“Autodesk Revit Best Practices #2:
Shawn Zirbes, Cad Technology Center (CTC), Minneapolis, MN”
AGC BIM Forum LOD

LEVEL OF DEVELOPMENT SPECIFICATION

2014
BIM for Masonry LOD Examples
Office building – Structural System Modelling
Brick Office Building – Steel and CMU Structural Systems

Structure model

- Brick with Metal Stud Backup
- Brick with CMU Backup
Exterior Wall Type – Brick with CMU Backup & Brick with Metal Stud Backup – LOD 300

For LOD 300 model exterior walls have been developed as 2 wall types, one wall type for structure layer & one wall type for all remaining layers other than structure.

Exterior brick veneer wall type remains common for both backup systems and has all layers in one single wall family.
CMU grouted cells placed at new scope area for LOD 350 modeling

CMU Wall is placed in Structural Model and remaining wall layers are modeled as individual wall types in architectural model.
Exterior Wall Type – Brick with Metal Stud Backup – LOD 350

Metal Studs placed at new scope area for LOD 350 modeling

All wall layers are modeled as individual wall types in architectural model
Anchor Type – Brick with CMU Backup – LOD 350

Brick Tie placement between Brick Veneer and CMU Backup

Brick Tie placement in Plan

Sectional View

Brick Tie
Anchor Type – Brick with Metal Stud Backup – LOD 350

Brick Tie placement between Brick veneer and Metal Stud Backup wall

Brick Tie placement in Plan

Sectional View

Brick Tie

Brick Tie placement between Brick veneer and Metal Stud Backup wall
Design Options – Three design options created at brick exterior model

Brick pattern developed as model hatch patterns.

- Running Bond
- Flemish Bond
- Stacked Bond
LOD 350 DETAILS
CMU BACKUP WALLS
Brick Office Building – Steel and CMU Structural Systems

Base Detail Drafting View – Brick with CMU Backup – LOD 350

- Brick Veneer
- Weep in Wall to Drain out water
- Wall Ties
- Vertically grouted reinforced cells
- CMU Back-Up
- Insulation
- Drainage Material
- Weeps
- Concrete Wall

Sectional View of Wall Base

Weep in Wall to Drain out water

3D View of Wall Base
Window Sill Detail Drafting View – Brick with CMU Backup – LOD 350

Sectional View of Window Sill

- Anchor (in head joint)
- Drip edge in sill
- Flexible membrane flashing with end dams
- Continuous galvanized angle with PVC shim on back of angle
- Air barrier fluid applied membrane
- 1” - 1 1/4”

3D View

- High efficiency alum. window frame
- Receptor framing
- Stool
- 2x4 treated wood nailer
- Grout CMU solid
- 2” rigid insulation
- 8” CMU back-up
- Adjustable dovetail anchors

Thermally Broke Aluminum Window Frame

Brick Veneer

Flashing Member

Sill

L-Angle on Wall

Flashing with End Dams

Sill and Window
Head Detail Drafting View – Brick with CMU Backup – LOD 350

Vertically Grouted Reinforced Cells
Drainage Panel
Adjustable Dovetail Anchors

Sectional View of Lintel
3D View of Lintel

2" Rigid Insulation
Adjustable Dovetail Anchor
4" Brick (Clay) Veneer
Flexible Membrane Flashing
Drainage Material
Weeps @ 24" OC.
Loose Steel Lintel Hot Dip Galvanized
Receptor Framing

2" Air Space
8" CMU Back-Up
Air Barrier Fluid Applied Membrane
Flexible Membrane Flashing
2x6 Treated Wood Nailer
Lintel Unit (W/ Reinf, Per Structural Design Grouted Solid)

Steel Lintel
Wood Nailer
Weeps
Drainage Material

Brick Office Building – Steel and CMU Structural Systems

Coping Detail Drafting View – Brick with CMU Backup – LOD 350

Sectional View of Coping

- SEALANT (UNDER DRIP)
- COMPRESSIBLE FILLER
- 4" BRICK VENEER (CLAY)
- 2" RIGID INSULATION
- GROUT TOP CMU COARSE SOLID
- ADJUSTABLE DOVETAIL ANCHORS
- 8" CMU BOND BEAM W/ REINF.

SLOPE TO ROOF

- STAINLESS STEEL STRAP ANCHOR W/ SPLIT-TAIL AND EXPANSION PIN W/ GASKET INCL. COMPRESSIBLE MATERIAL IN SLOT
- NATURAL STONE OR PRECAST CONCRETE COPING
- TREADED WOOD BLOCKING UNDER ANCHOR
- DRIP EDGE IN COPING ON BOTH SIDES
- COMPATIBLE METAL COUNTER FLASHING HEMMED W/DROP
- 2" RIGID INSULATION
- 3/4" SHEATHING
- ROOF FINISH

PCC Coping

- Strap Anchors with Wood Blocking
- Metal Counter Flashing
- Insulation with voids for wood blocking
- Sheathing

Insulation layer

Flash over base insulation

Coping Stone over the flashing

3D View of Coping
LOD 350 DETAILS
METAL STUD BACKUP WALLS
Base Detail Drafting View – Brick with Metal Stud Backup – LOD 350

Sectional View of Base

- Air Barrier
- 7" LW Concrete on 4" Metal Deck
- Adjustable Wall Ties @ 18" O.C. Vertically and 24" O.C. Horizontally
- Air Barrier Fluid Applied Membrane
- Thru Wall Flashing 8" Vertical Min. Adhered to Metal Drip Edge
- 4" Brick (Clay) Veneer
- 2" Rigid Insulation
- Drainage Material
- Weep Vent

Plan View

- Metal Studs
- Rigid Insulation
- Brick Veneer
- Gypsum Wall Board
- Drainage Material
- Weeps

Flashing with Brick ties on Stud Wall
Air Barrier and Drainage Material
Weeps and Brick Veneer
Window Sill Detail Drafting View – Brick with Metal Stud Backup – LOD 400

Sectional View of Window Sill

- SILL BRICK ANCHORS
- FILL COLLAR & CORE SOLID
- SLOPE BRICK MIN. 15" W/1" OVERHANG
- FLEXIBLE MEMBRANE FLASHING WITH END DAMS
- 4" BRICK(CLAY) VENEER
- 2" AIR SPACE
- 2" RIGID INSULATION
- CONCAVE MORTAR JOINT
- STOOL
- CONTINUOUS GALVANIZED L-ANGLE W/PVC SHIM ON BACK OF ANGLE
- 6"-16 GA. STEEL STUD @ 16" O.C.
- SIDE MOUNTED ADJUSTABLE TIES W/ INSULATION SUPPORTS
- AIR BARRIER FLUID APPLIED MEMBRANE
- 1/2" GYPSUM WALL BOARD

3D View

- Window Frame
- Flashing Member
- Inclined Brick Sill
- Brick Veneer
- Brick Tie

L-Angle support → Brick Sill on Metal Flashing → Slope Brick Sill → Window Sill
Weeps and Brick ties are placed aligned to the course mortar.
Coping Detail Drafting View – Brick with Metal Stud Backup – LOD 350

EXTEND A MEMBRANE TO EXTERIOR UNDERSIDE OF SHEET METAL COPING
SLOPING METAL COPING W/ CONTINUOUS CLEAT BOTH SIDES-EXTEND MIN. OF 4” OVER FACE OF BRICK
SEALANT
4” BRICK VENEER
CONCAVE MORTAR JOINT
2” AIR SPACE
SIDE MOUNTED ADJUSTABLE TIES W/INSULATION SUPPORTS

WOOD NAIDER W/ (2) SCREW-FASTNERS
SEALANT
1/2” GYPSUM WALL BOARD
5”-16 GA. STEEL STUD @16” O.C
2” RIGID INSULATION
AIR BARRIER FLUID APPLIED MEMBRANE

BASIC ROOF INSULATION
STRUCTURAL STEEL

SECTIONAL VIEW OF COPING

METAL SHEET COPING
WOOD NAIDER
METAL STUD WALL
BRICK VENEER
ROOF

3D VIEW OF COPING
Brick Office Building – Steel and CMU Structural Systems

Movement Joint – Brick with CMU Backup & Brick with Metal Stud Backup – LOD 350

- Preformed Gasket
- Silicon Sealant with Backer Rod
- Control Joint in CMU Wall
- Neoprene Pad
- Backer Rod
- Expansion Joint Detail

3D View

Red circled items indicate: Silicon Sealant with Backer Rod
In the present model, with most of the detail at LOD 300 & LOD 350, two worksets are sufficient enough to accommodate all elements of the model.

Exterior Shell Model
- Exterior
- Exterior_350

Includes all element detailed at LOD 300
Includes all element detailed within the scope of LOD 350

Along with these two modeling worksets, there are additional basic worksets in the model:
- Shared Levels and Grids
- Revit Link_Arch-Int
- Revit Link_Mech
- Revit Link_Stru

Contains all levels and grid lines for model views
Contains elements from respective linked files

As a sample case scenario; in case the entire model is created at LOD 350, we can further subdivide the worksets to allot to each element category as shown below:

LOD 350 Model
- Shared Levels and Grids
- Revit Link_Stru
- Revit Link_Mech
- Revit Link_Arch-Int
- CMU Walls
- Stud Walls
- Insulation Walls
- Veneer Walls
- Exterior Metal Studs
- Air Barrier Systems
- Glazing
- Grouted Cell
- Stainless Steel Flashing
- Support System
- Site
“Thank You:
Shawn Zirbes, Cad Technology Center (CTC), Minneapolis, MN”