

Civil AI Estimator

Automating Quantity Takeoff in Revit 2025

Powered by OpenAI & Revit API
Developer: Lynn

THE PROBLEM

Manual takeoff is slow (hours/days).

Coding standards (CESMM4) is complex.

Excel spreadsheets are disconnected from BIM.

THE SOLUTION

A native **Revit Add-in** that connects to **ChatGPT**.

- ✓ Reads Geometry (Volumes/Areas)
- ✓ Identifies Materials
- ✓ Assigns Cost Codes automatically

INSTALLATION WORKFLOW

1.Download Source from GitHub

<https://github.com/Lynn-hh/Revit-Civil-AI-Estimator/tree/main/RevitAiEstimator>

2.Download VisualStudio

<https://visualstudio.microsoft.com/>

3.Paste API Key in AiService.cs

4.Build Solution (Ctrl+Shift+B)

Revit magically loads the plugin!

1.Download Source from GitHub

<https://github.com/Lynn-hh/Revit-Civil-AI-Estimator/tree/main/RevitAiEstimator>

The screenshot shows the GitHub repository page for **Lynn-hh / Revit-Civil-AI-Estimator**. The repository is public and has 1 branch (main) and 0 tags. The **Code** button in the top navigation bar is highlighted. A dropdown menu is open, showing options to clone the repository (Local, Codespaces) or download the source code as a ZIP file. The **Download ZIP** option is highlighted.

The repository page displays the following information:

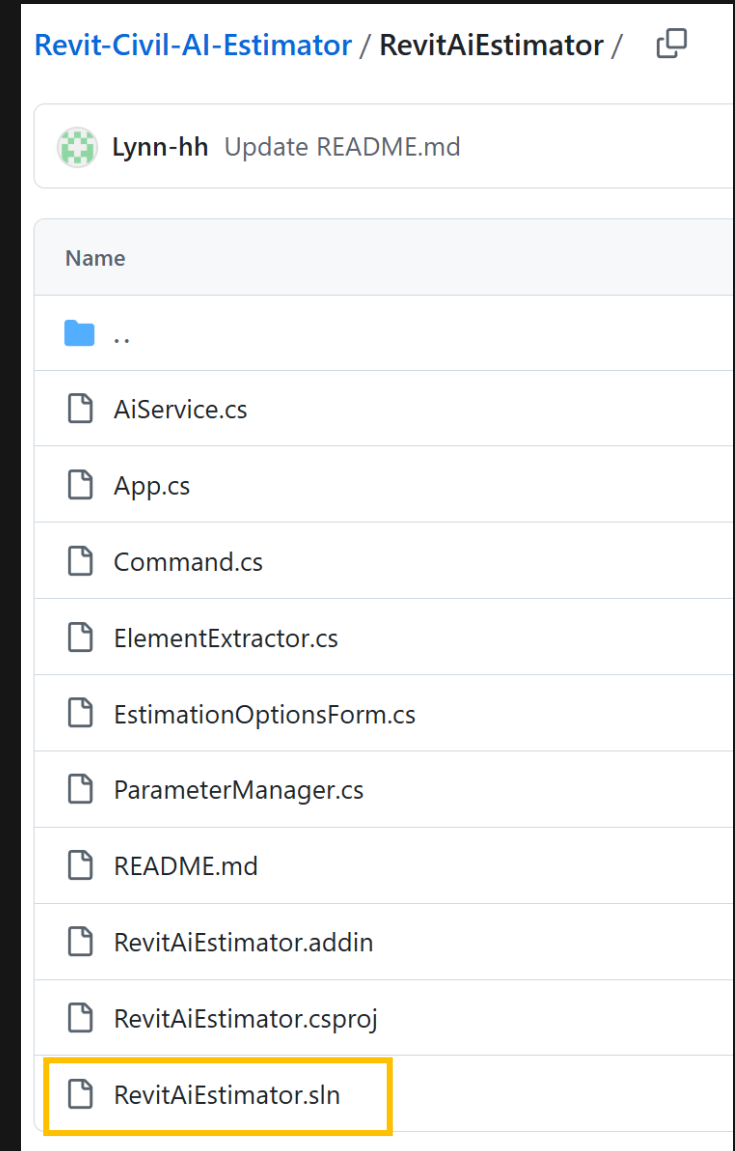
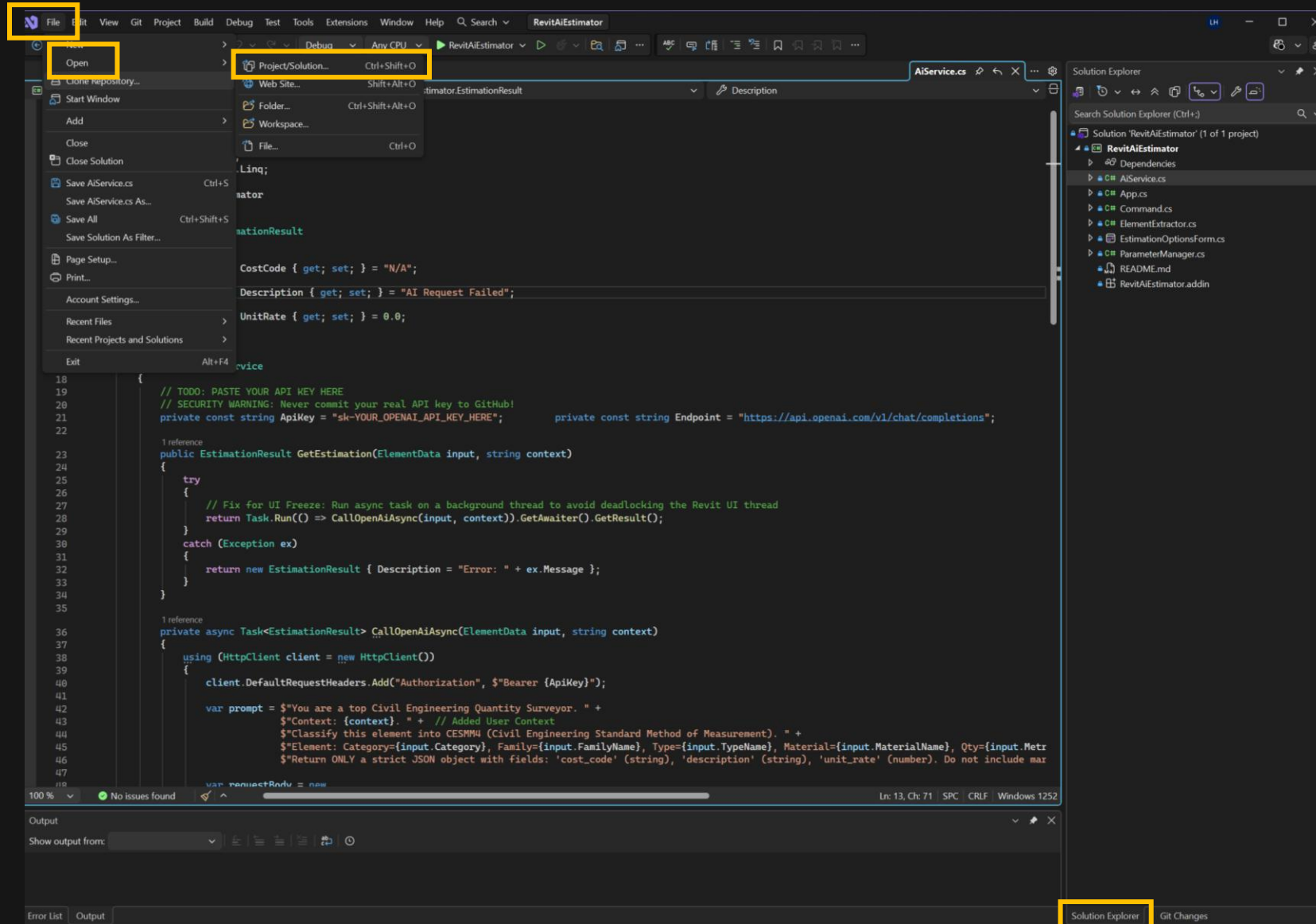
- Repository name: **Revit-Civil-AI-Estimator** (Public)
- Branch: **main** (1 Branch, 0 Tags)
- Files: **RevitAiEstimator** (Update README.m...), **.gitignore** (first commit)
- README section: **Add a README** (Help people interested in this repository understand your project. [Add a README](#))

The **Code** dropdown menu includes the following options:

- Local** (selected)
- Codespaces**
- Clone** (with a question mark icon)
- HTTPS** (selected), **SSH**, **GitHub CLI**
- URL: <https://github.com/Lynn-hh/Revit-Civil-AI-Estin>
- Clone using the web URL.
- Open with GitHub Desktop**
- Download ZIP** (highlighted)

2. Download VisualStudio and open the github file: RevitAiEstimator.sln

<https://visualstudio.microsoft.com/>



3. Add your GPT API Key in file AiService.cs

How to get GPT key (next slide)

The screenshot shows the Visual Studio IDE with the RevitAiEstimator project open. The file AiService.cs is selected in the Solution Explorer and is open in the editor. The code in AiService.cs includes using statements for System, System.Net.Http, System.Text, System.Threading.Tasks, Newtonsoft.Json, and Newtonsoft.Json.Linq. It defines a namespace RevitAiEstimator and contains two classes: EstimationResult and AiService. The AiService class has a private const string ApiKey property, which is highlighted with a yellow box. The value of ApiKey is a placeholder: "sk-YOUR_OPENAI_API_KEY_HERE". There is also a private const string Endpoint property with the value "https://api.openai.com/v1/chat/completions". The code is as follows:

```
1 using System;
2 using System.Net.Http;
3 using System.Text;
4 using System.Threading.Tasks;
5 using Newtonsoft.Json;
6 using Newtonsoft.Json.Linq;
7
8 namespace RevitAiEstimator
9 {
10     7 references
11     public class EstimationResult
12     {
13         2 references
14         public string CostCode { get; set; } = "N/A";
15         4 references
16         public string Description { get; set; } = "AI Request Failed";
17         2 references
18         public double UnitRate { get; set; } = 0.0;
19     }
20
21     2 references
22     public class AiService
23     {
24         // TODO: PASTE YOUR API KEY HERE
25         // SECURITY WARNING: Never commit your real API key to GitHub!
26         private const string ApiKey = "sk-YOUR_OPENAI_API_KEY_HERE";
27         private const string Endpoint = "https://api.openai.com/v1/chat/completions";
28
29         1 reference
30         public EstimationResult GetEstimation(ElementData input, string context)
31         {
32             try
33             {
34                 // Fix for UI Freeze: Run async task on a background thread to avoid deadlocking the Revit UI thread
35             }
36         }
37     }
38 }
```

How to get GPT key

First: go to <https://platform.openai.com/api-keys>

Second: create new secret key

Personal / Default project

Dashboard Docs API reference

Create

- Chat
- Agent Builder
- Audio
- Images
- Assistants

Manage

- Usage
- API keys**
- Logs
- Storage
- Batches

Optimize

- Evaluation
- Fine-tuning

API keys

You have permission to view and manage all API keys in this project.

Do not share your API key with others or expose it in the browser or other client-side code. To protect your account's security, OpenAI may automatically disable any API key that has leaked publicly.

View usage per API key on the [Usage page](#).

NAME	SECRET KEY	CREATED	LAST USED	CREATED BY	PERMISSIONS
isaacsim	sk-...dgoA	Sep 9, 2025	Sep 10, 2025	Lin He	All

+ Create new secret key

How to get GPT key

Third: get your key (Make sure not to expose your key to anyone on the internet, since it can generate expenses) and put it to excel

Save your key

Please save your secret key in a safe place since **you won't be able to view it again**. Keep it secure, as anyone with your API key can make requests on your behalf. If you do lose it, you'll need to generate a new one.

[Learn more about API key best practices](#)

sk-proj-FRs78TCvxS7uLU1Ck7dApbq6hvl

Copy



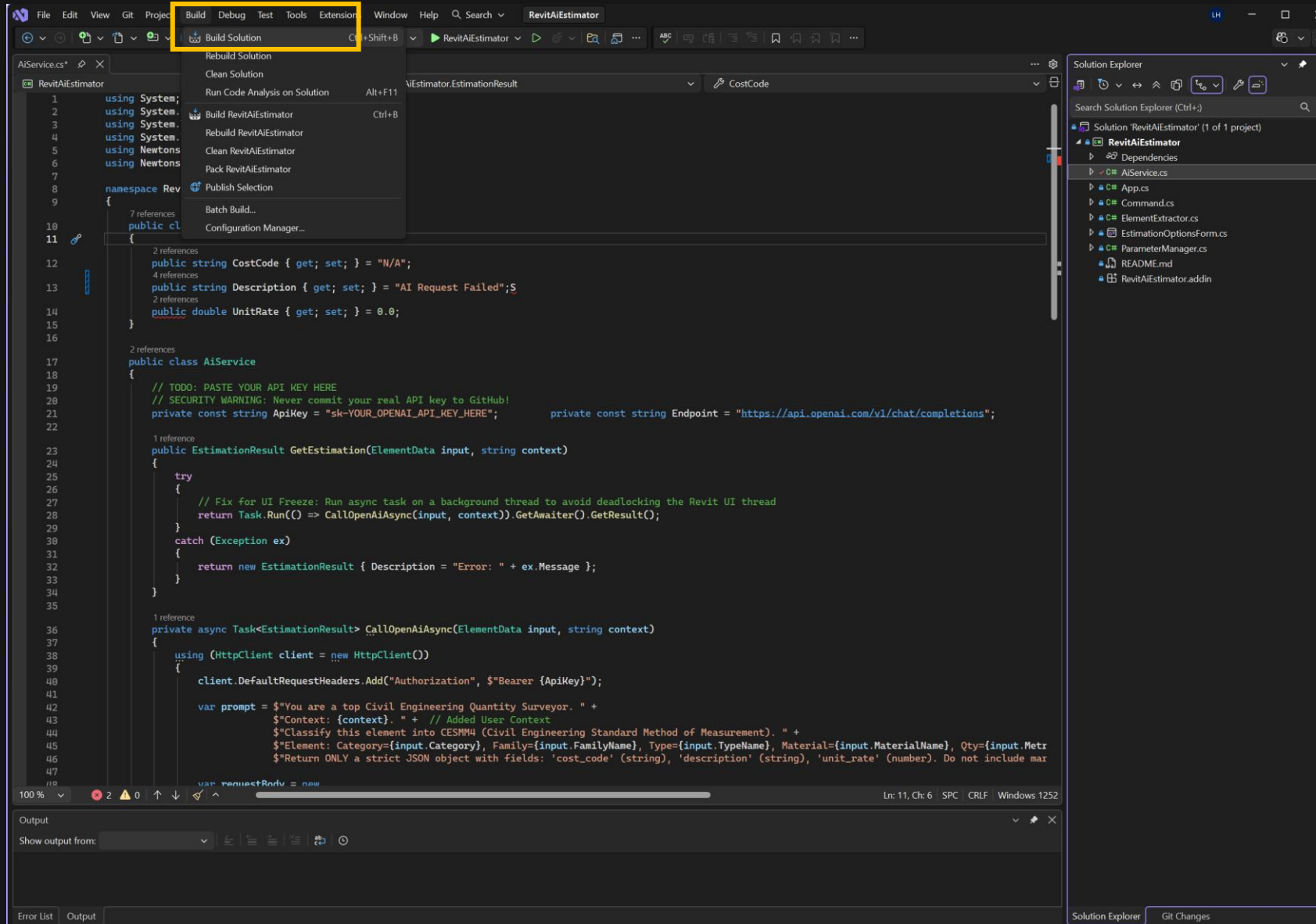
Permissions

Read and write API resources

Done

```
1 using System;
2 using System.Net.Http;
3 using System.Text;
4 using System.Threading.Tasks;
5 using Newtonsoft.Json;
6 using Newtonsoft.Json.Linq;
7
8 namespace RevitAIEstimator
9 {
10     7 references
11     public class EstimationResult
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18         public double UnitRate { get; set; } = 0.0;
19     }
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21     2 references
22     public class AiService
23     {
24         // TODO: PASTE YOUR API KEY HERE
25         private const string ApiKey = "sk-YOUR_OPENAI_API_KEY_HERE"; private const string Endpoint = "https://api.openai.com/v1/chat/completions";
26
27         1 reference
28         public EstimationResult GetEstimation(ElementData input, string context)
29         {
30             try
31             {
32                 // Fix for UI Freeze: Run async task on a background thread to avoid deadlocking the Revit UI thread
33                 return Task.Run(() => CallOpenAIAsync(input, context)).GetAwaiter().GetResult();
34             }
35             catch (Exception ex)
36             {
37                 return new EstimationResult { Description = "Error: " + ex.Message };
38             }
39         }
40     }
41 }
```


4. Build Solution (Ctrl+Shift+B)



5. Install to Revit:

Go to the output folder bin\Debug\net8.0-windows\.

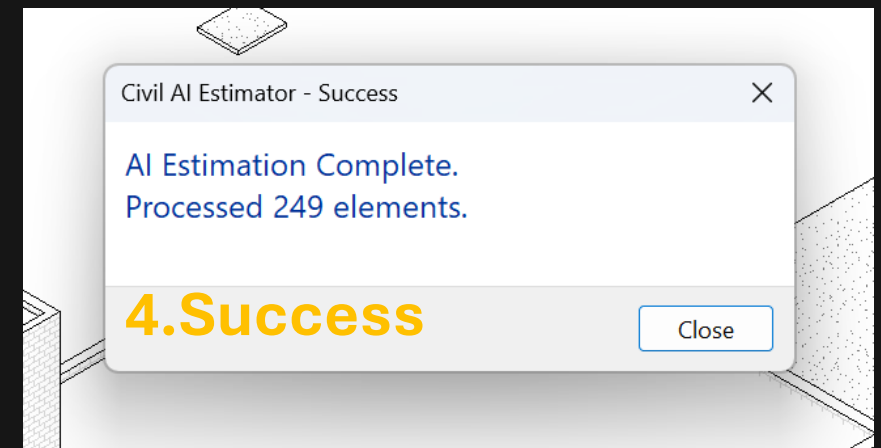
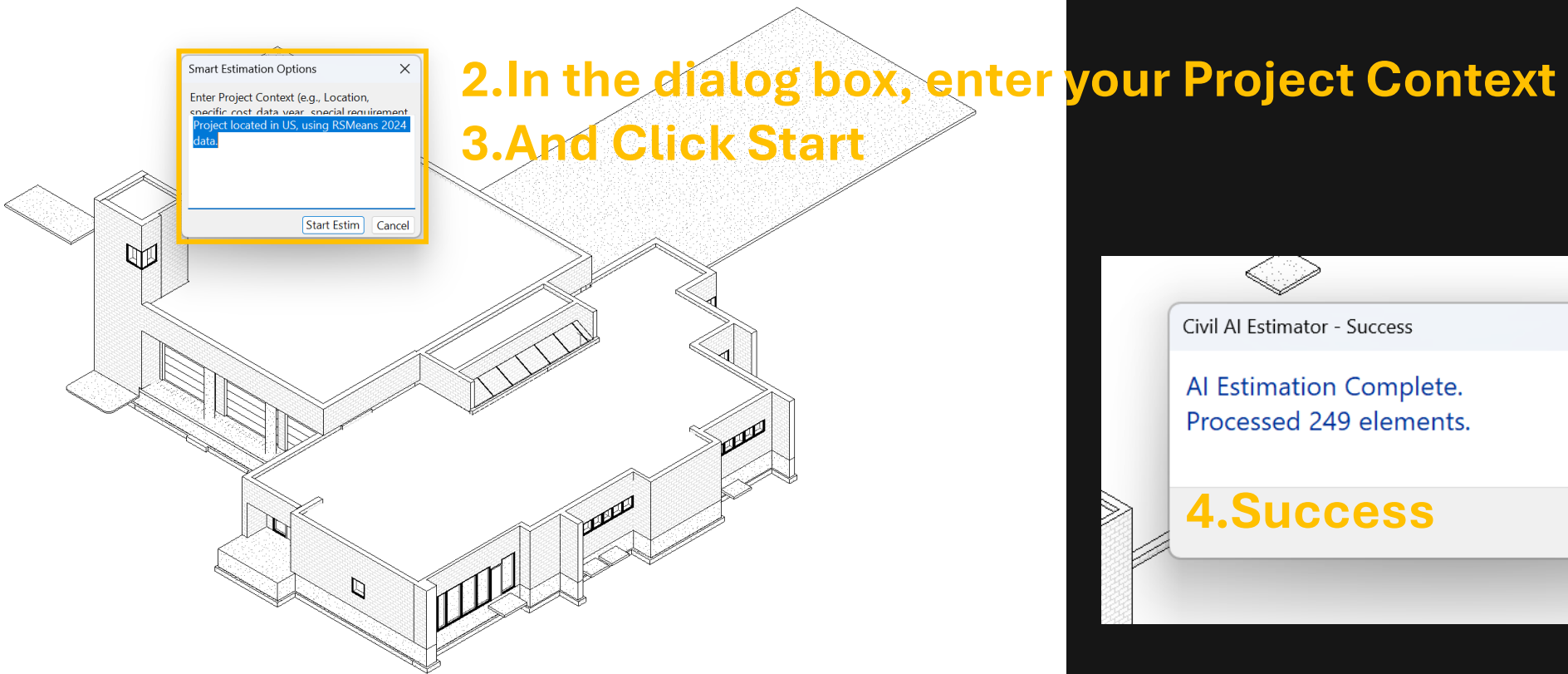
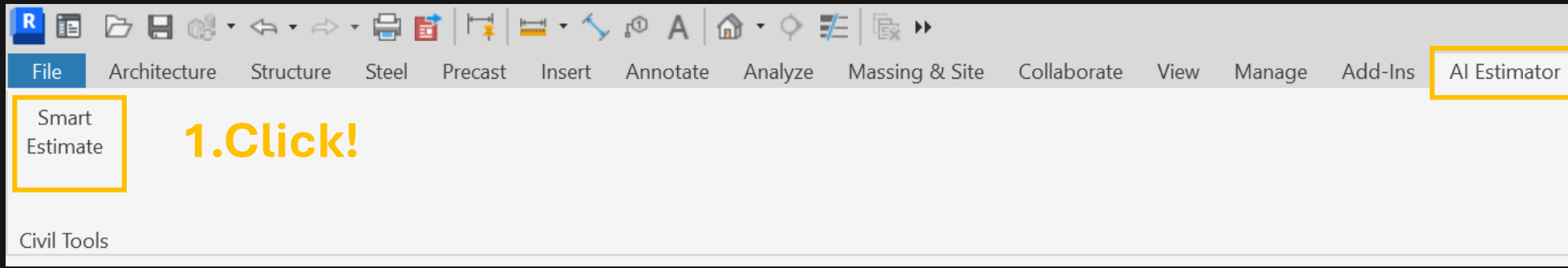
Open RevitAiEstimator.addin and check the path.

Copy **RevitAiEstimator.addin** to
%ProgramData%\Autodesk\Revit\Addins\2025\

Open Revit and choose **always load**

Revit magically loads the plugin!

6. Revit magically loads the plugin



Demo: The "Magic" Button

We built a context-aware dialog:

"Project located in Austin, Texas.

Use local labor rates & limestone excavation costs.

Currency: USD."

(AI adjusts prices based on THIS input!)

7. AI Data

Modify Walls

Properties

Basic Wall

Exterior_1'-5 1/2"

Walls (1) Edit Type

Constraints

Location Line

Finish Face: Interior

Base Constraint

First Floor and Ground Level

Base Offset

-2' 0"

Base is Attached

☐

Base Extension Distance

0' 0"

Top Constraint

Unconnected

Unconnected Height

39' 3 1/2"

Top Offset

0' 0"

Top is Attached

☐

Top Extension Distance

0' 0"

Room Bounding

☒

Related to Mass

☐

Cross-Section Definition

Cross-Section

Vertical

Structural

Structural

☐

Structural Usage

Non-bearing

Dimensions

Length

11' 2 1/2"

Area

422.94 SF

Volume

616.66 CF

Identity Data

Image

Comments

Mark

Phasing

Phase Created

New Construction

Phase Demolished

None

IFC Parameters

Export to IFC

By Type

Export to IFC As

IFC Predefined Type

IfcGUID

0TtNtd09rA9wV7\$poLIJbI

Data

AI_CostCode

B1

AI_Description

Masonry walls using concrete masonry units

AI_Rate

120.500000

Views (all)

Structural Plans

Reference

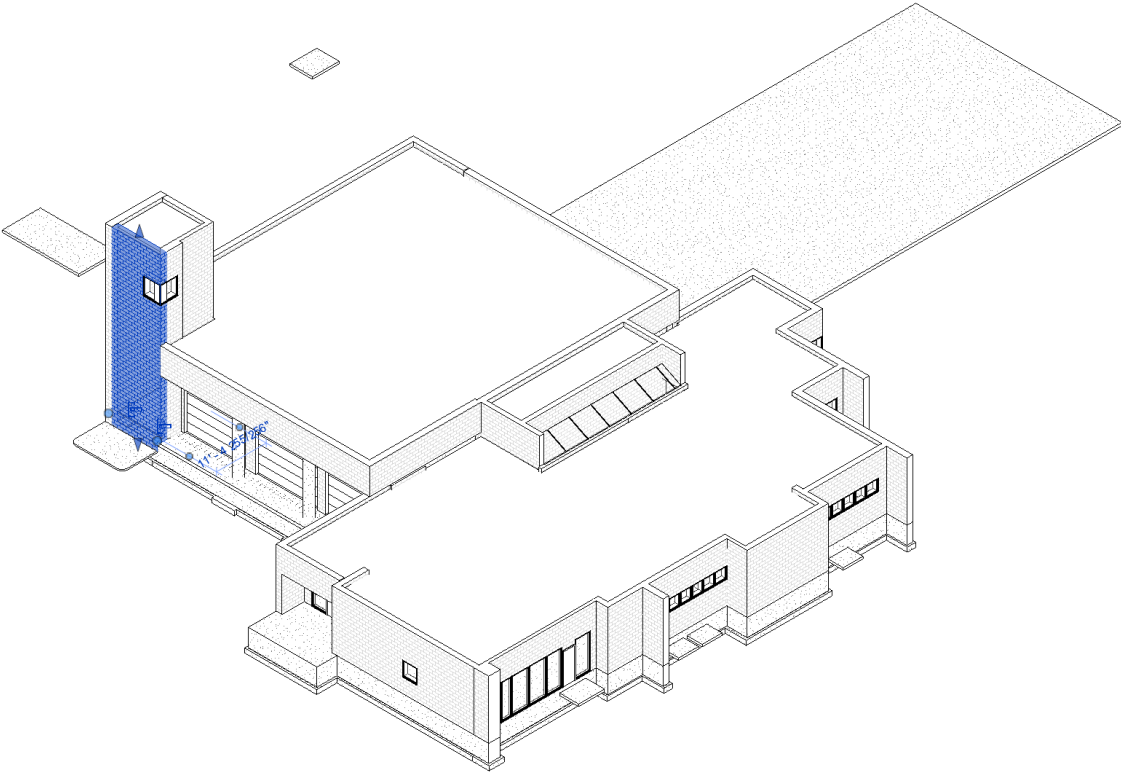
Project Browser - BIM_Model

Search

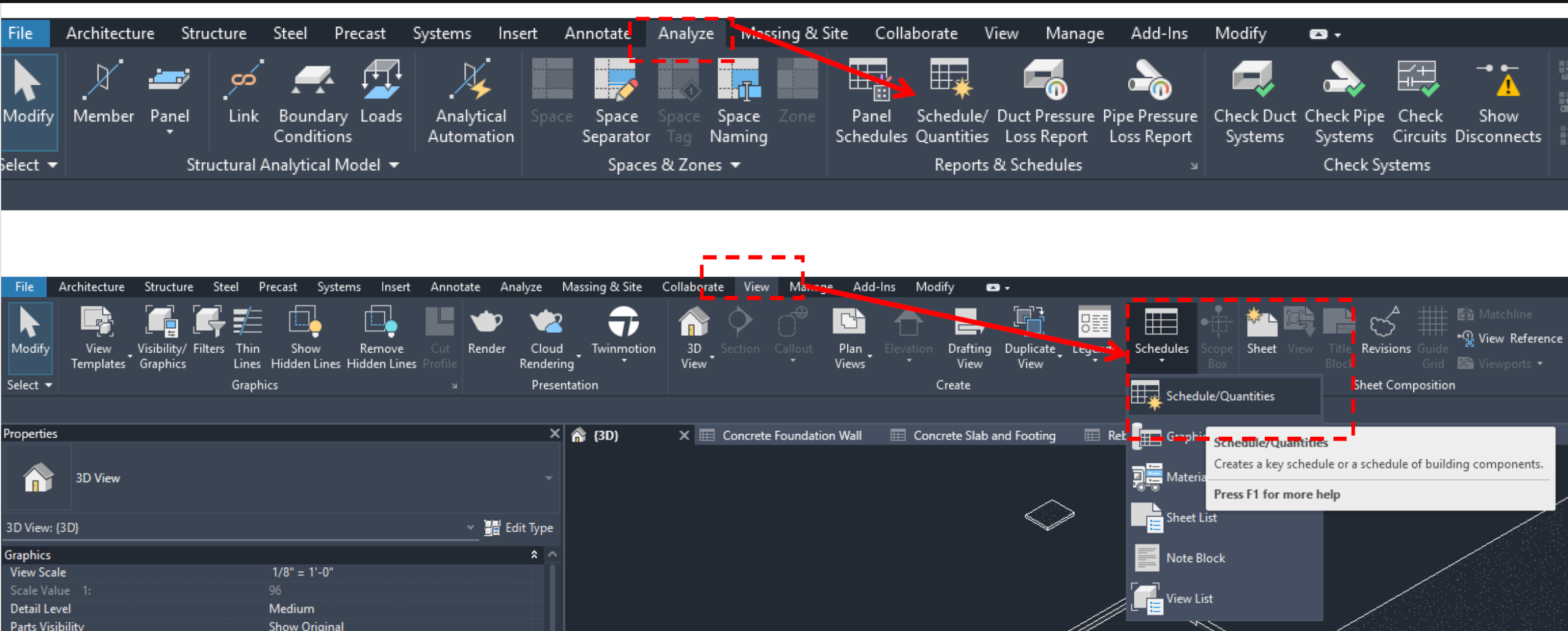
Views (all)

Structural Plans

Reference



8. Schedule/Quantities



8. Schedule/Quantities

New Schedule

Category name search:

Filter list: Architecture

Category: ☒ Architecture
☐ Structure
☐ Mechanical
☐ Electrical
☐ Piping
☐ Infrastructure

Electrical Equipment
Electrical Fixtures
Entourage
Fire Protection
Floors
Food Service Equipment
Furniture
Furniture Systems
Generic Models
Grids
Hardscape
Levels
Lighting Fixtures
Lines
<Path of Travel Lines>
Mass
Mechanical Control Devices
Mechanical Equipment
Medical Equipment
Model Groups
Parking
Parts
Planting
Plumbing Equipment

Name: Floor Schedule

☒ Schedule building components
☐ Schedule keys

Key name:

Phase: New Construction

OK Cancel Help

Schedule Name (table name)

Normal Steps for Creating a Schedule or Quantity

- In the New Schedule dialog, do the following:
 - Select a component from the category list. A default name appears in the Name text box, which you can change as necessary.
 - Select Schedule building components.

Note: Do not select Schedule keys.

- Specify the phase.(New Construction)
- Click OK.

Schedules/Quantities (all)

- Concrete Foundation Wall
- Concrete Slab and Footing
- Rebar

Phase: New Construction
Existing
New Construction

Choose Wall

7. Schedule/Quantities

Schedule Properties

Fields Filter Sorting/Grouping Formatting Appearance

Select available fields from:
Walls

Parameter Name Search:

Filter Available Fields

Available fields: 62 items

Absorptance
Angle From Vertical
Area
Assembly Code
Assembly Description
Assembly Name
Base Constraint
Base Offset
Bottom Width
Comments
Cross-Section
Default Exterior Angle
Default Interior Angle
Description
Enable Angle Overrides
Estimated Reinforcement Volume
Excavation Volume on Toposolid
Exchange Entity ID
Exchange ID

AI_CostCode
AI_Description
AI_Rate
Family and Type
Cost
Count

Must be selected

The rest can be customized using calculated parameters.

Include elements in links

OK Cancel Help

(Add Parameter).

(Remove Parameter).

(Move Up) or (Move Down).

(Combine Parameters).

(Edit Parameter).

(Delete Parameter).

(New Parameter)

(Calculated Parameter).

9. Get the result

Smart Estimate

Civil Tools

Modify Schedule/Quantities

Properties

Schedule

Schedule: Wall Schedule

Identity Data

View Template

View Name

Dependency

Phasing

Phase Filter

Phase

IFC Parameters

Export to IFC

Other

Fields

Filter

Sorting/Grouping

Formatting

Appearance

Autodesk Revit 2025.2 - BIM_Model - Schedule: Wall Schedule

FileArchitectureStructureSteelPrecastInsertAnnotateAnalyzeMassing & SiteCollaborateViewManageAdd-InsAI EstimatorModifyModify Schedule/Quantities

Wall Schedule

<Wall Schedule>

A	B	C	D	E	
AI_CostCode	AI_Description	AI_Rate	Cost	Count	
B1	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_8" Concrete
B1	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_1" Concrete
B1	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_8" Concrete
B112	Cast-in-place concrete foundation walls	150.75		1	Basic Wall Foundation_8" Concrete
B112	Cast-in-place concrete foundation walls, 8 inches thick	150		1	Basic Wall Foundation_8" Concrete
B122	Concrete foundations, cast-in-place, 8 inches thick	150		1	Basic Wall Foundation_8" Concrete
B1.1	Cast-in-place concrete foundation walls	150.75		1	Basic Wall Foundation_1" 1 1/2" Concrete
B111	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_1" 1 1/2" Concrete
E10.110	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_8" Concrete
B112	Concrete foundation walls, cast-in-place	250.75		1	Basic Wall Foundation_2' 8" Concrete
B112	Cast-in-place concrete foundation walls	150.75		1	Basic Wall Foundation_1" 1 1/2" Concrete
B122	Concrete foundations, cast-in-place	150		1	Basic Wall Foundation_1" 1 1/2" Concrete
B1.1	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_8" Concrete
B111	Cast-in-place concrete foundation walls	150.75		1	Basic Wall Foundation_14" Concrete
B112	Concrete foundation walls, 8 inch thick, cast-in-place	150.75		1	Basic Wall Foundation_8" Concrete
B1.1	Cast-in-place concrete foundation walls	150.75		1	Basic Wall Foundation_1" Concrete
B2	Masonry walls - Concrete Masonry Units, Interior, 8 inches	120.5		1	Basic Wall Interior_8"
C211	Cast-in-place concrete foundation walls	150		1	Basic Wall Foundation_14" Concrete
B1	Masonry walls using Concrete Masonry Units	125.5		1	Basic Wall Exterior_1" 1 1/2"
23.1	Masonry walls - Concrete Masonry Units	150.75		1	Basic Wall Exterior_1'5 1/2"
B1	Masonry walls using concrete masonry units	120.5		1	Basic Wall Exterior_1'5 1/2"
B1	Masonry walls using concrete masonry units	120.5		1	Basic Wall Exterior_1'5 1/2"
B1	Masonry - Concrete Masonry Units, Exterior Walls	150.75		1	Basic Wall Exterior_1' 1 1/2"
B1	Masonry walls using concrete masonry units	185.5		1	Basic Wall Exterior_10"
B1	Masonry walls using Concrete Masonry Units (CMU) for exterior applications	150.75		1	Basic Wall Exterior_1' 1 1/2"
B1	Masonry walls using Concrete Masonry Units	150.75		1	Basic Wall Exterior_1'3 1/2"
B1	Masonry walls; concrete masonry units; 8 inch; interior	150.75		1	Basic Wall Interior_8"
B1.1	Masonry - Concrete Masonry Units, Interior Walls, 8 inches	125.5		1	Basic Wall Interior_8"
B2.1	Interior concrete masonry unit walls, 8 inches thick	150.75		1	Basic Wall Interior_8"
B1.2	Interior masonry walls using 8-inch concrete masonry units	125.5		1	Basic Wall Interior_8"
B211	Masonry - Concrete Masonry Units, Interior Walls, 8 inch	125.5		1	Basic Wall Interior_8"
B2	Masonry walls, concrete masonry units, interior, 8 inch	125.5		1	Basic Wall Interior_8"
23.1.1	Masonry walls using concrete masonry units	150.75		1	Basic Wall Exterior_1'4"
B1	Masonry walls using concrete masonry units	150.75		1	Basic Wall Exterior_1'4"
B1.1	Masonry - Concrete Masonry Units, Exterior Walls	150.75		1	Basic Wall Exterior_1'4"
B1	Masonry walls using concrete masonry units	150.75		1	Basic Wall Exterior_1'4"
B2	Masonry walls using concrete masonry units	150.75		1	Basic Wall Interior_8"
B1	Masonry - Concrete Masonry Units, Interior Walls, 8 inches	150		1	Basic Wall Interior_8"
21.3.1	Masonry walls using concrete masonry units	150.75		1	Basic Wall Exterior_1'4"
23.1.1	Masonry - Concrete Masonry Units, Interior Wall, 12 inch	150.75		1	Basic Wall Interior_12"
22.1.1	Masonry walls - Concrete Masonry Units, Interior 8 inch	150.75		1	Basic Wall Interior_8"
B1	Masonry - Concrete Masonry Units, Interior Walls, 8 inch	150.75		1	Basic Wall Interior_8"
B1	Masonry Walls - Interior Concrete Masonry Units	120.5		1	Basic Wall Interior_8"
B1	Masonry walls - Interior 8" Concrete Masonry Units	120.5		1	Basic Wall Interior_8"
B1.1	Masonry - Concrete Masonry Units, Interior Walls, 8 inch	150.75		1	Basic Wall Interior_8"
B1	Masonry walls - Interior 8" CMU	150		1	Basic Wall Interior_8"
B1	Masonry walls using concrete masonry units	150		1	Basic Wall Exterior_1' 1 1/2"
B1	Masonry walls using concrete masonry units	150.75		1	Basic Wall Exterior_1' 1 1/2"
B1	Masonry walls - Interior 8 inch concrete masonry units	150.75		1	Basic Wall Interior_8"
B1	Masonry - Concrete Masonry Units, Interior 8" Wall	125.5		1	Basic Wall Interior_8"
B1	Masonry walls, interior, 8 inch, concrete masonry units	150.75		1	Basic Wall Interior_8"
B1	Masonry - Concrete Masonry Units, Interior Walls	150.75		1	Basic Wall Interior_8"
25.1.1	Concrete masonry walls, 8 inches thick, interior	120.5		1	Basic Wall Interior_8"
B1	Masonry - Concrete Masonry Units for Interior Walls	150.75		1	Basic Wall Interior_8"
24.1.1	Concrete masonry unit walls, 8 inches thick, interior	150.75		1	Basic Wall Interior_8"
B2	Concrete Masonry Unit Walls - Interior 8 inch	150.75		1	Basic Wall Interior_8"
B1.1	Interior masonry wall using 8" concrete masonry units	150.75		1	Basic Wall Interior_8"
B1.1	Interior masonry walls using 8" concrete masonry units	150.75		1	Basic Wall Interior_8"
24.1.1	Masonry walls - Concrete Masonry Units, interior	150		1	Basic Wall Interior_8"
B1.1	Masonry walls, concrete masonry units, interior, 8 inches	150.75		1	Basic Wall Interior_8"
B1.1	Masonry - Concrete Masonry Units, Interior Walls, 8 inches	150.75		1	Basic Wall Interior_8"
24.1.3	Interior masonry walls using 8-inch concrete masonry units	150.75		1	Basic Wall Interior_8"
26.1.1	Concrete masonry walls, 8 inch, interior	120.5		1	Basic Wall Interior_8"
B1	Masonry - Concrete Masonry Units, Interior Walls, 8 inches	150		1	Basic Wall Interior_8"
24.1.1	Concrete masonry units, walls, interior, 8 inches	150.75		1	Basic Wall Interior_8"
B1	Masonry walls - Concrete Masonry Units, Interior, 8 inch	150.75		1	Basic Wall Interior_8"
B1	Concrete Masonry Unit Walls - Interior	130.5		1	Basic Wall Interior_8"

Project Browser - BIM_Model

Views (all)

Structural Plans

Reference

Floor Plans

00_Driveway and concrete pads

00_Driveway with reinforcement

00_Footing

00_Footing with reinforcement

00_Foundation

THANK YOU!

EXTEND & CUSTOMIZE

This add-in can be customized. Just extend the source code