# AR15400
# Revit: Your Drawing Management Marvel
## Get a Grip on BIM Management Through the National CAD Standard

Ron Allen

Arch IV/ BIM Manager

# Your AU Experts:

## Speaker: Ron Allen

Ron Allen is an Arc IV/ BIM Manager with AECOM through the B+P (Buildings and Places) in the Greenwood/Denver Office.
Ron's career has been constantly evolving and refining process and production with emerging technologies. Beginning with BASIC programming and electronics as a hobby in 1984, the pursuit of technology and its uses turned to formal study at Mississippi State University. At MSU he integrated several aspects of his education which included Computer science ( UNIX on VAX systems and SCI Indigo systems, programming ANSI C, PASCAL, COBOL), and Art which included Wave front 3D animation and modeling, Alias, Alias Up Front, Matador and video production, B&W Photography & music. The most prominent education was Architectural studies, it was then he began using Soft Desk (AutoCAD Architecture's predecessor) and AutoCAD. By 1998 he had Bachelors in Architecture with undeclared minors in Art and Computer Science.

His professional career started in Architecture in 1998. In 2006 he started using Revit which changed everything. Since 2006 he has worked production and BIM management on several projects across many Architectural Business lines from interiors, through residential, production housing, commercial, low/mid/high rise, hospitality, medical, military, industrial, themed, and transit.

In his current position at AECOM and an Arc IV/BIM Manager he is continuing the integration and exploration of new and useful technologies including Databases, LIDAR, UAVs, Photogrammetry, IOT, Electronics, VR, AR, Model manager, Model compare, the A360 Suite including Autodesk Navis, C4R, BIM 360 Glue, Docs.

## Co-Speaker Matthew Anderle

Matthew Anderle is the Building Information Modeling (BIM) director for the Buildings+Places business line of AECOM, with focus on the Americas. He is a BIM and technology evangelist with over 16 years of experience establishing global BIM workflows and standards around content, training, interoperability, and BIM consultation as a service. His experience spans over multiple market sectors with emphasis on large healthcare facilities, data centers, aviation, government projects, and residential. Anderle serves AECOM as a leader in the advanced and efficient implementation of BIM processes for a variety of project types. He manages and directs large project teams on interoffice BIM collaboration workflows, enabling continental offices to work as one entity.

# Learning Objectives

- NCS for file/folder organization
- Archival process with standard file folders
- NCS as a views/ browser/ template framework
- Export and manage using the framework

# History of the NCS

- 1999 NCS 1.0
- Based On:
  - American Institute of Architects (AIA) CAD Layer Guidelines
  - Construction Specifications Institute (CSI) Uniform Drawing System (UDS),
  - Parts of the A/E/C CADD Standard (Now known as the U.S. Department of Defense CAD/GIS Technology Center)
  - U.S. Coast Guard Plotting Guidelines

# Transitional compatibility

- CAD structures translate to Revit
- CAD structure lends familiarity in Revit Landscape
- Established management system

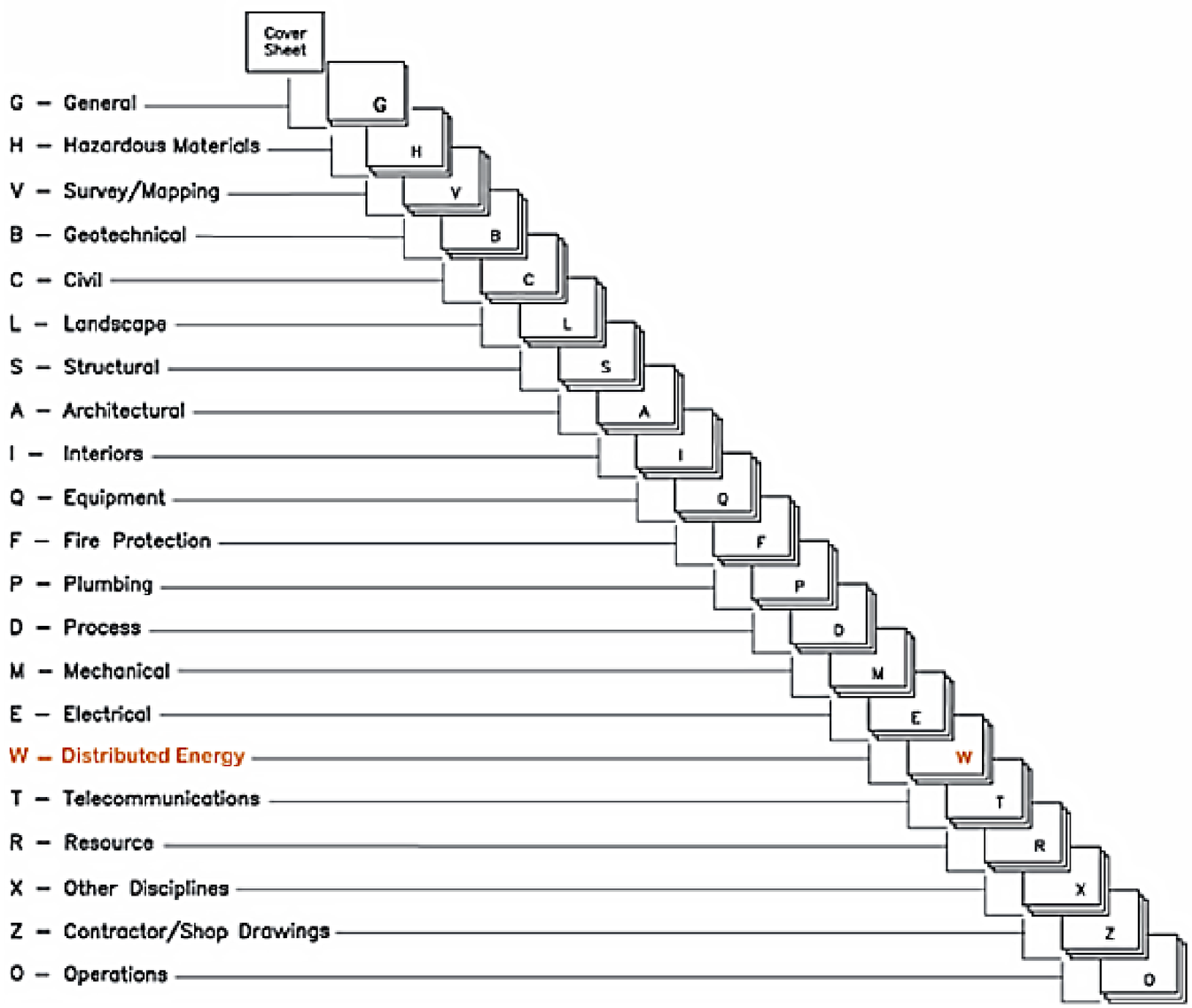
# NCS and the Uniform Drawing System

- Modular system to organize drawing data.
- Two character code (level 1 + level 2) covers most every discipline and their most common subcategories.

# Uniform Drawing System (UDS)– “2.0 Sheet Organization”

## Detailed but Problematic:

- “Alphabet soup”
- Does not conform to natural sort
- Alternate sort orders

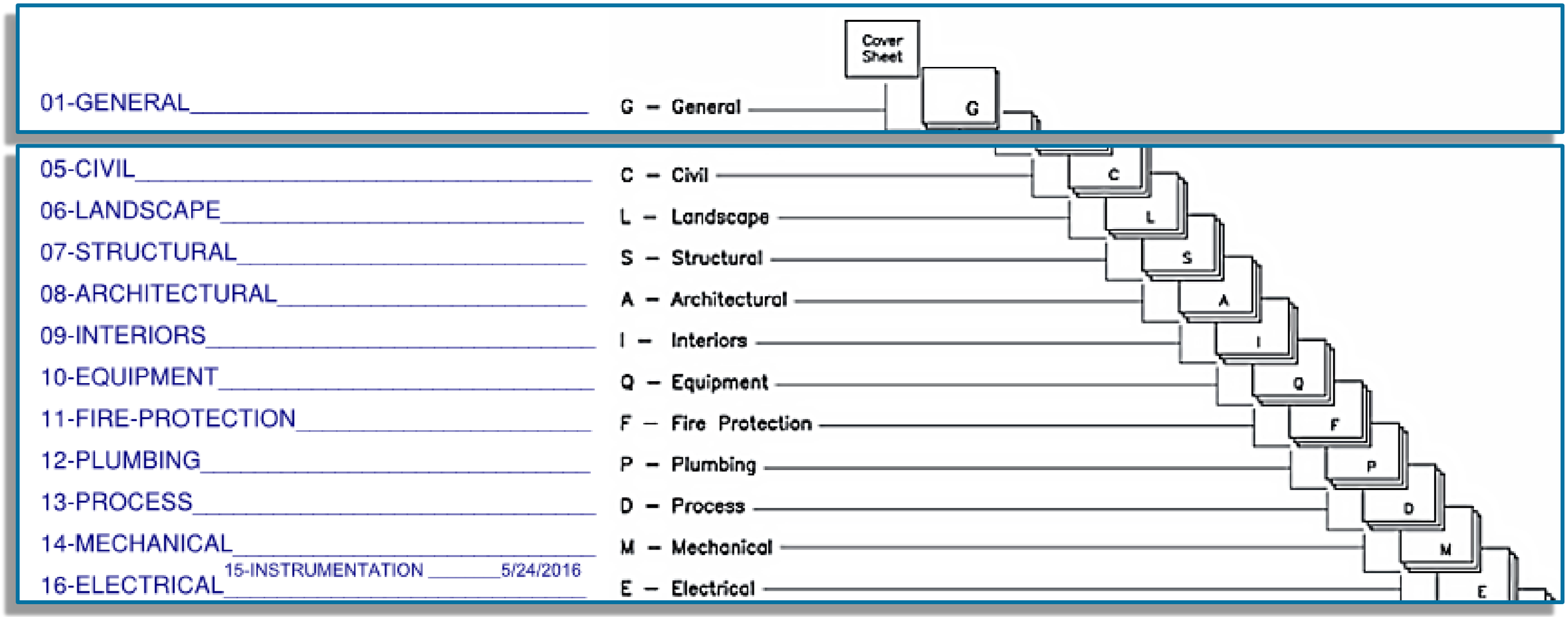


# Natural Sort Order (for Indexing files)

**Natural sort order** is an **ordering** of strings in alphabetical **order**, except that multi-digit numbers are ordered as a single character. ... Functionality to **sort** by **natural sort order** is built into many programming languages and libraries

# UDS Section 2.0 “Sheet Organization”

## Top-level index added (2 digits), where numbers easily order using the ‘Natural sort order”



# Framework for other systems

- NCS Makes a great default
- Sections are added in the “GI” sheets for Codes and other sheets officials want first
- Additional index orders can be created for client needs
- Order should be Spelt out in the PXPRCMM and followed from kickoff.

# NCS for file/folder organization

# Folder organization

***P:*** _____ Project Drive

**\32701** _____ Project number

**\32701 Apopka project (Shortcut)** _____ Human name, no added path!

**\00-general** _____ i.e. NCS (MASTER AGREEMENT) Folder Structure
1 Folder PER data managing group

**\08-00-A** _____ NCS Folder Structure – Level 1+Level 2

**\08-00-A Architectural (shortcut)** _____ human name

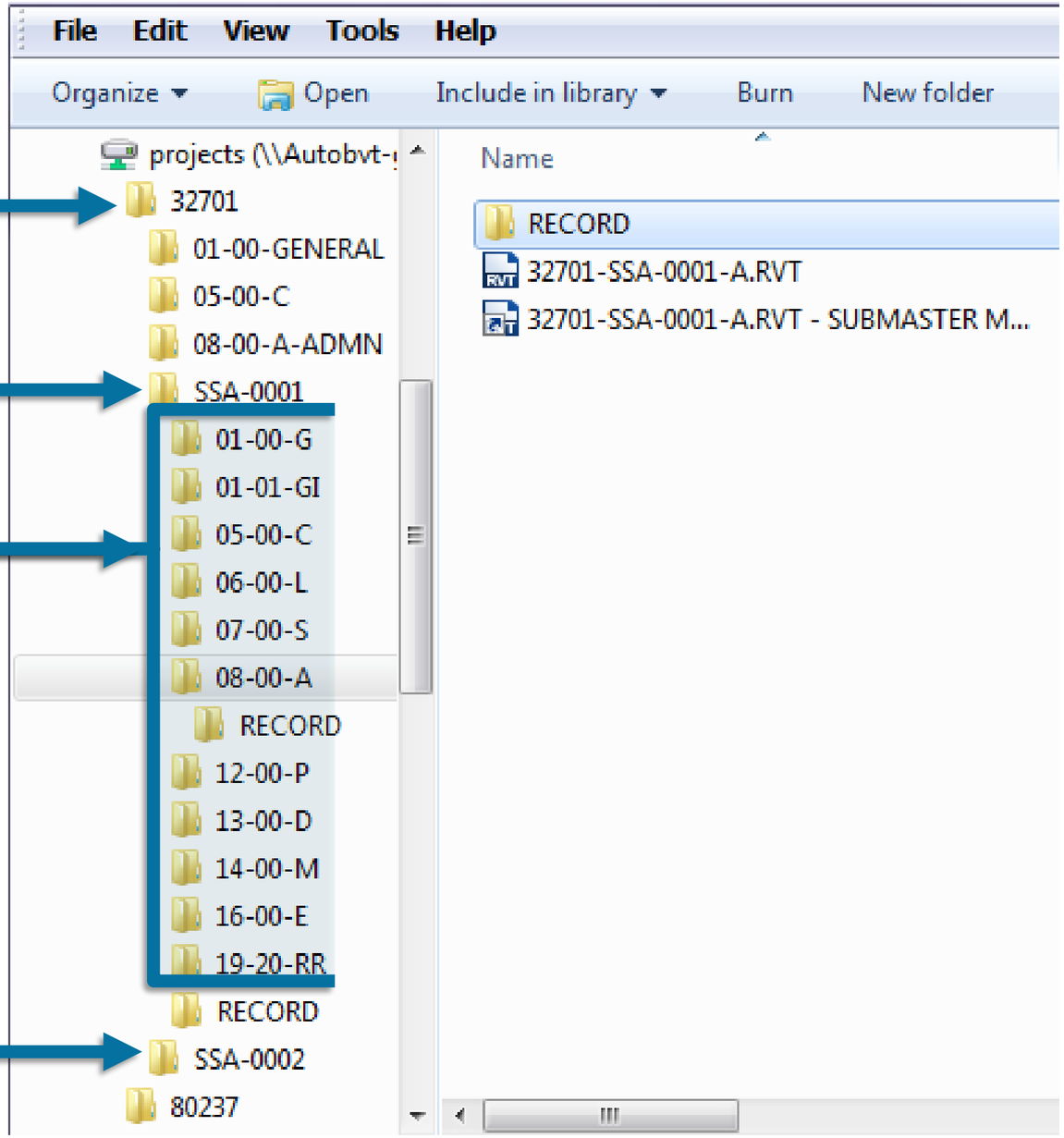
# Folder Structure (windows view)

**Project Number (Common files / master service)**

**TASK 0001 project under MSA**

**Consultants on TASK 0001**
**(or typical non-MSA)**

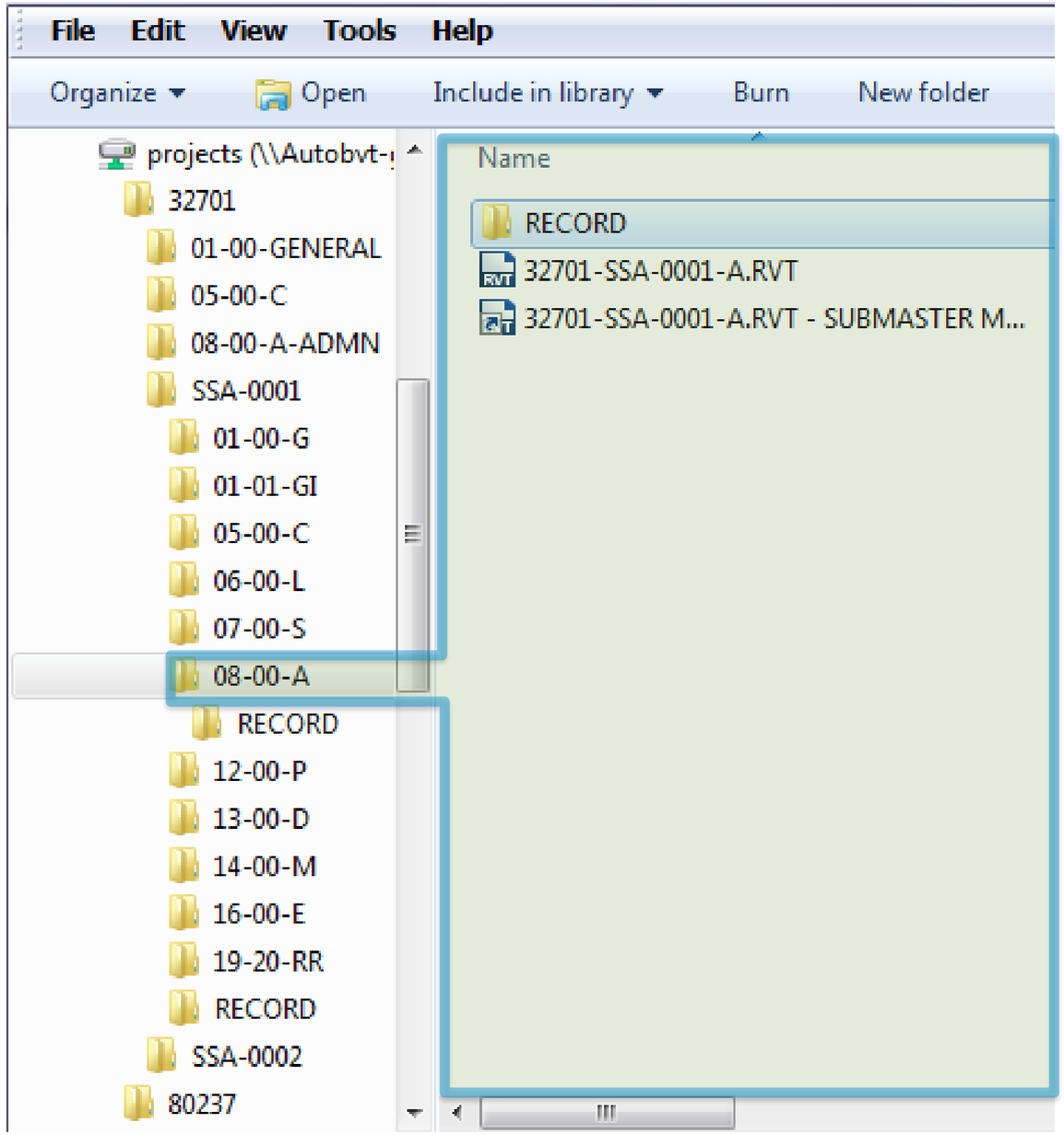
**TASK 0002 project under MSA**



# *LIVE* / *RECORD* folders (Live Files)

## TOP-LEVEL=LIVE

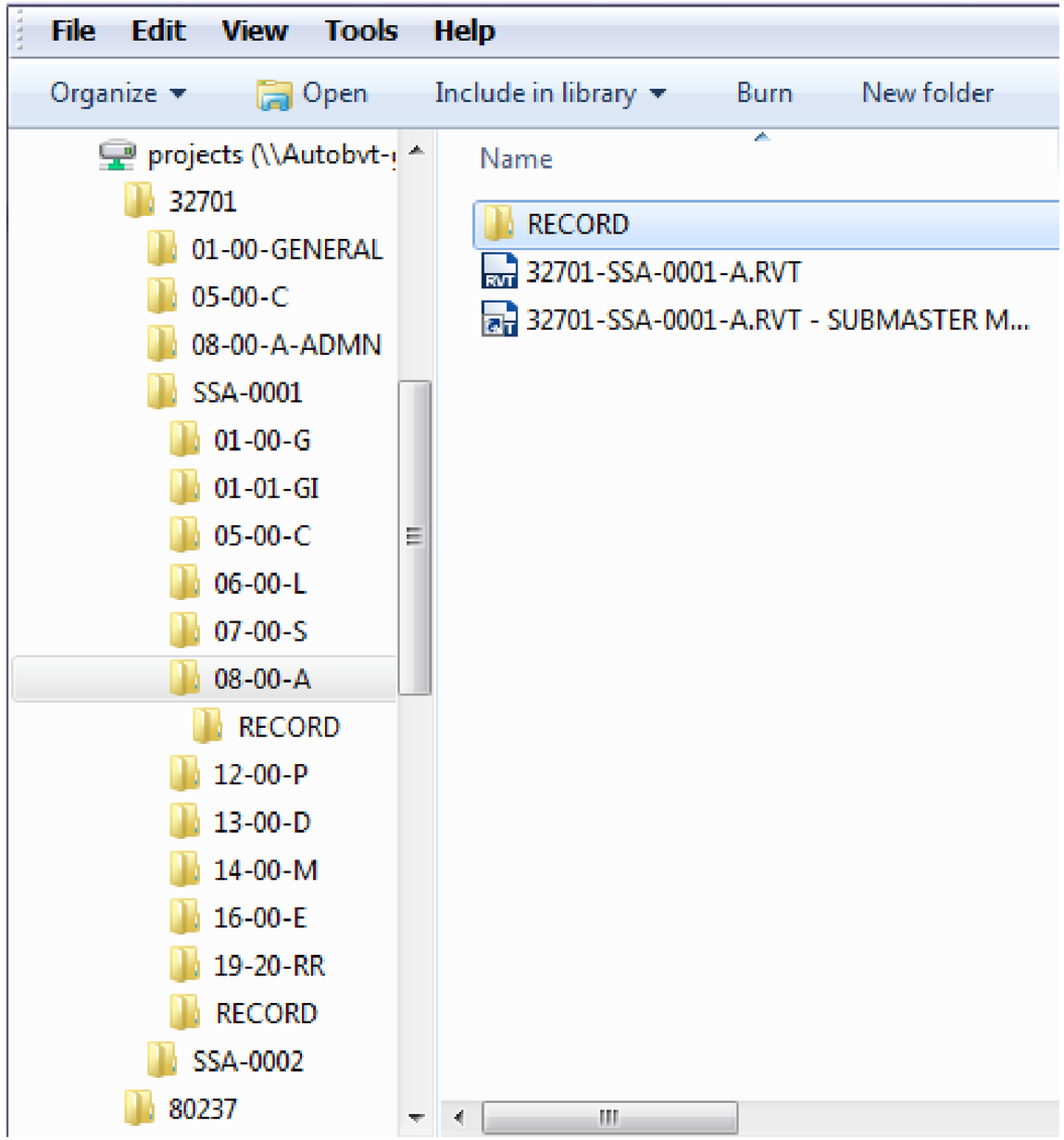
- Current content
- Name stays the same!
- No penalty on C4R for renaming or relocating




NCS for file/folder organization

# *LIVE* / *RECORD* folders (Live Files)

- **LINK Files by referencing up one level**
- **“..\”**
- Then into the link folder:
  e.g. ..\07-00-s\32701-ssa-0001-S.rvt
- Relative paths are best!

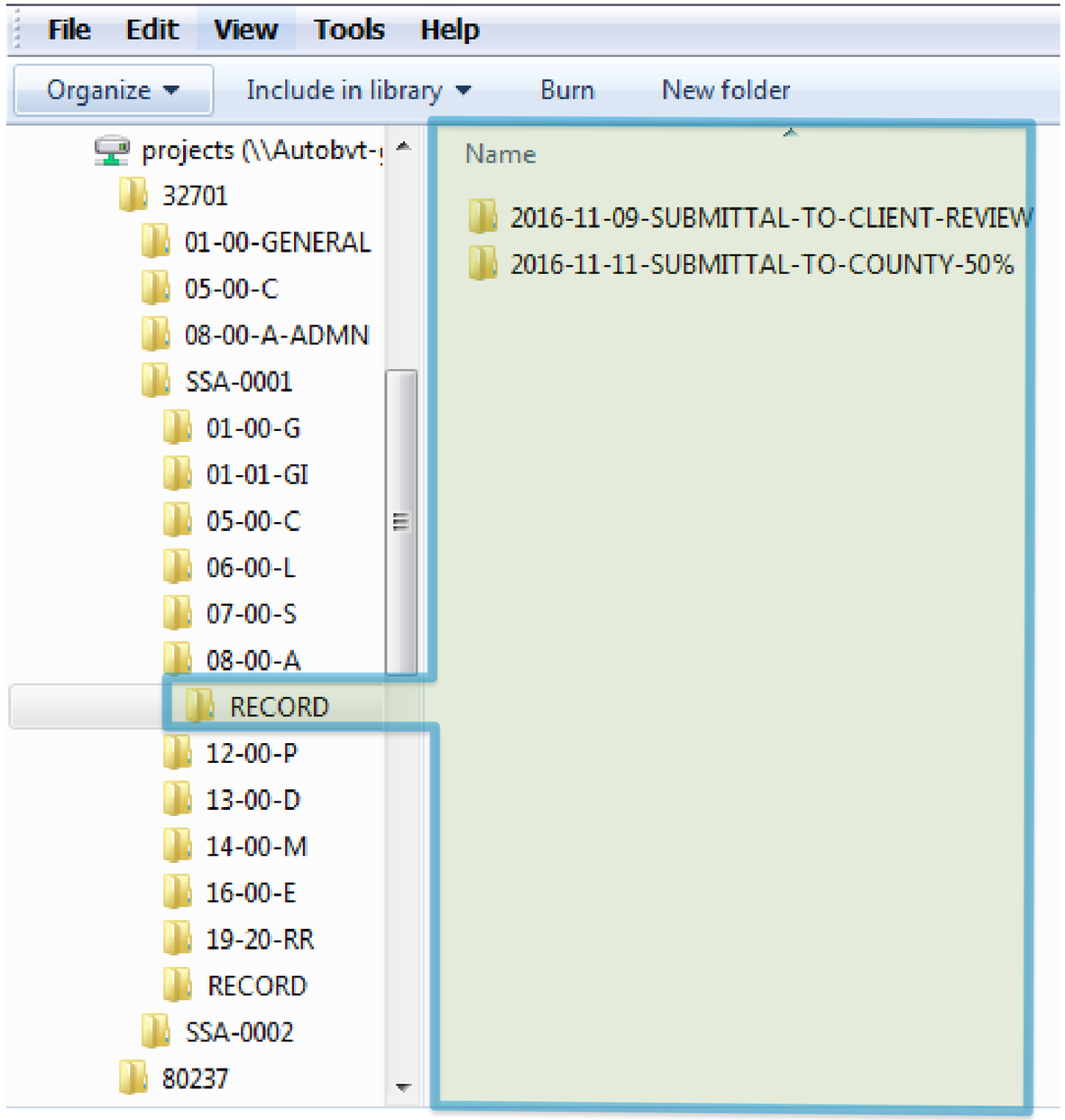


# *LIVE* / *RECORD* folders (Working Archive)

## RECORD=STORAGE

- E-RECORD of Milestones
- Backups
- Read Only
- +ZIP dated folders
- Requires digging!
- YYYY-MM-DD-24-MM-a-p-[…]

- Copy files in and then send from the folder.

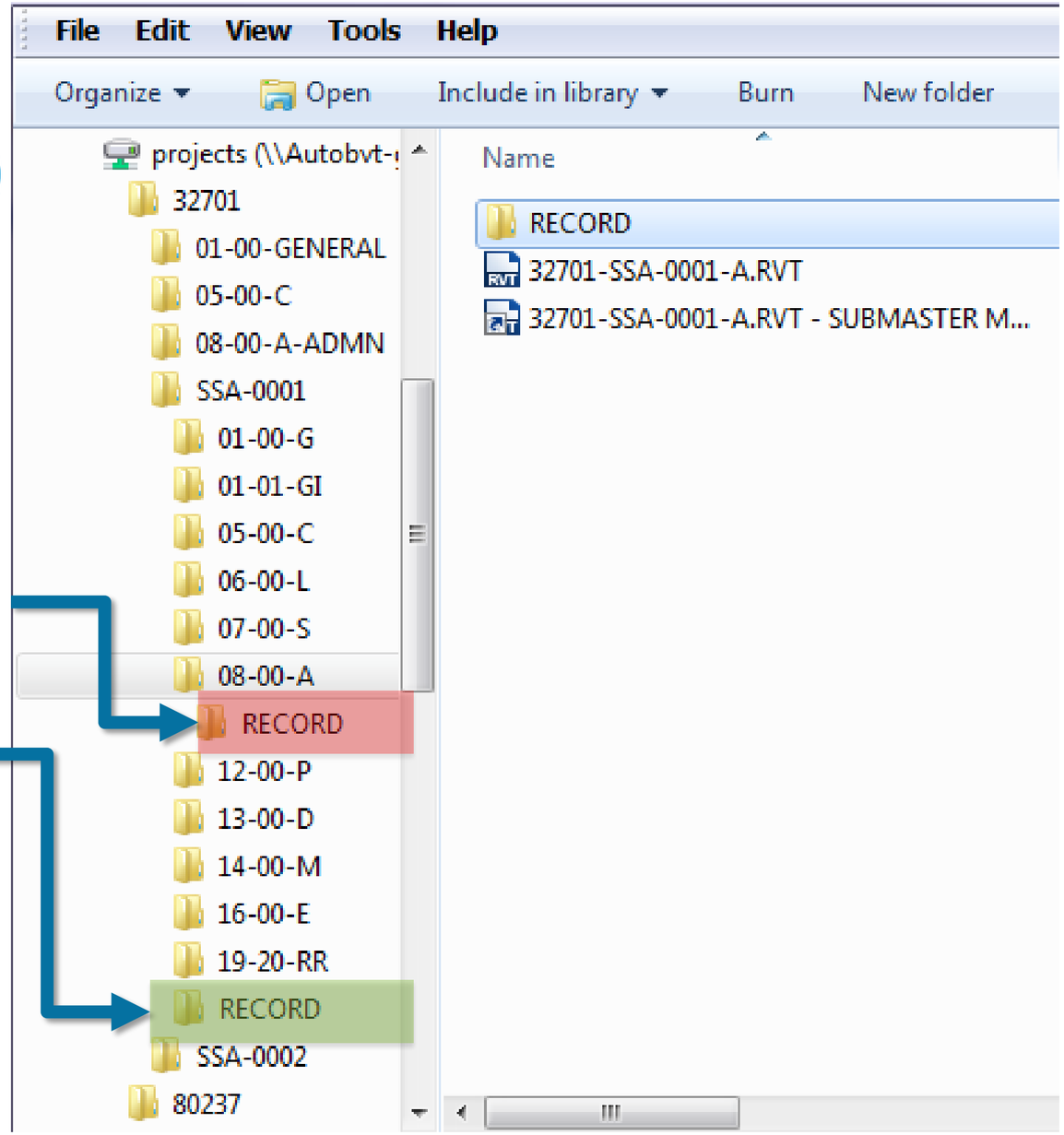


# *Multi-Discipline Submittals (i.e. to client)*

**Combined submissions**

**are ‘Promoted’ up the tree**

- RECORD folder to gather sub-folder ”Records” into submissions to “roll-up” the tree where necessary
- Easy PM / Reviewer access.
- These continue to reference/pass up the tree if required.



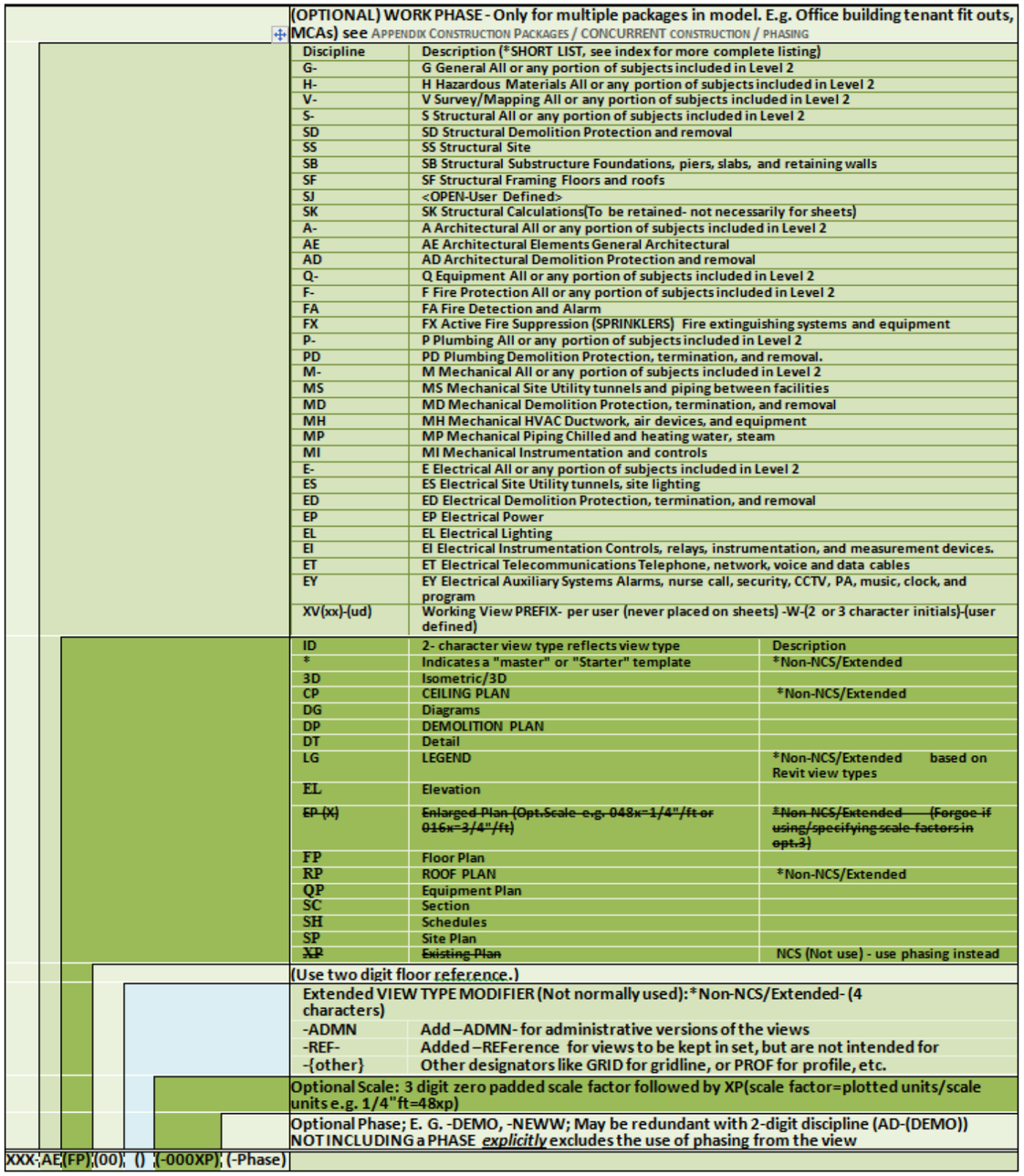
# NCS for Views/ Browser / Templates in Revit

# Same system is reapplied in different places

- Rhythm of system repeats
- Repetition reinforces memory and creates habit (familiarity)
- References to system are everywhere as cross reference

# Reading the Key

- Result across bottom
- Key is in order
- Top items = leftmost
- Move down list = next group
- List abbreviated when sending to consultants for their content



(OPTIONAL) WORK PHASE - Only for multiple packages in model. E.g. Office building tenant fit outs, MCAs) see APPENDIX CONSTRUCTION PACKAGES / CONCURRENT CONSTRUCTION / PHASING

| Discipline | Description (*SHORT LIST, see index for more complete listing) |
|---|---|
| G- | G General All or any portion of subjects included in Level 2 |
| H- | H Hazardous Materials All or any portion of subjects included in Level 2 |
| V- | V Survey/Mapping All or any portion of subjects included in Level 2 |
| S- | S Structural All or any portion of subjects included in Level 2 |
| SD | SD Structural Demolition Protection and removal |
| SS | SS Structural Site |
| SB | SB Structural Substructure Foundations, piers, slabs, and retaining walls |
| SF | SF Structural Framing Floors and roofs |
| SJ | <OPEN-User Defined> |
| SK | SK Structural Calculations(To be retained- not necessarily for sheets) |
| A- | A Architectural All or any portion of subjects included in Level 2 |
| AE | AE Architectural Elements General Architectural |
| AD | AD Architectural Demolition Protection and removal |
| Q- | Q Equipment All or any portion of subjects included in Level 2 |
| F- | F Fire Protection All or any portion of subjects included in Level 2 |
| FA | FA Fire Detection and Alarm |
| FX | FX Active Fire Suppression (SPRINKLERS) Fire extinguishing systems and equipment |
| P- | P Plumbing All or any portion of subjects included in Level 2 |
| PD | PD Plumbing Demolition Protection, termination, and removal. |
| M- | M Mechanical All or any portion of subjects included in Level 2 |
| MS | MS Mechanical Site Utility tunnels and piping between facilities |
| MD | MD Mechanical Demolition Protection, termination, and removal |
| MH | MH Mechanical HVAC Ductwork, air devices, and equipment |
| MP | MP Mechanical Piping Chilled and heating water, steam |
| MI | MI Mechanical Instrumentation and controls |
| E- | E Electrical All or any portion of subjects included in Level 2 |
| ES | ES Electrical Site Utility tunnels, site lighting |
| ED | ED Electrical Demolition Protection, termination, and removal |
| EP | EP Electrical Power |
| EL | EL Electrical Lighting |
| EI | EI Electrical Instrumentation Controls, relays, instrumentation, and measurement devices. |
| ET | ET Electrical Telecommunications Telephone, network, voice and data cables |
| EY | EY Electrical Auxiliary Systems Alarms, nurse call, security, CCTV, PA, music, clock, and program |
| XV(xx)-(ud) | Working View PREFIX- per user (never placed on sheets) -W-(2 or 3 character initials)-(user defined) |

| ID | 2- character view type reflects view type | Description |
|---|---|---|
| * | Indicates a "master" or "Starter" template | *Non-NCS/Extended |
| 3D | Isometric/3D | |
| CP | CEILING PLAN | *Non-NCS/Extended |
| DG | Diagrams | |
| DP | DEMOLITION PLAN | |
| DT | Detail | |
| LG | LEGEND | *Non-NCS/Extended based on Revit view types |
| EL | Elevation | |
| ~~EP (X)~~ | ~~Enlarged Plan (Opt.Scale e.g. 048x=1/4"/ft or 016x=3/4"/ft)~~ | ~~*Non-NCS/Extended (Forgoe if using/specifying scale factors in opt.3)~~ |
| FP | Floor Plan | |
| RP | ROOF PLAN | *Non-NCS/Extended |
| QP | Equipment Plan | |
| SC | Section | |
| SH | Schedules | |
| SP | Site Plan | |
| ~~XR~~ | ~~Existing Plan~~ | NCS (Not use) - use phasing instead |

(Use two digit floor reference.)

Extended VIEW TYPE MODIFIER (Not normally used): *Non-NCS/Extended- (4 characters)

| | |
|---|---|
| -ADMN | Add –ADMN- for administrative versions of the views |
| -REF- | Added –REFerence for views to be kept in set, but are not intended for |
| -{other} | Other designators like GRID for gridline, or PROF for profile, etc. |

Optional Scale: 3 digit zero padded scale factor followed by XP(scale factor=plotted units/scale units e.g. 1/4"ft=48xp)

Optional Phase; E. G. -DEMO, -NEWW; May be redundant with 2-digit discipline (AD-(DEMO))
NOT INCLUDING a PHASE *explicitly* excludes the use of phasing from the view

XXX-AE(FP)-(00)_ ()_(-000XP)_(-Phase)

NCS for file/folder organization

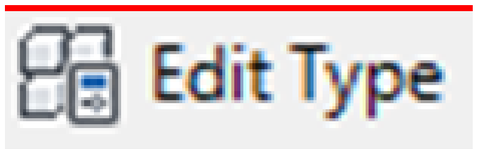
# Adding Management tricks to your Revit Arsenal

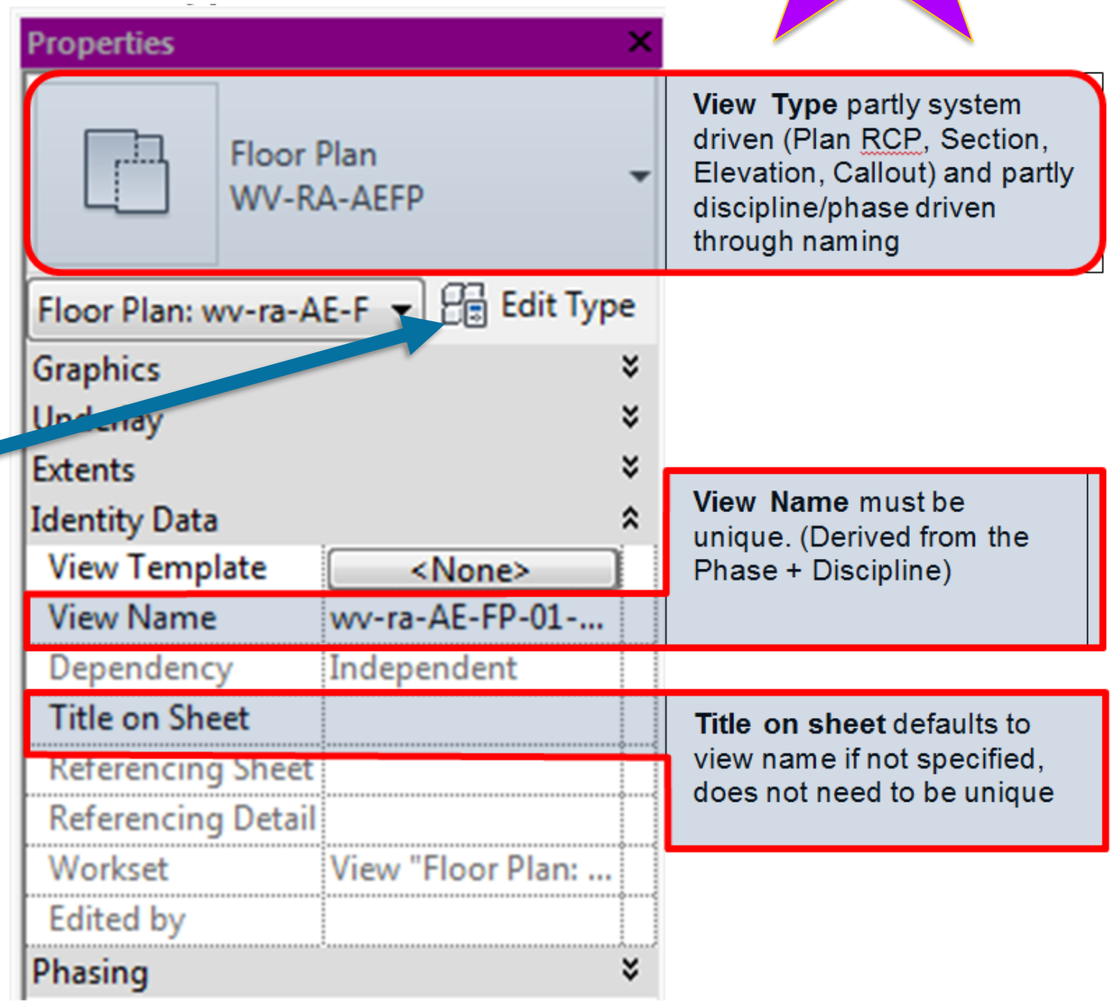


NCS for file/folder organization

# Revit view types

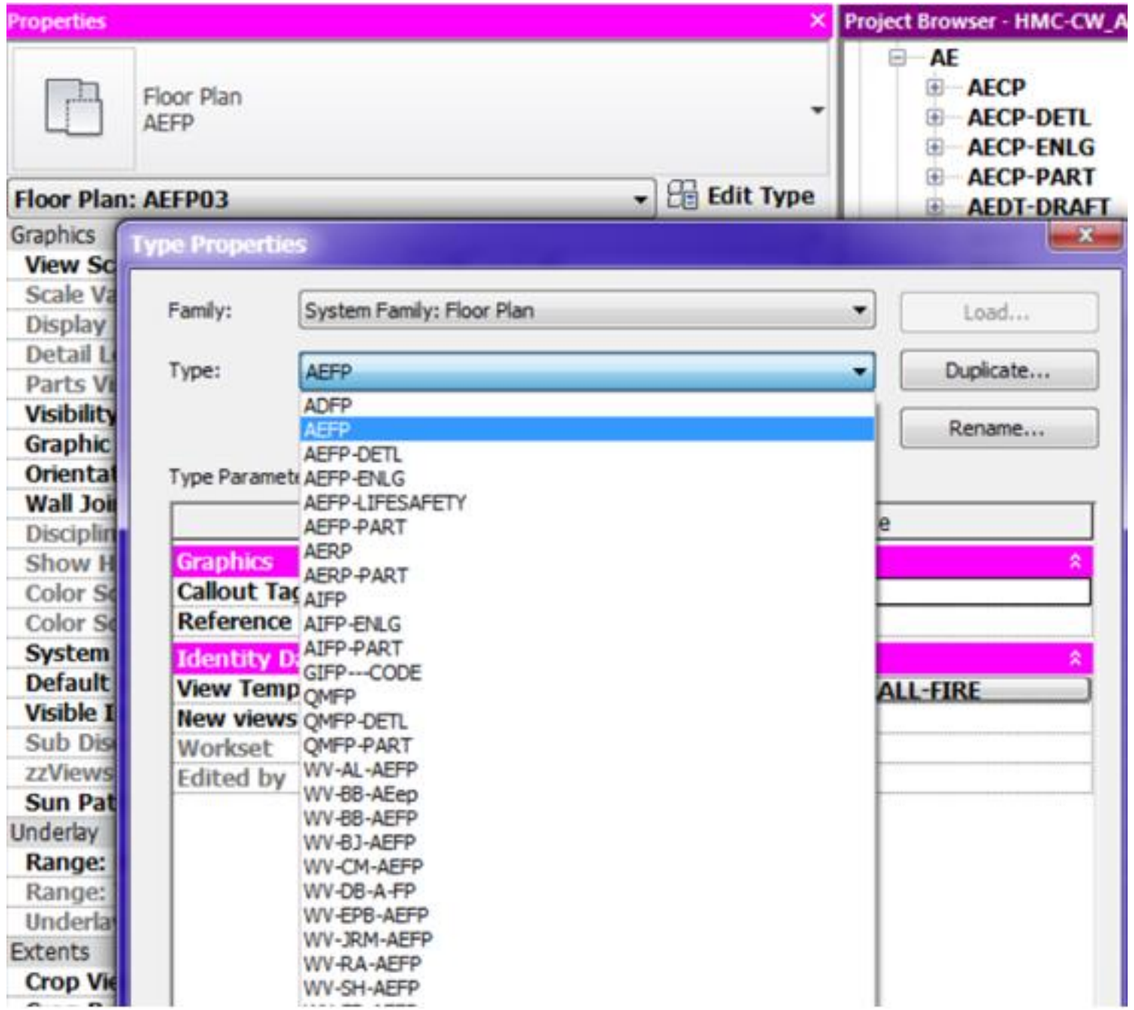
- In any open view, use Edit Type to create new view types:



# View types

- NCS Level 1+2
- Additional Descriptors
  - DETL - Detail
  - ENLG – Enlarged
  - LIFESAFETY
  - PART – Partial Plan





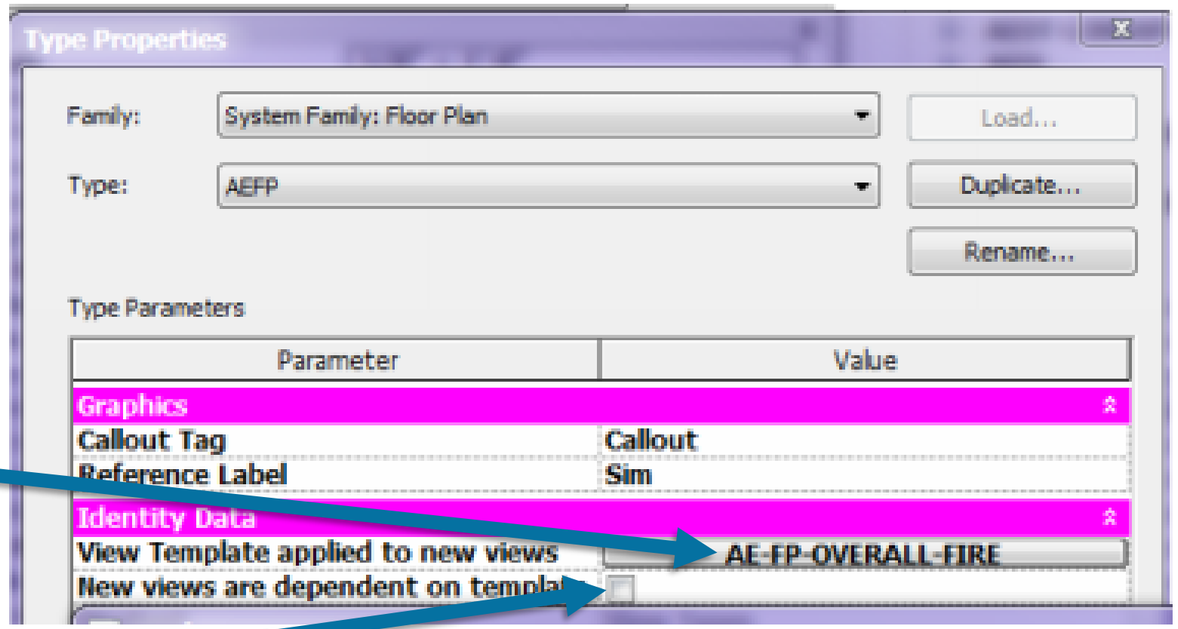

NCS as a views/ browser/ template framework

# View type drawbacks

- Must be in starter/global template for seed
- Transfer Projects Standards doesn’t work (yet)
- API may be used to transfer / create / manage

# View template association with view type

- View template
  - (one-to-one relationship with 1st four letters of names)
- Lock view template



# Using Filters to eliminate ‘Cross Talk’ in views

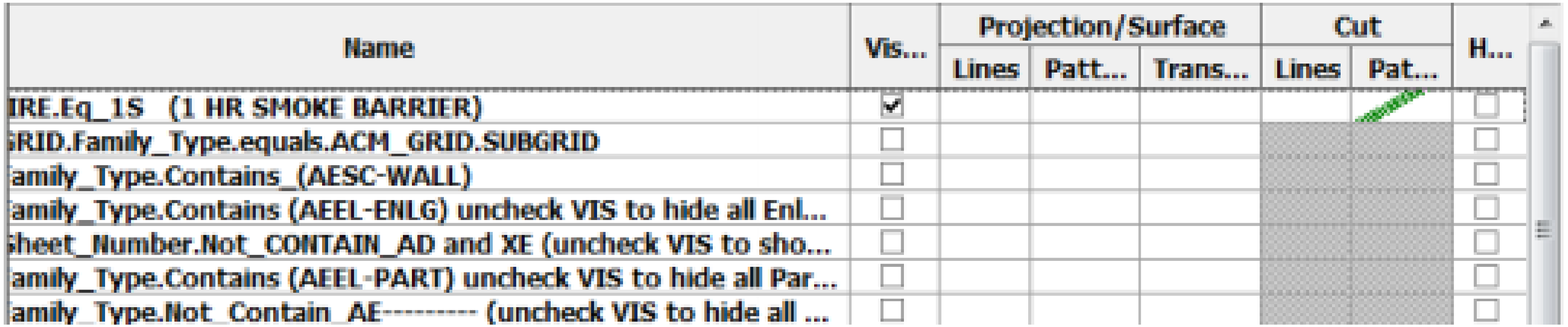
# “Cross-talk” or unwanted annotations

- One consultant or sub consultant managing aspects in one model
  - Arch managing Interiors
  - Arch managing Equipment
  - Arch managing Real estate drawing

  - Unwanted sections/callouts, elevations show…

# View Templates Using VIEW FILTERS

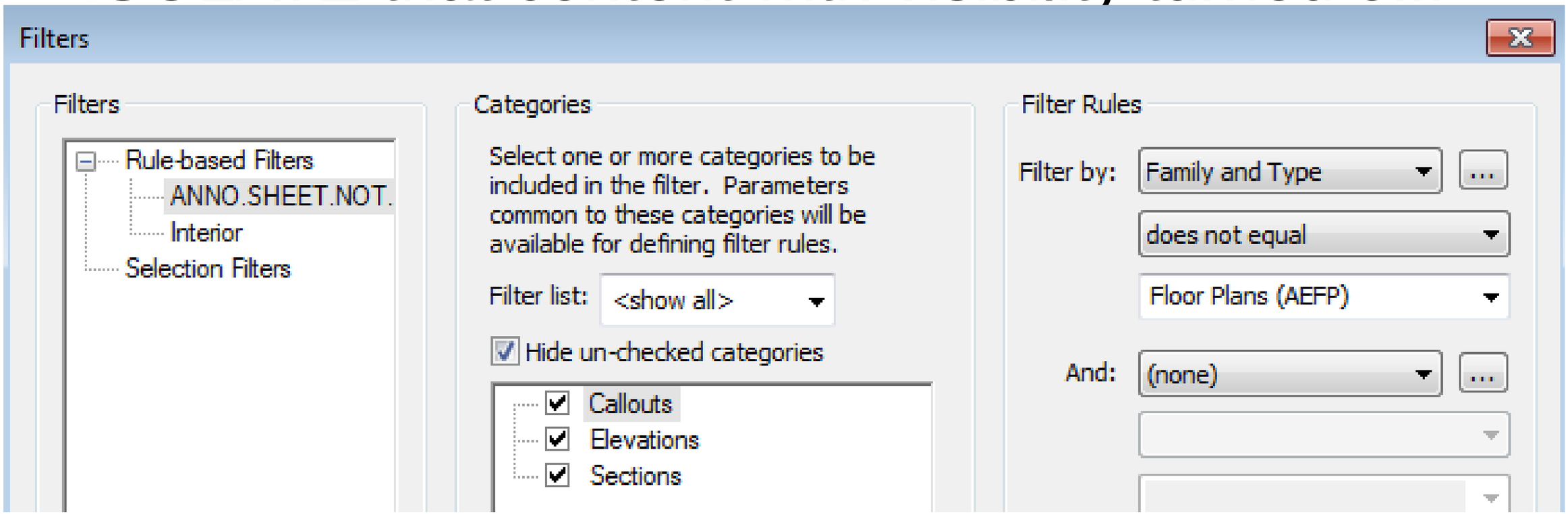
- Filters are selections sets
- These selection sets are manipulated e.g.:



| Name | Vis... | Projection/Surface | | | Cut | | H... |
|---|---|---|---|---|---|---|---|
| | | Lines | Patt... | Trans... | Lines | Pat... | |
| IRE.Eq_1S (1 HR SMOKE BARRIER) | ☑ | | | | | | |
| GRID.Family_Type.equals.ACM_GRID.SUBGRID | ☐ | | | | | | |
| amily_Type.Contains_(AESC-WALL) | ☐ | | | | | | |
| amily_Type.Contains (AEEL-ENLG) uncheck VIS to hide all Enl... | ☐ | | | | | | |
| heet_Number.Not_CONTAIN_AD and XE (uncheck VIS to sho... | ☐ | | | | | | |
| amily_Type.Contains (AEEL-PART) uncheck VIS to hide all Par... | ☐ | | | | | | |
| amily_Type.Not_Contain_AE--------- (uncheck VIS to hide all ... | ☐ | | | | | | |

# View Templates Using VIEW FILTERS

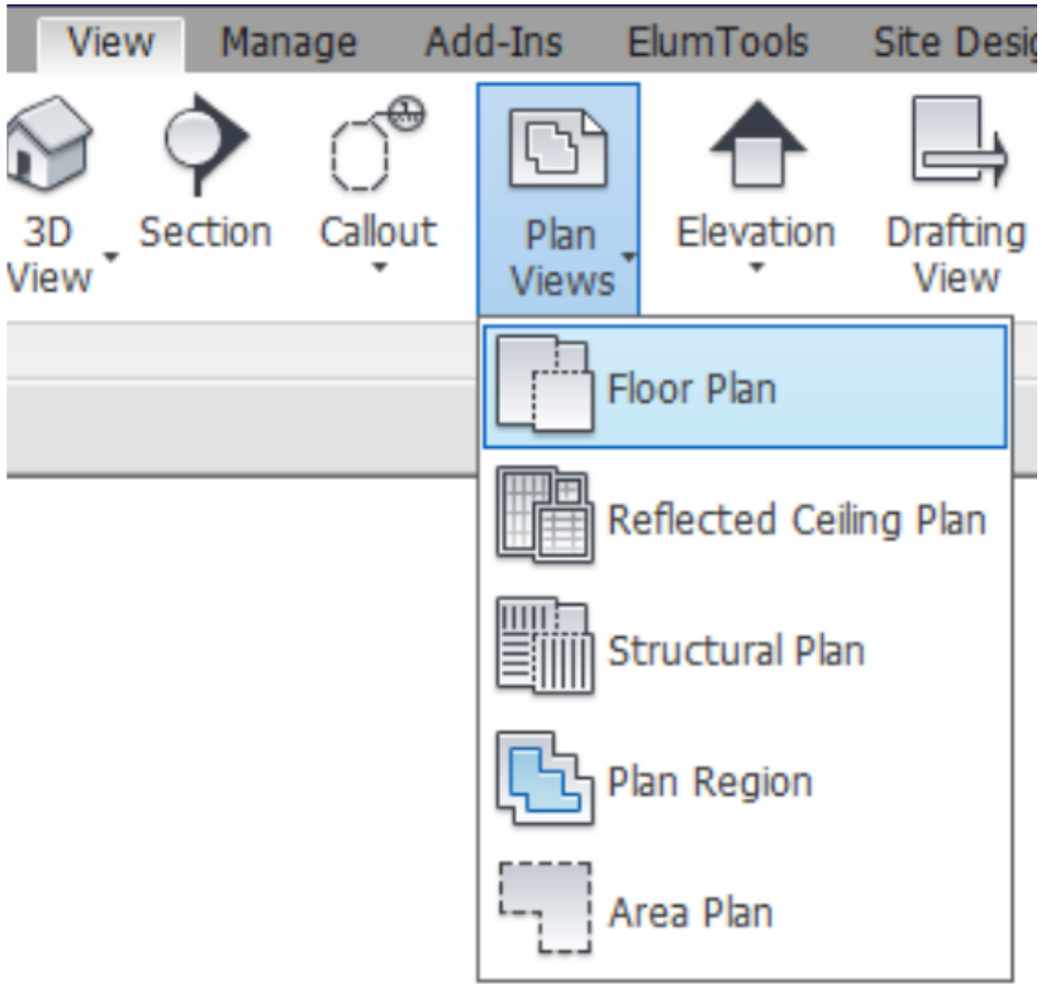
- Hiding “Not Equal To” filters will show and ISOLATE that content with visibility turned off:



# Creating new views (are they already there?)

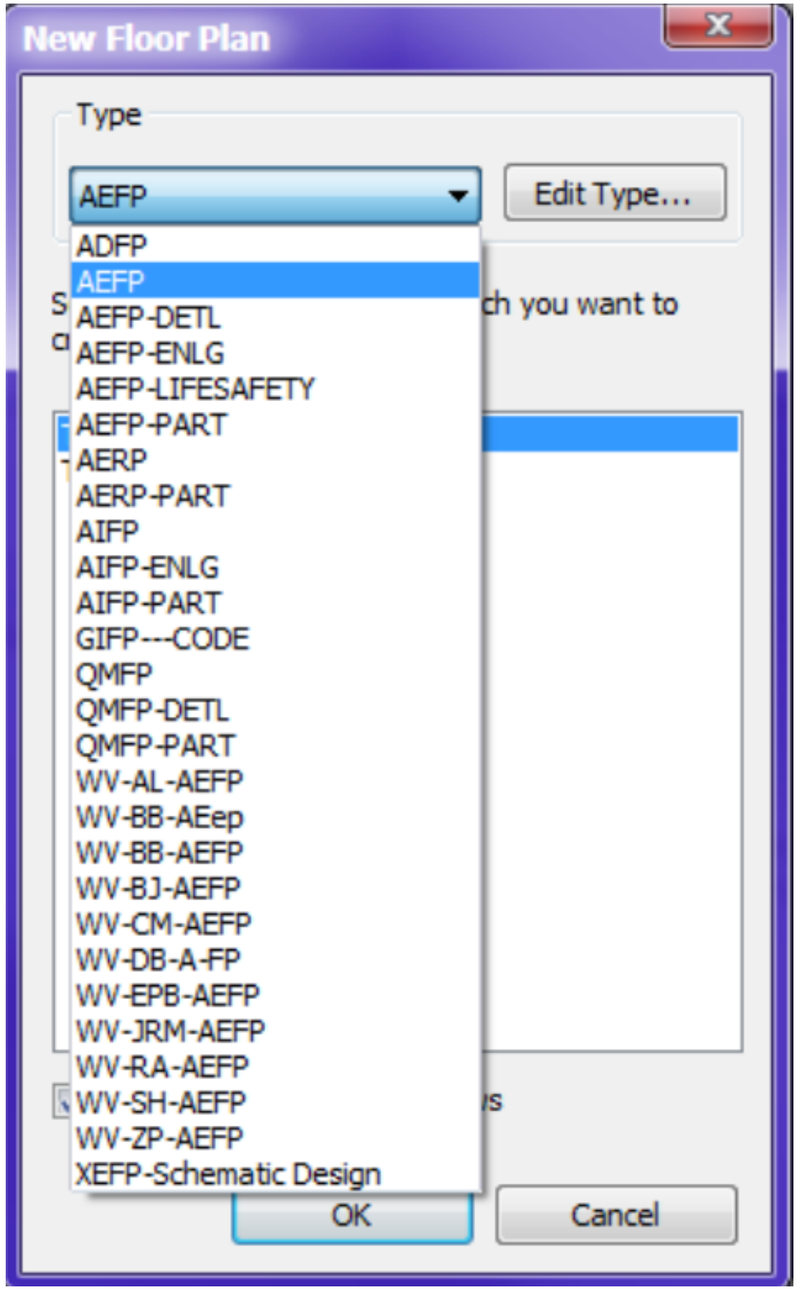
# Subsequent view creation (plan, section, detail, etc.)

- Revit > View > Plan Views > Floor Plan



# Subsequent view creation (plan, section, detail, etc.)

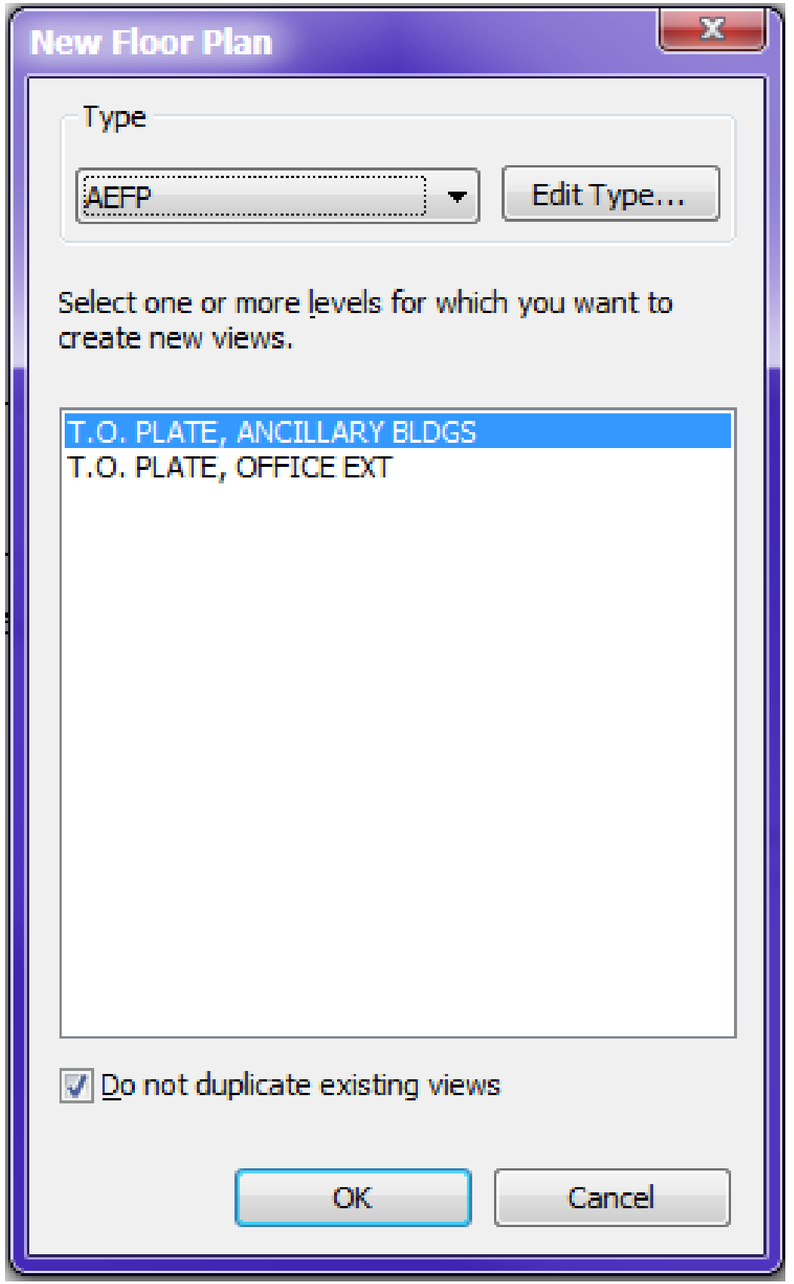
- Select a View type from the available options



# Subsequent view creation (plan, section, detail, etc.)

- Do not duplicate existing views (Hides already created & associated with levels + TYPE)

- Back-check to not duplicate



# Subsequent view creation (plan, section, detail, etc.)

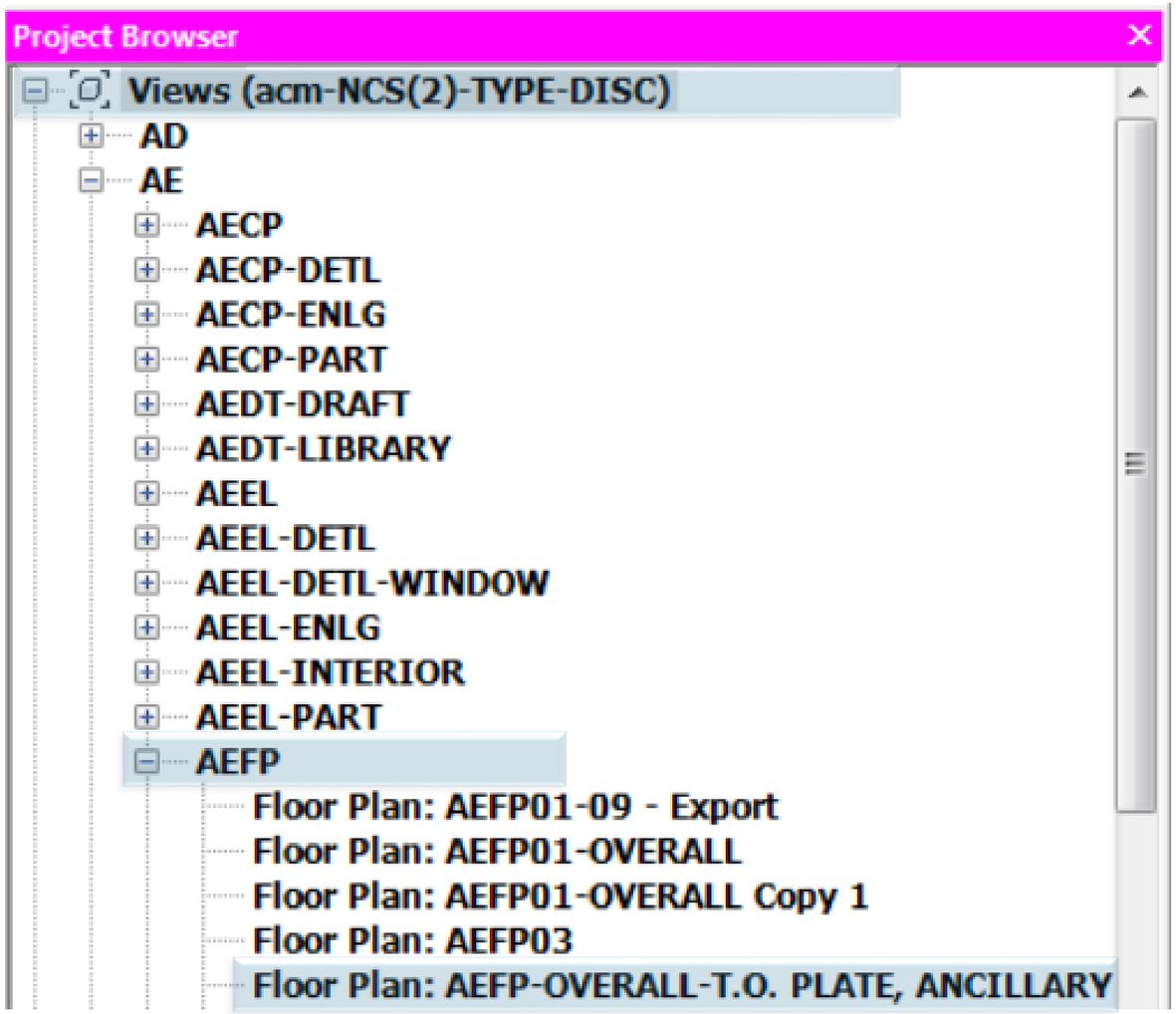
- Rename View Name to MATCH PREFIX (same as view type PREFIX)

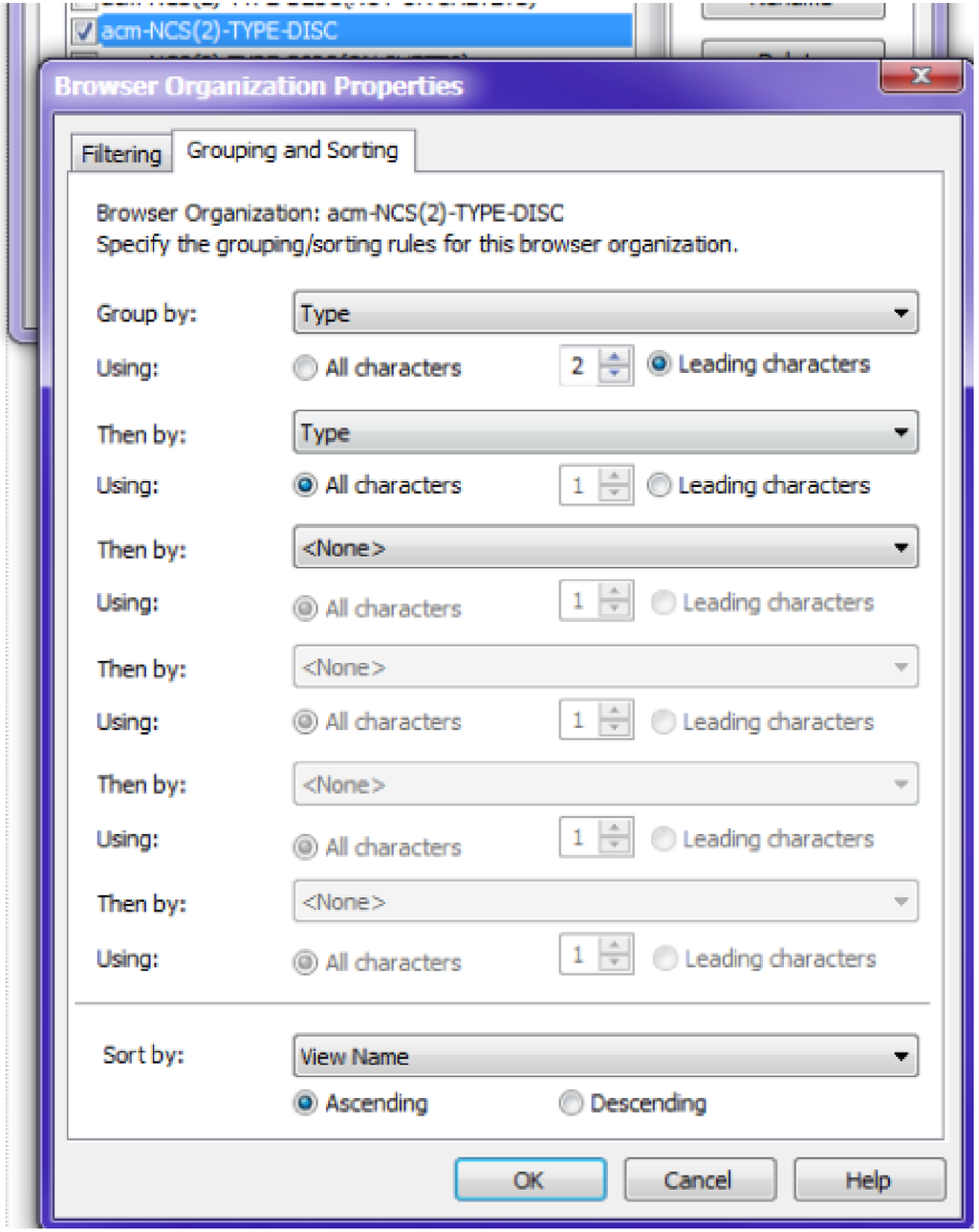
- Set the title on sheet to the desired title seen below the view

| Identity Data | |
|---|---|
| View Template | AE-RP-OVERALL-FIRE |
| View Name | AEFP-OVERALL-T.O. PLATE, ANC... |
| Dependency | Independent |
| Title on Sheet | T.O. PLATE, ANCILLARY BLDGS |
| Referencing Sheet | A201 |
| Referencing Detail | A |
| Workset | View "Floor Plan: AEFP-OVERAL... |
| Edited by | ron.allen@aecom.com |

# Project Browser Using View Types

# Project Browser

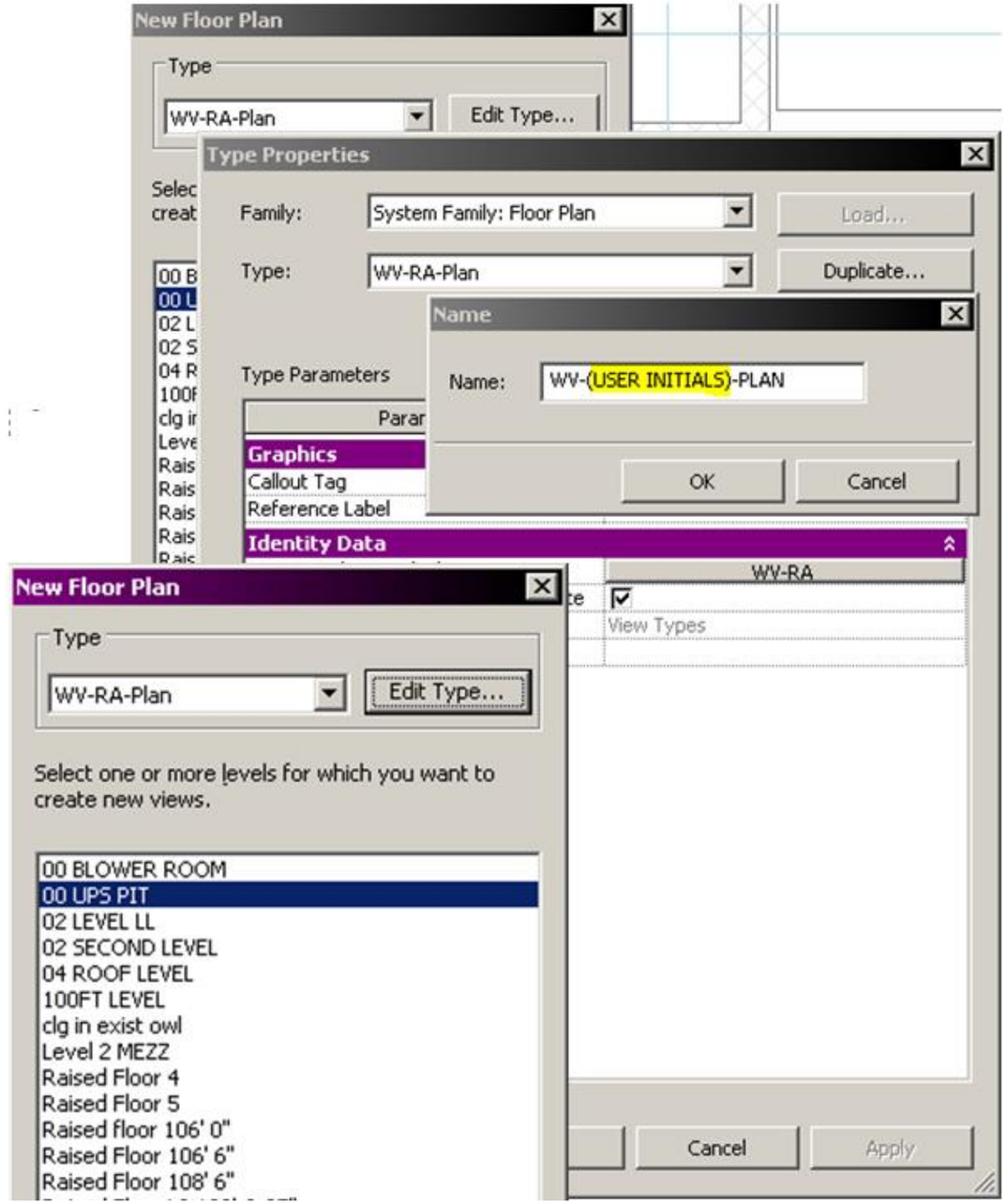


# Working views
# Use them!

- Each user has their own working view types;
- Plan
- Section
- Elevation

Prevents users overrunning one another



# Sheets

Extended sheet NUMBER for organizing in sets

## Two Digit Sheet sequence Designators for typical plan types (preferred)

*Table 5 Sheet numbering and designators*

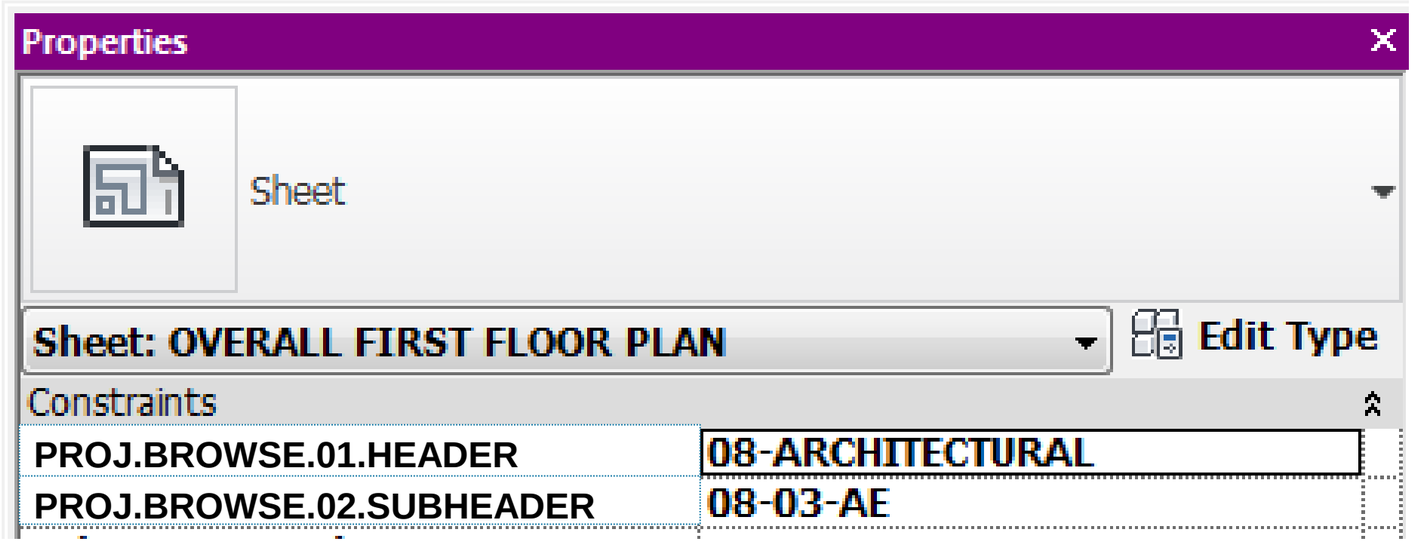
| | | | | | |
|---|---|---|---|---|---|
| | | | | | Optional-for Construction prefix for buildings with multiple packages or phased releases within the same project/structure. See "construction descriptors" for this project. |
| | | | | | **Two Digit discipline designator**; e.g. AE, G-, GI -- use "Discipline Designators" master list |
| | | | | | **2-digit SHEET TYPE DESIGNATOR** / **TYPICAL SINGLE DIGIT PLAN TYPES DESIGNATOR DESCRIPTION (e.g. AE11x)** |
| | | | | | **00** General (symbols legend, notes, etc.) |
| | | | | | **10** Plans (horizontal views) |
| | | | | | **15** REFLECTED CEILING PLANS |
| | | | | | **18** ROOF PLANS |
| | | | | | **20** Elevations (vertical views) |
| | | | | | **30** Sections (building sections) |
| | | | | | **31** wall sections |
| | | | | | **32** wall sections |
| | | | | | **40** Enlarged plans |
| | | | | | **41** Large-Scale Views (plans, elevations, stair sections, or sections that are not details) |
| | | | | | **46** Enlarged interior elevations (Specialized corridors, entry/reception/etc.) |
| | | | | | **48** Enlarged interior elevations (Specialized corridors, entry/reception/etc.) |
| | | | | | **50** Details |
| | | | | | **60** Schedules and Diagrams |
| | | | | | **61** door schedules |
| | | | | | **62** WINDOW, DOOR TYPES, STOREFRONT, CURTAIN WALL, HOLLOW METAL DETAILS |
| | | | | | **70** wall partition sheets |
| | | | | | **80** User Defined (for types that do not fall in other categories) |
| | | | | | **90** 3D Representations (isometrics, perspectives, photographs) |
| | | | | | **Floor level #**(where applicable), or **sequential number**. (note use Two or three digits for large multistory projects >9 floors) |
| | | | | | **Subdivided view identifier** ("match line" views) where applicable to split (parent/dependent views). **Note:** Subdivided plans typically indicated with the addition of a trailing letter or Dot and letter, e.g. "AE100A, AE100B, AE100C" or "AE100.A, AE100.B, AE100.C" |
| **XXX-** | **AE** | **10** | **0** | **A** | **Sheet Number "XXX-AE-100A"** |

# Set Sheet Order Shared parameters (all disciplines)

**PROJ.BROWSE.01.HEADER**
Numbered header for each discipline e.g.
E.g. “**08-ARCHITECTURAL**”

**PROJ.BROWSE.02.SUBHEADER**
Sheet sub-location within the discipline.
E.g. “**08-04-AI**” for arch interiors

Optional:
**PROJ.BROWSE.00.HEADER**
E.g. “**ARCHITECTURAL**” to remove the unsightly number



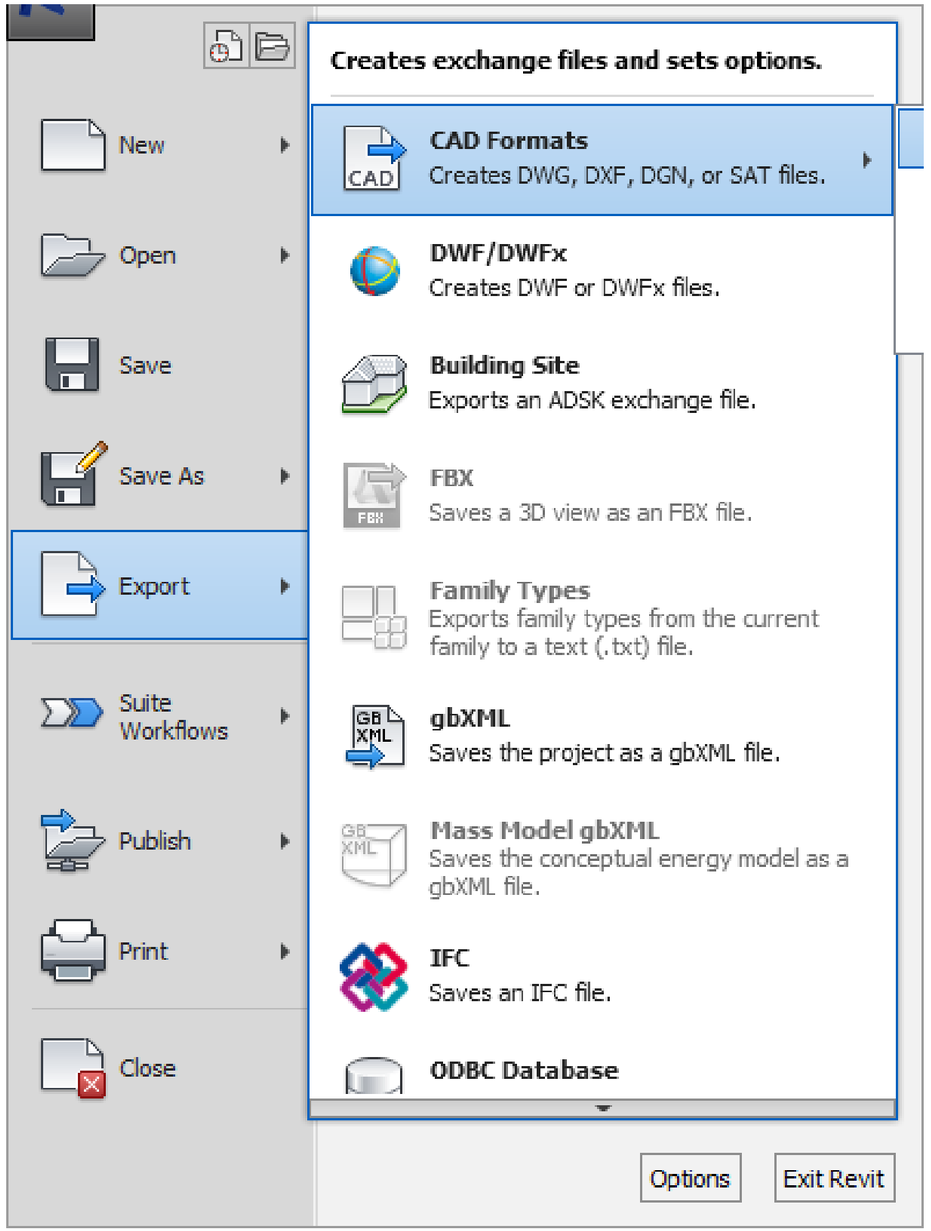
# Use PDF (BlueBeam) break apart sheet sets by the numbers…

- Add the shared parameters to title block in white text(will point invisible white)
- Use Bluebeam extract them for renumbering and dissecting.
- The numbers use the natural sort to reorder individually extracted PDF sheets back into a set.

# Exporting using the framework

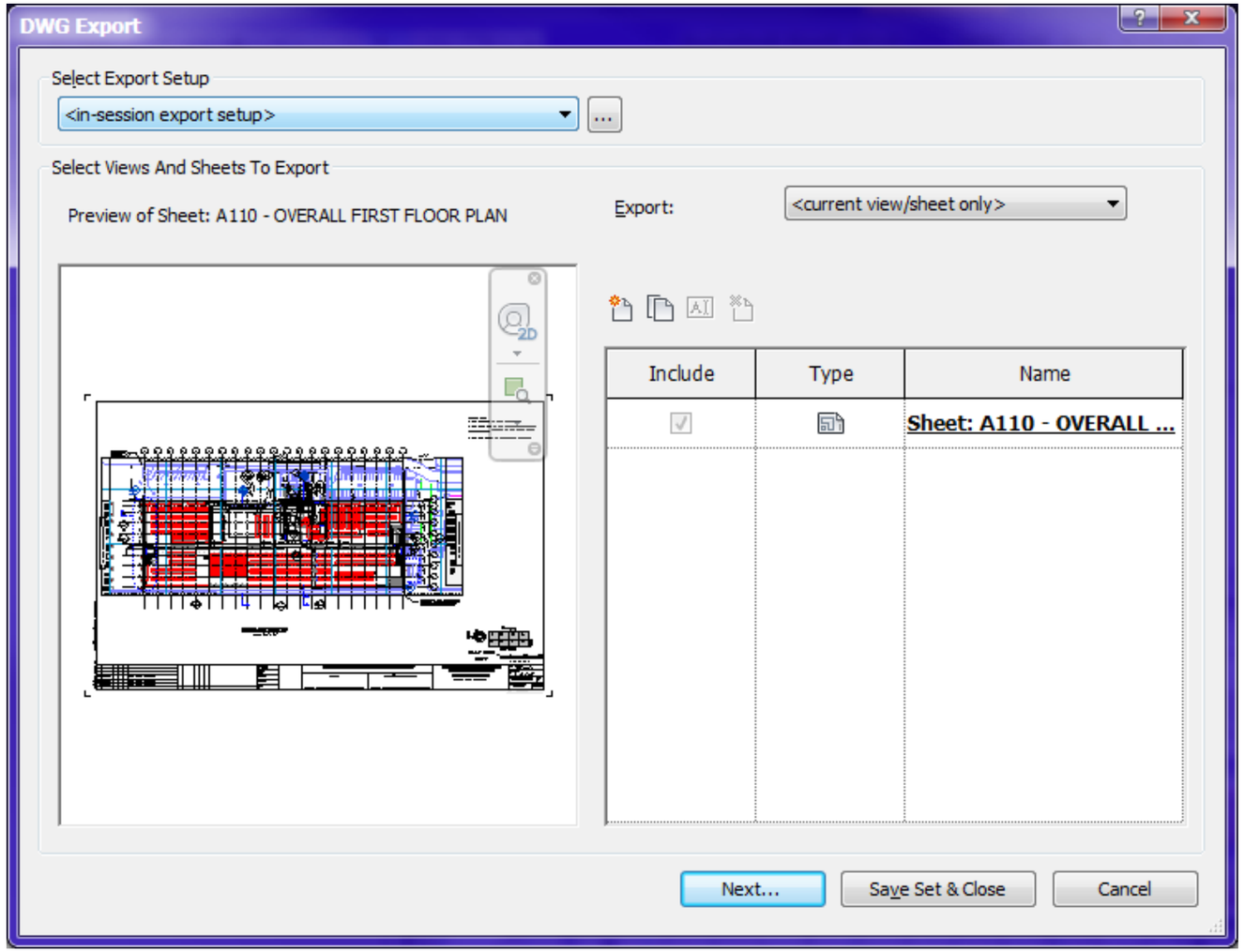
# Exporting

- Sheet names/numbers and view names are used in creating embedded blocks and linked files
- Export CAD formats
- Export CAD



# Exporting

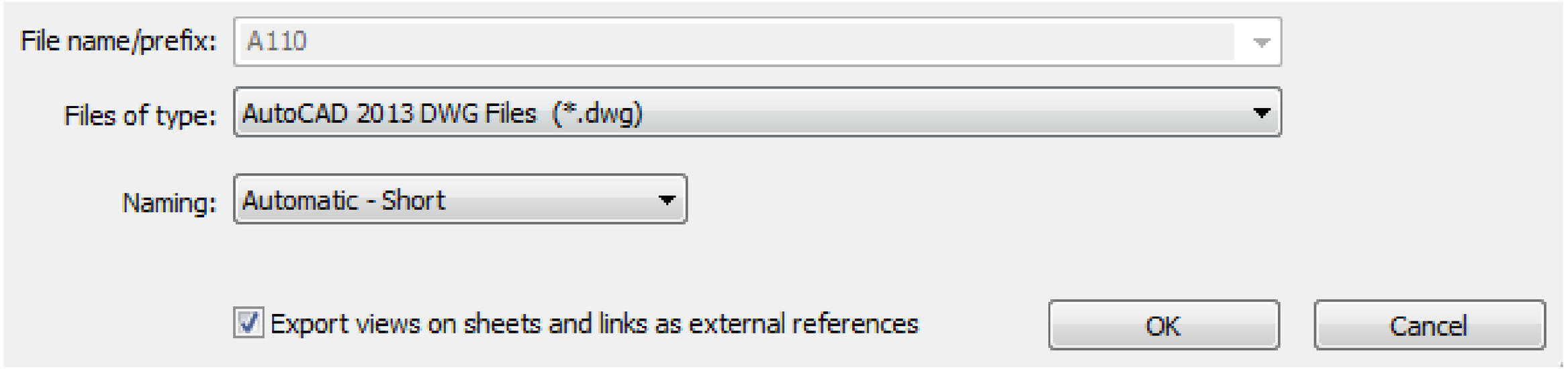
- Select sheets and sets
- Select parents to dependent views




Export and manage using the framework

# Exporting – settings at save

- Automatic short for naming
- Export views as references



# Re-path partial plans

- Revit chops off the plans
- After export re-path the partial chopped views to the parent CAD file
- This will better match traditional CAD setups

- Fine tuning is required for advanced (systems) exports from MEP to CAD.

# Thank You

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