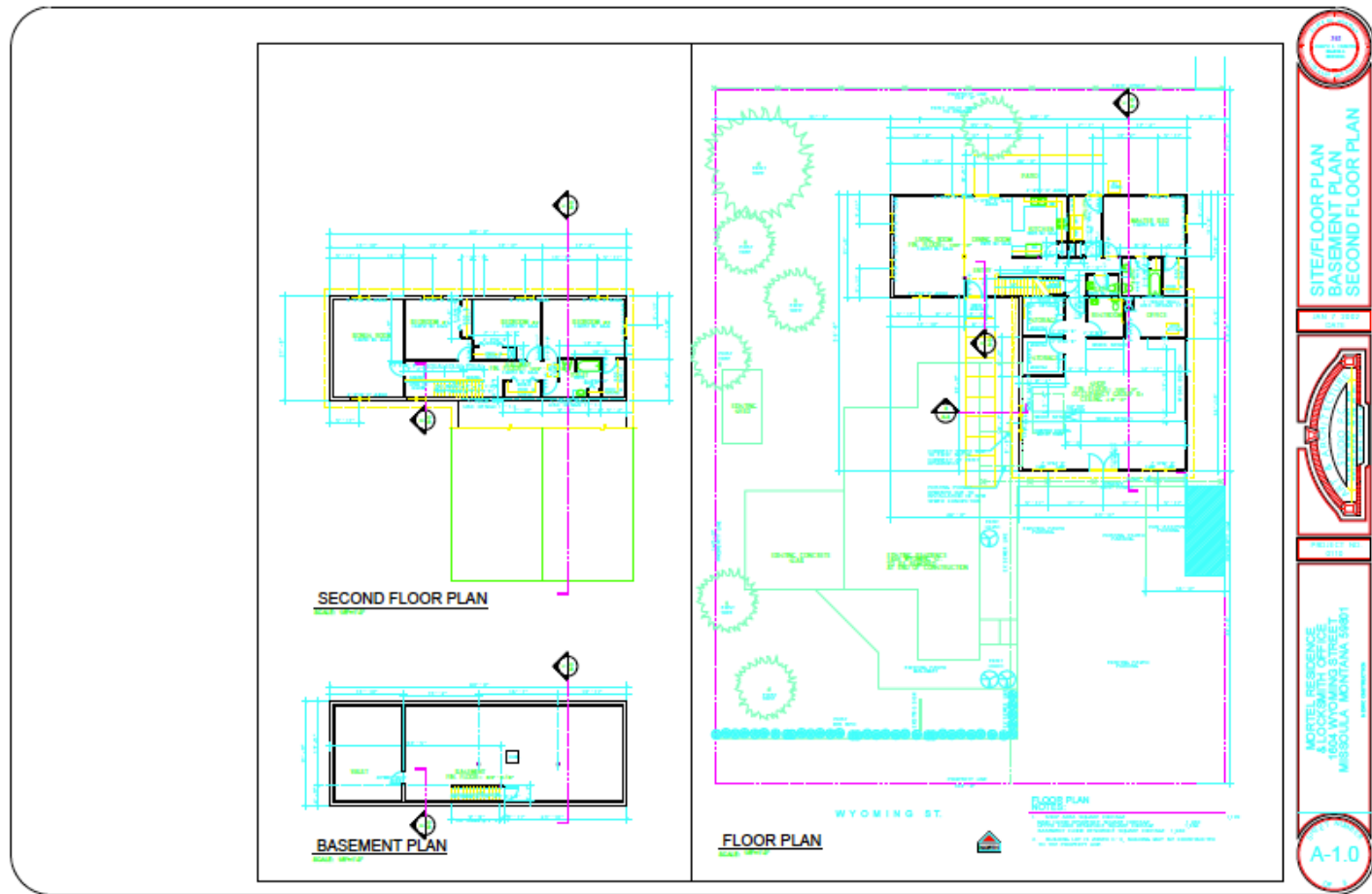


with Adobe Acrobat Pro

TESTED

## Layers

- ☒ 0
- ☒ AUDIT\_I\_02042215021
- ☒ v-port
- ☒ THIN
- ☒ SYMBOLS
- ☒ WALL
- ☒ SYM
- ☒ HEAVY
- ☒ EXISTING
- ☒ MEDIUM
- ☒ 0110|BORDER
- ☒ 0110|STAMP
- ☒ 0110|WALL
- ☒ 0110|THIN
- ☒ 0110|HATCH
- ☒ 0110|TEXT
- ☒ DIMENSIONS
- ☒ 1-TEXT
- ☒ PLUMBING
- ☐ HATCH
- ☒ GRABBAR
- ☒ DOOR
- ☐ FURNITURE
- ☒ NOTES
- ☒ THINY
- ☒ Removed
- ☒ misc1
- ☒ LIGHT
- ☒ light2



# MIGRATION



with AutoCAD\*

NOT TESTED

# MIGRATION



with AutoCAD\*

NOT TESTED

# MIGRATION



with AutoCAD\*

NOT TESTED



\*AutoCAD may not be only  
option for migration



Open  
Design  
Alliance

Providing Teigha the platform for engineering applications

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## Teigha

- ▶ Teigha
- ▶ Teigha.NET
- ▶ Teigha Xtensions SDK
- ▶ Third Party Components

## Member Showcases

- ▶ Caddie Software
- ▶ IMSI/Design
- ▶ Graebert GmbH
- ▶ Informative Graphics
- ▶ nanoCAD
- ▶ ZWSOFT
- ▶ ESRI
- ▶ Carlson Software
- ▶ Xinet
- ▶ IntelliCAD Technology Consortium

## The development platform for engineering solutions



### Introducing the ODA

Founded in 1998 as the OpenDWG Alliance, the Open Design Alliance (ODA) empowers its 1200 members worldwide to build engineering applications to effectively address the demands of their customers.

ODA members can quickly design, build and deliver specialist engineering applications using Teigha®, ODA's software development platform. [Read more »](#)



### Introducing Teigha

Designed by the ODA, Teigha® is available on all major operating systems. It supports the use of C++, .NET, and ActiveX interfaces and allows the exchange of data through .dwg, .dgn, .stl and .pdf files.

The ODA's expertise and its relationships with well-known third party component vendors enable it to continue enhancing Teigha for the benefit of its members. [Read more »](#)

## Member Showcases using Teigha

ZWSOFT



Gräbert  
CAD ANYWHERE.

## News

ODA Announces Teigha® Version 3.8  
Phoenix, AZ: December 19, 2012  
Open Design Alliance (ODA) today announced the release of version 3.8 of Teigha, its software...

[Read more](#)

Spatial Corp and Open Design Alliance Announce Partnership  
Phoenix, AZ, Broomfield, CO –

December 12, 2012

Spatial Corp., the leading provider of 3D development components for design, manufacturing and...

[Read more](#)

ODA Announces Teigha Version 3.6  
Phoenix, AZ: July 16, 2012  
Open Design Alliance (ODA) today announced the release of version 3.6 of Teigha®, its software...

[Read more](#)

ODA consolidates support for .dgn and .dwt file formats in Teigha

# EMULATION



with VMWare / QEMU / KEEP

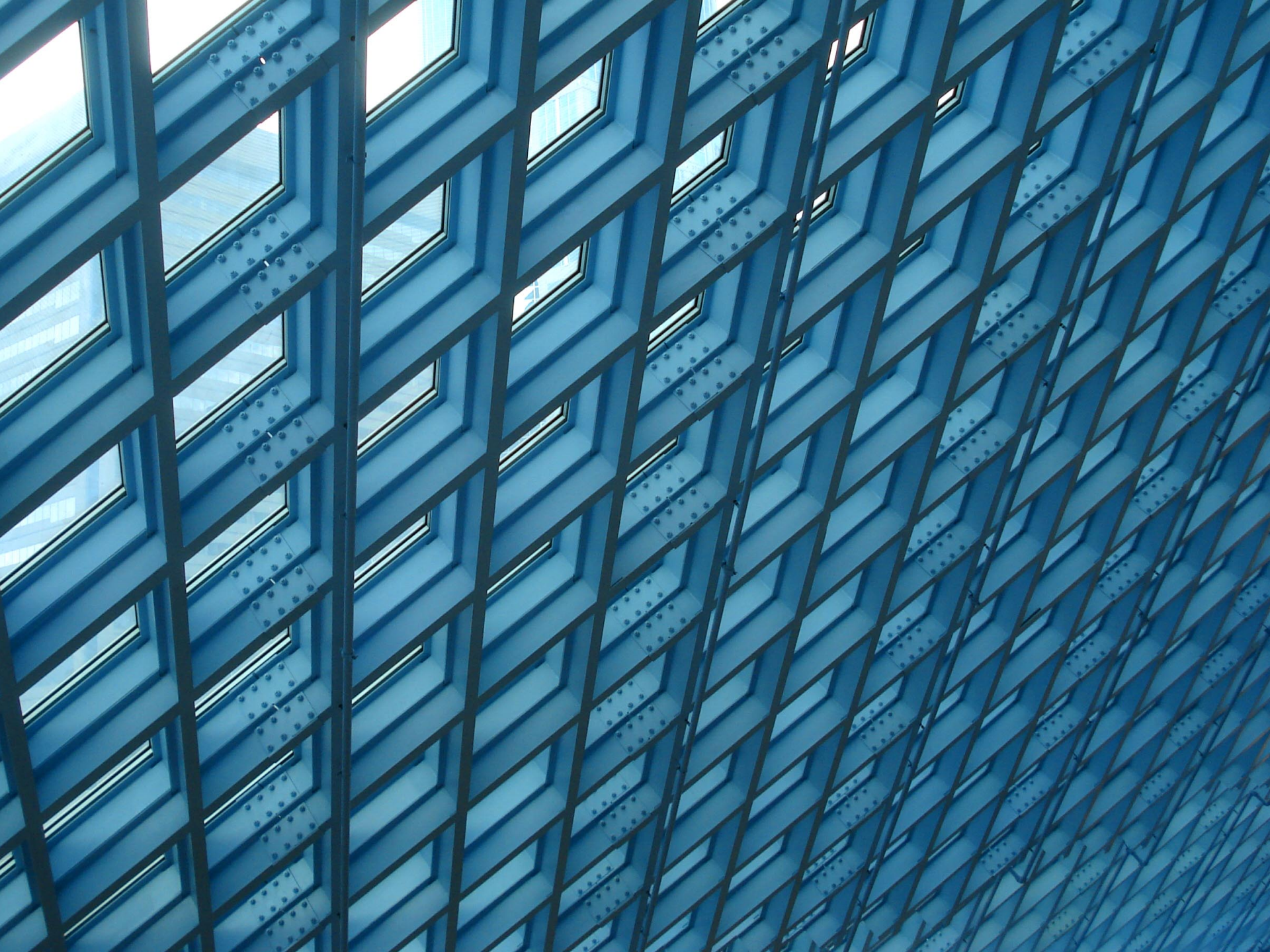
**NOT TESTED**

## Next Steps

Test and determine feasibility of additional migration strategies

Test and determine feasibility of emulation strategy







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*Digital Archive for Architecture (DAArch)* (n.d.) Retrieved December 20, 2012 from <http://kfa-inc.com/kfa12/articles/kfa-launches-daarch-demo-site/>

Westcott, K. (2005). Computer-Aided Design. In *AHDS Preservation Handbook*. Retrieved December 20, 2013 from <http://www.ahds.ac.uk/preservation/ahds-preservation-documents.htm>

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*Designed to Last: Preserving Computer-Aided Design*. Retrieved December 20, 2012 from <http://www.dpconline.org/events/previous-events/625-designed-to-last-preserving-computer-aided-design>

*Digital Dilemma: Preserving Computer-Aided Design (CAD) Files*. Retrieved December 20, 2012 from <http://siarchives.si.edu/blog/digital-dilemma-preserving-computer-aided-design-cad-files>

*Open Design Alliance*. Retrieved December 20, 2012 from <http://www.opendesign.com/>

# Thank You!

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@samalanmeister