Building Technology III New York City College of Technology

> Course Day 16 Revit Day 08 (Project Day 5)

The New Academic Building – Masonry Wall Construction : GYM



Professor Paul C. King, RA, AIA, ARA Prof.Paul.King@Gmail.com

http://professorpaulking.wordpress.com/ http://students.autodesk.com/

Project Day 04

GYM Brick on CMU •Duplicate •Edit Structure •Assembly View

- Split Region
- Assign Material
- Assign Wall Type
- Add Reveals
- Add Sweeps
- Overview 1 2

Windows

- 96 x 144
- Insert & Align
- Copy & Mirror

GYM Overview

Autocad Coursing Study

- · Layers & Units
- Wall Section
- Elevation
- Section

• Steps 1 2 3 4 5 6 7 8 9 10

Wrap-Up

Building Tech III CityTech

New Masonry Wall : Brick on CMU

 Select existing masonry wall • Edit Type > Duplicate Masonry Wall

Properties			×	Temp	nrary Hide/	Isolate		
					Type Propertie	×5		
Basic V Exterio	Vall r - Brick	on CMU	•	ſ	- 1			
					Family:	System Family: Ba		Load
Walls (1)	•	Edit Ty	pe		Type	Exterior Brick or		Duplicate
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Level 2						15-11.		7 1pm pd 1 7

• Name the new wall GYM: Exterior – Brick on CMU

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Building Tech III CityTech

New Masonry Wall : Brick on CMU

-amily:	System Family: Bas	ic Wall	Load	• View	: Section Mod	lify Type	Attributes	
Type:	GYM - Exterior - Brid	ck on CMU	Duplicate					
			Banama					
			Kendniem	Edit Assembly				
Type Paran	eters					Family: Ba	asic Wall	
	Parameter		Value			Type: E	xterior - Brick on CMU - GYM	ht. 20
	- didiffect					Total dicoless. 1	7 1/2 Sample neig	nt: 20
Construc	tion		*					
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Wrapping	at Ends	None				1 Finish 1 [4]	Masonry - Bric Variable	V
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winderi		1 / 1/2				3 Thermal/Air L	Insulation / Th 0' 3"	V
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			1 Finish 1 [4] Masonry - Bric 0' 3 5/8			5 Core Boundary	Layers Above W 0' 0"	
			2 Thermal/Air L Misc. Air Laver 0' 3"			6 Structure [1]	Masonry - Co 0' 7 5/8"	
			3 Thermal/Air L Insulation / Th 0' 3"			7 Core Boundary	Layers Below W 0" 0"	
			4 Membrane La Vapor / Moist 0' 0"			8 Substrate [2]	Metal - Furrin 0° 15/8	
			5 Core Boundary Layers Above W 0' 0"				INTERIOR SIDE	
			6 Structure [1] Masonry - Co 0' 7 5/8	<u>3' 4''</u>		Insert	Delete Up	Do
			7 Core Boundary Layers Below W 0' 0"					
			8 Substrate [2] Metal - Furrin 0' 1 5/8			Default Wrapping		
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			At Inserts: At Ends:		· · · · · · · · · · · · · · · · · · ·	Modify	Merge Regions	Sweeps
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Wrap-Up

Building Tech III CityTech

Edit Assembly View

- Sectional or Plan View of Assembly
- Listing of Layers of Assembly

Edit Assembly

4

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- Split Region
- Sweeps & Reveals



Add Precast or Stone Base : Split Region



Project Day 04

- Split RegionAssign Material Assign Wall Type
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- Add Sweeps
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GYM Overview

Autocad **Coursing Study**

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Building Tech CityTech

		*	Family: Type: Total thic Resistant Thermal I Layers	GYM - Exterio GYM - Exterio deness: 1' 7 1/2" ce (R): 31.6278 (h-fi Mass: 28.6462 BTU	vr - Brick on CMU (2+年)/BTU I°F			Sample Height: 20' 0"	
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- HA-			3	Thermal/Air Layer [3]	Rigid insulation	0'3"			
			4	Membrane Layer	Damp-proofing	0' 0"			
			5	Core Boundary	Layers Above Wrap	0' 0"		in the second	
			6	Structure [1]	Concrete Masonry Un	0' 7 5/8"		V	
			7	Core Boundary	Layers Below Wrap	<mark>0' 0"</mark>			
			8	Substrate [2]	Metal Furring	0' 1 5/8"			
	₽		9	Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"			-
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- plit Region
- elect Front Face of Brick
- elect Dimension
- et Value to 3'-4" (brick coursing)



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Wrap-Up

Building Tech III CityTech

Add Precast or Stone Base : Assign Material

	Function	Material	Thickness			terial
1	Finish 1 [4]	Brick, Common 🛛 🔶	Turnubic	Highligh	t first laver	
2	Thermal/Air Layer [3]	Air	0' 3"		,	
3	Thermal/Air Layer [3]	Rigid insulation	0' 3"			
1	Membrane Layer	Damp-proofing	0' 0"			
5	Core Boundary	Layers Above Wrap	0' 0"	1		
5	Structure [1]	Concrete Masonry Un	0' 7 5/8"	171	V	
7	Core Boundary	Layers Below Wrap	0' 0"			
8	Substrate [2]	Metal Furring	0' 1 5/8"			
9	Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"	V		
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	P1 1 4 141	DILO	N		v mot layer	
2	Finish 1 [4]	Brick, Common	Variable			
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- Select First Layer > Insert New Layer
- Function to Finish 1 [4]
- Assign Material > Precast
- Assign Layers



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Wrap-Up

Building Tech III CityTech

Selected wall displays with precast base

Add Precast or Stone Base : Assign Wall Type





- Select all 4 masonry walls and assign the to the new type
- GYM Exterior Brick on CMU





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GYM Brick on CMU Duplicate Edit Structure Assembly \

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Building Tech III CityTech

Masonry Wall : Add Reveals

Assign Layers

Preview >>

Split Region

from the wall

shown

Edit Assembly

3

Add 4 reveals as

Reveals

View: Section: Modify type 🔻

Reveals

Reveals

 What is a reveal? Reveals A reveal is a negative Profile Distance Offset Flip From Side Setback shape – it is subtracted 1 0' 0" Reveal-Brick Course : 2 Bricks 18' 0" Base Exterior 0'0" 2 Reveal-Brick Course: 1 Brick 12' 0" Base Exterior 0' 0" 0' 0" 3 Reveal-Brick Course : 1 Brick 8' 0" Exterior 0' 0" 0' 0" Base 4 Reveal-Brick Course : 3 Bricks 6' 0" Base Exterior 0' 0" pron. 0' 0" 1- Reveal : 2 Bricks : 18' from Base 2- Reveal : 1 Bricks : 12' from Base 3- Reveal : 1 Bricks : 8' from Base Family: 4- Reveal : 3 Bricks : 6' from Base Profile Load Profile Add Delete Duplicate OK Cancel Apply J Select Add 4 Times • Options: Load Profile Add Duplicate Delete OK Cancel Apply Profile Modify Merge Regions Sweeps Select Reveals Distance

OK

Cancel

Help

Reveals

- From (Base/Top)

X

Project Day 04

GYM Brick on CMU Duplicate Edit Structure Assembly \

- Split Re

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GYM Overview

Autocad **Coursing Study**

- Layers & Units
- Wall Section
- Elevation
- Section
- Steps 1 2 3 4 5 8 9 10

Wrap-Up

Building Tech III CityTech

Masonry Wall : Add Sweeps

Wall Sweeps

Wall Sweeps

- What is a sweep?
- A sweep is a positive shape - it is added to the wall
- Add 2 sweeps as shown

Edit Assembly

(7) 2D



X

Offset

Project Day 04

GYM Brick on CMU •Duplicate •Edit Structure •Assembly View

- Split Regid
- Assign Material
- Assign Wall Type
- Add Reveals
- Add Sweep:
- Overview 1 2

Windows

- 96 x 144
- Insert & Align
- Copy & Mirror

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Masonry Wall : With Reveals and Sweeps





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Masonry Wall : With Reveals and Sweeps



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Building Tech III CityTech

Windows : Create New Type 96 x 144 (8' x 12')

Architecture Structure	Systems Insert Annotate Analyze	Massing & Site Collaborate View M	anage Modify 🖾 🔹
			0 0 1 0 0
Modify Wall Door Window	Component Column Roof Ceiling	Floor Curtain Curtain Mullion Railing System Grid	Ramp Stair Model Model Mode Text Line Group
Select 👻 🗤	Indow (MN) Build	Cir	culation Model
Properties	X Temporary Hide/Isolate	52	
Fixed	Type Properties	2	
36" x 48"	Family: Fixed	▼ Load	• Architecture >
New Windows	it typ	Dupicate	Window
Sill Height 3' 0"		Rename	·····aow
Identity Data	A Type Parameters		
Comments	Parameter	Name	• Fixed 36" <u>x 48</u>
Other	8 Construction	05 x 144 (6' x 12')	
Head Height 7' 0"	Wall Closure Construction Type	By he Name: 90 x 144 (8 x 12)	Edit Type >
	Materials and Finishes		
	Glass Pane Material	Glass OK Cancel	Duplicate
	Sash Material	Sash	
Properties help Ar	Dimensions	Â	• 06 v 1// (9' v 1
Project Browser - NewAcademicBldg.Prof.King.Day.05.rvt	× Height Default Sill Height	4 0 3' 0"	* 30 X 144 (0 X 1
□ [] Views (all)	Width	3' 0"	
	Window Inset	0' 0 3/4"	
Level 2	E Rough Width Rough Height		
	Identity Data	*	
Here Floor Plans	Assembly Code	B2020100	
	Keynote		
Level 1	Model Manufacturer		
Level 2 Level 3	Dimensions		
Level 4	Height	12' 0"	^
— Level 6	D.f. dk Cill Links	21.01	
		3' U'	
	Width	8. 0.	
	Window Inset	0' 0 3/4"	
	Rough Width		

Project Day 04

Windows : 96 x 144 (8' x 12') : Insert & Align GYM Brick on CMU 1.6 Guidelines 1.6 Duplicate Edit Structure Offset 10' Assembly View NN Offset 8" (2x) Split Region Draw 10 Add Windows Guideline Assign Material Assign Wall Type = = = = G -Add Reveals Offset 8" [10] each side Add Sweeps Overview 1 2 (MM) ndows Collaborate View Manage Modify | Place Lines Massing & Site 96 x 144 notate Analyze Properties × Insert & Align P Copy & Mirror CCCA Fixed -12 + 3 96 x 144 (8' x 12') - 레 - ₩ 💥 • Sill Height 10'-0" **GYM Overview** Draw Modify View Measure Create - E Edit Type Windows (2) Offset: 0' 8" Constraints \$ Autocad Level Level 1 **Coursing Study** Massing & Site Collaborate View Architecture Analyze Sill Height 10' Layers & Units Show Hidden Lines 4 9 Ļj S Wall Section Remove Hidden Lines Modify View Visibility/ Filters Thin Render Render Render 3D Section Templates Graphics in Cloud Gallery View Lines Elevation Select * Section Guidelines • Align • Steps 1 2 3 4 5 6 7 8 9 10 Thin Lines Wrap-Up Align to Guidelines

Building Tech III CityTech

Project Day 04

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Copy & Mirro

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Building Tech III CityTech

Windows : Copy & Mirror



(1.6)

(NN)

MM)

Windows do not

display in plan?



North Elevation

Copy Across

X

- Select Windows
- Mirror across axis





- Level 1
- View Range
- Offsets to 12'

Project Day 04

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Building Tech III CityTech

GYM: Overview

 Isometric & Perspective views of GYM



Project Day 04

CityTech

Autocad Study : Layers & Units



Project Day 04

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Building Tech III CityTech

Family: Basic Wall Type: GYM - Exterior - Brick on CMU Total thickness: 1' 7 1/2" Resistance (R): 32.1276 (h·ft²·약F)/BTU Thermal Mass: 35.4526 BTU/°F Layers EXTERIOR SIDE Function Material 1 Finish 1 (4) Concrete, Precast 0' 3 5/8" 2 Finish 1 (4) Structural Material 1 Finish 1 (4) Concrete, Precast 0' 3 5/8" 2 Finish 1 (4) Structural Material 1 Finish 1 (4) Concrete, Precast 0' 3 5/8" 3 Thermal/Air Lay 3 Thermal/Air Lay 4 Thermal/Air Lay 5 Membrane Laye 5 Membrane Laye 6 Concrete Maroury Liptice 7 Structure [1] 7 Structure [1]								×
Layers EXTERIOR SIDE Function Material Thickness Wraps Structural Material 1 Finish 1 (4) Concrete, Precast 0' 3 5/8" Image: Concrete, Precast Image: Conconcet, Precast Image: Concre		*	Family Type: Total t Resist Therm	: Basic GYM - hickness: 1' 7 1 ance (R): 32.12 al Mass: 35.45	Wall Exterior - Brick on CMU /2* 76 (h-ft2-ଙ୍କ)/BTU 26 BTU/ଙ୍କ		Sample Heig	pht: 20' 0"
Function Material Thickness Wraps Structural Material 1 Finish 1 (4) Concrete, Precast 0' 3 5/8" Image: Concrete, Precast Imag			Laye	rs	EXTERIO	R SIDE		
1 Finish 1 [4] Concrete, Precast 0' 3 5/8" Image: Concrete, Precast 0' 3 5/8" 2 Finish 1 [4] Brick, Common 0' 3 5/8" Image: Concrete, Precast Image: Co				Function	Material	Thickness	Wraps	Structural
2 Finish 1 [4] Brick, Common 0' 3 5/8" V 3 Thermal/Air Lay Air 0' 3" V 4 Thermal/Air Lay Rigid insulation 0' 3" V 5 Membrane Laye Damp-proofing 0' 0" V 6 Core Boundary Layers Above Wrap 0' 0" V 7 Structure [1] Correcte Marcon Ulbit 0' 2 5/8" V			1	Finish 1 [4]	Concrete, Precast	0' 3 5/8"	V	
3 Thermal/Air Lay Air 0' 3" Image: Constraint of the constraint o	1		2	Finish 1 [4]	Brick, Common	0' 3 5/8"		
4 Thermal/Air Lay Rigid insulation 0' 3" ✓ 5 Membrane Laye Damp-proofing 0' 0" ✓ 6 Core Boundary Layers Above Wrap 0' 0" ✓ 7 Structure [1] Correste Maxony Units 7 25/8"			3	Thermal/Air Lay	Air	0' 3"		
5 Membrane Laye Damp-proofing 0' 0" 6 Core Boundary Layers Above Wrap 0' 0" 7 Structure [1] Concrete Masonov Units 0' 7.5/8"			4	Thermal/Air Lay	Rigid insulation	0' 3"		
6 Core Boundary Layers Above Wrap 0' 0" 7 Structure [1] Concrete Masony Units 0' 75%"	E.		5	Membrane Laye	Damp-proofing	0' 0"		
7 Structure [1] Concrete Masonny Units 0' 7 5/8"			6	Core Boundary	Lavers Above Wrap	0' 0"		
		100	0	core boundary				
8 Core Boundary Layers Below Wrap 0' 0"			7	Structure [1]	Concrete Masonry Units	0' 7 5/8"		V
	4"		7 8 9	Structure [1] Core Boundary Substrate [2]	Concrete Masonry Units Layers Below Wrap Metal Furring	0' 7 5/8" 0' 0" 0' 1 5/8"		



Modify Merge Regions

Assign Layers Split Region Preview >>

Reveals		
OK	Cancel	ן (

-

Sweeps

Help

INTERIO	OR SIDE
	L lin

(1)	34

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View: Section: Modify type 🔻

-

Project Day 04

GYM Brick on CMU •Duplicate •Edit Structure •Assembly View

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Building Tech III CityTech

Autocad Study : Layers of Masonry Wall

The Elevation:

n: Create a set of guidelines based on the outlines of the elevations of the multi-use space taken from the Revit model. Add guidelines to find the center of the first brick and then account for the 3/8" joint by offsetting this line 3/16" in each direction. Use guidelines to draw the bricks.



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Building Tech III CityTech

Autocad Study : Layers of Masonry Wall

The Section:

Start by drawing the guidelines. Create a horizontal line and offset this up 8". Remember that the first brick sits 3/8" above the ground line. Next offset the top line down three times at a distance of 3/8" to account for the mortar joints. Draw a diagonal line in the remaining space. Use the divide command to place "points" at the third points along the diagonal line. Draw your first brick in section. Draw your first concrete block. Copy the bricks to complete the first 8 inches of the wall.



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Building Tech III CityTech

Autocad Study : Layers of Masonry Wall

Step by Step:

- Step: Creating properly coursed bricks in elevation using an 8" module
- Step 1: Starting at 0,0 draw horizontal and vertical lines at least two feet long. Next Offset these two lines over and up at a distance of 8 inches.



Step 2: Offset the horizontal lines down three times at a distance of 3/8" once for each of the three joints. Offset the vertical line left 3/8" to account for 1 mortar joint.



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Building Tech III CityTech Step 3: Draw a diagonal line from intersection to intersection. Use the <u>divide</u> command to locate point notes at the third points of the line.



Step 4: Draw a horizontal guideline from the first point node across the vertical lines. On the <u>Brick Layer</u> draw a rectangle from intersection to intersection.





Step 5: Copy the first brick up the height of the brick.



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Wrap-Up

Building Tech III CityTech Step 6: Move the second brick up 3/8" or the height of 1 mortar joint. Copy the second brick up again the distance of 1 brick and 1 joint. Snap to the guidelines.



Step 7: Draw a guideline from the midpoint of the second brick directly up. Offset this guideline 3/16" in each direction to account for a full mortar joint.



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Building Tech III CityTech Step 8: Complete a half brick by drawing from the intersection of the guidelines to the corner of the second brick. Move the second brick over the distance of the half brick plus 1 joint.



Step 9: Copy the second row of bricks up to complete the first set of bricks.



- **Step 10:** Working with this set of bricks use the **Array** command to copy bricks to fill the horizontal and vertical dimensions of the elevations. Working with proper coursing work out all the vertical and horizontal masonry openings.
 - Note: The half brick should be used to begin developing the wall section.

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Building Tech III CityTech

Day 16 / Revit Day 08 / Project Day 05 - Wrap Up

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