



INSTRUCTOR SOLUTIONS

Procore – Estimating and Takeoff Exercises

The following exercises will provide you an opportunity to use the Procore® cloud-based construction management software to perform a Quantity Takeoff and create an Estimate.

The exercises require you to review project plans and determine quantities (Each, Linear Foot, Square Foot, Cubic Foot, Cubic Yard) of different types of building materials. Upon completing the takeoff, you will use the resulting quantities to develop an estimate.

Upon completion of the exercises, the instructor will review your Takeoff and Estimate for accuracy and completeness.

It is suggested that you be familiar with the Procore software application, specifically the use of the *Bidding* and *Estimating* tools prior to the use of this learning module. Training videos can be found at <https://support.procore.com>.

Note: *The drawings used in this learning module are for the Vortex Business Center. These drawings are working drawings that have not been finalized for construction. Therefore, there are some areas with missing details and/or conflicting information. The instructor may provide clarifications as required.*

Procore Estimating Tool – Door Takeoff Exercise #1

Using the door schedule on the drawing, *Door, Wall & Ceiling Type Schedules – A600*, and the Exercise #1 Handout provided by your instructor, develop a list of all of the doors required for the first floor of the Vortex Business Center project. Your list should be broken out by door types, including the door numbers in numerical order, and a description of the door types.

Once your list has developed, use drawing *First Floor - Annotated Plan – A112* to perform an individual quantity takeoff for each door type using the Count measurement type.

Step 1

Create a new estimate by selecting the plus sign at the bottom of the Estimating screen, and select, Create Empty Estimate. Name the estimate “[Your Last Name] Estimate”.



Step 2

On the top left of the screen, select Takeoff. Create a new Takeoff Group: *Exercise #1*.

Note: *Ensure that other Takeoff Groups (if there are any) are hidden.*

Step 3

Once the Exercise #1 group has been created, create a new Takeoff Layer for each door type using the following criteria:

Note: *Prior to doing work on a new layer, all previously developed layers should be hidden.*



- **Catalog Item Name:** Doors - First Floor
 - | Takeoff Type | Floor | Door Type | Material |
|--------------|-------------------|-----------|----------|
| Doors | – 1 st | Type A, | Glass |
- **Measurement Type:** Count
- **Unit of Measure:** Each
- **Symbol:** Circle
- **Size:** 75%
- **Color:** Different color for each door type

***Note:** Pay close attention to the units you select when first creating the takeoff layer. Once it is set it cannot be changed.*

***Note:** After creating the first takeoff layer, you have the option to duplicate a layer and then modify the layer name for the next door type.*

Step 4

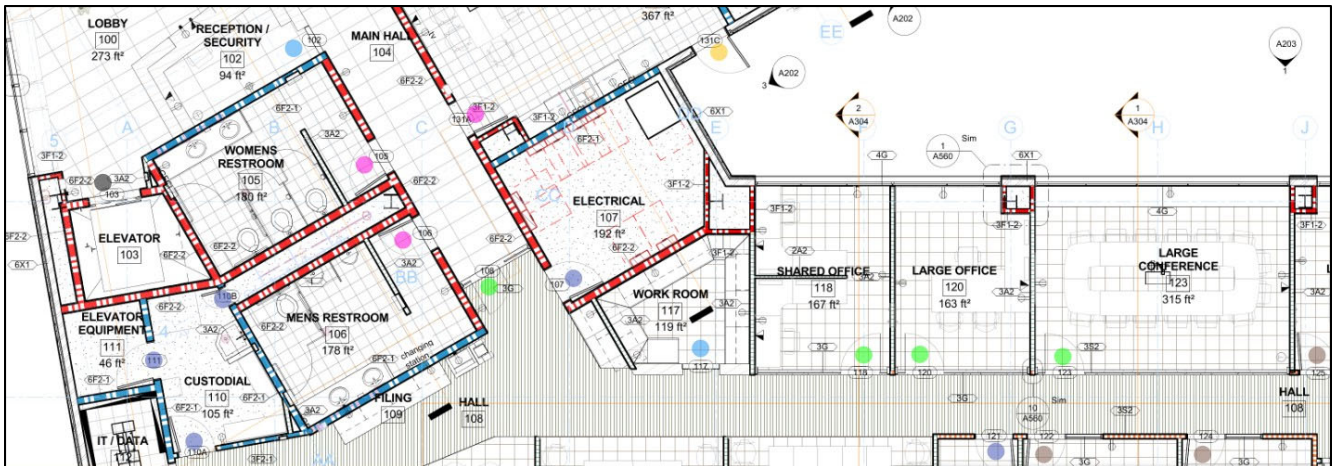
Ensure Sheet A112 is in view and only one takeoff layer is turned on, use the count tool to mark and identify each door type on the floor plan. Press escape when done to turn off the layer and then select the next takeoff layer to count the next door type.

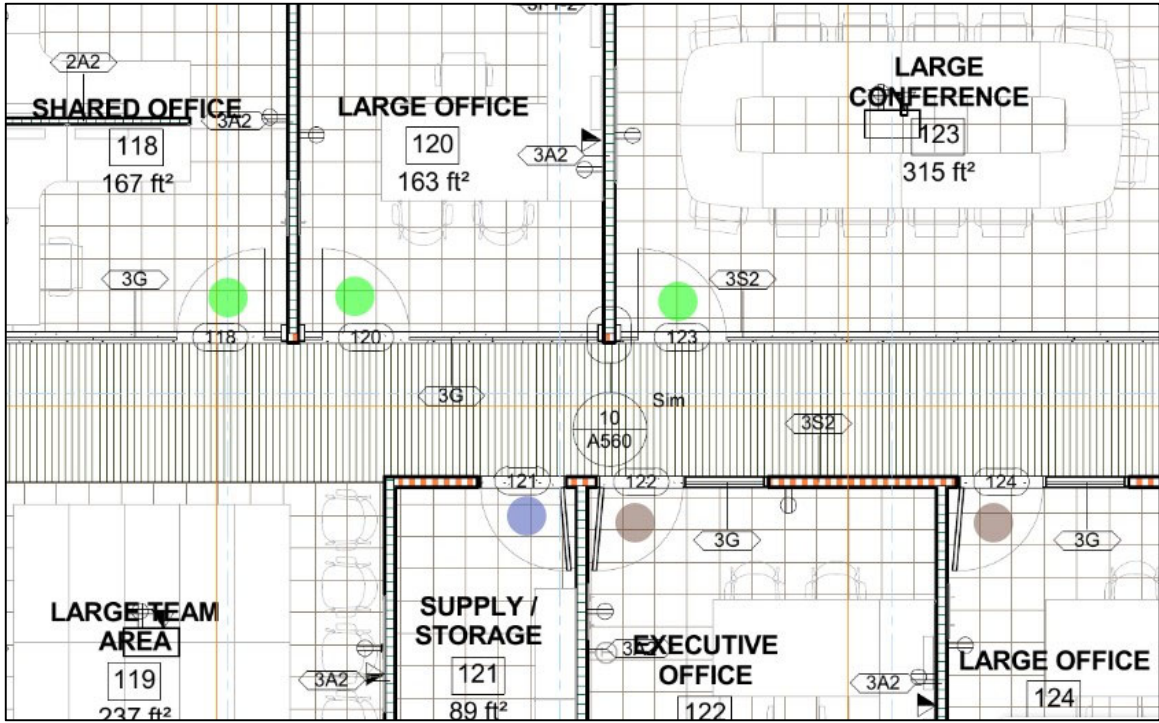
Upon completion of the exercises, the instructor will review your Door List and Takeoff for accuracy and completeness.

Exercise #1 – Example SOLUTIONS

- Exercise #1
 - Doors – 1st: Type A, Glass
 - 1
 - Doors – 1st: Type B, Glass
 - 6
 - Doors – 1st: Type C, Hollow Metal & ...
 - 1
 - Doors – 1st: Type D, Hollow Metal & ...
 - 1
 - Doors – 1st: Type E, None
 - 2
 - Doors – 1st: Type F, Solid Wood
 - 9
 - Doors – 1st: Type G, Solid Wood & Gl...
 - 6
 - Doors – 1st: Type H, Solid Wood & Gl...
 - 1
 - Doors – 1st: Type J, Solid Wood & Gla...
 - 3
 - Doors – 1st: Type K, Solid Wood & Gl...
 - 1

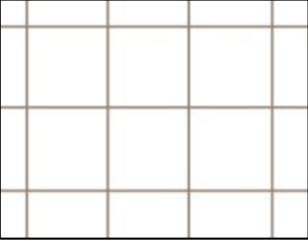
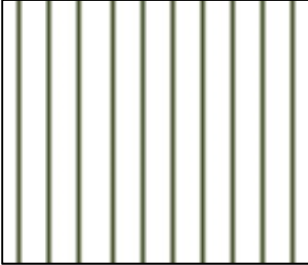


Instructor Note: The image on sheets A112 and A600 should look similar to the below images after students complete their takeoff for **Exercise 1**.





**Procore Estimating Tool – Flooring Takeoff
Exercise #2**

Using the floor plan for the first floor, *First Floor - Dimension Plan – A111*, and the Exercise #2 Handout, complete a takeoff of the flooring on the first floor of the Vortex Business Center project. You will perform a takeoff of four different types of flooring material and provide a quantity for each type. A list of the flooring types and their graphic representations on sheet A111 are below.

<i>FLOORING TYPE</i>	<i>GRAPHIC REPRESENTATION</i>
<p>Carpet Tile</p>	
<p>Sheet Carpet</p>	
<p>Ceramic Tile</p>	
<p>Sealed Concrete</p>	

In the handout, indicate the quantity of each type of flooring. In the notes section, write any assumptions you made while doing your takeoff. For example, are there areas of the floor plan showing a certain type of floor where you think it the intent was for it to be different or where there should be none at all? *Hint: "Shaft 140" is one example and there are a couple of others where you might have questions.*

Step 1

Using the Procore Estimating tool, create a new Takeoff Group: *Exercise #2.*

Note: *Ensure that all other Takeoff Groups are hidden.*

Step 2

Once the Exercise #2 group has been created, create a new takeoff layer for each floor type using the following criteria:

Note: *Prior to doing work on a new layer, all previously developed layers should be hidden.*



- **Catalog Item Name:** Flooring - Carpet Tile
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Square Feet
- **Color:** Different color for each floor type

- **Catalog Item Name:** Flooring - Sheet Carpet
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Square Yards (note that this one is different)
- **Color:** Different color for each floor type

- **Catalog Item Name:** Flooring - Ceramic Tile
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Square Feet
- **Color:** Different color for each floor type

- **Catalog Item Name:** Flooring - Sealed Concrete
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Square Feet
- **Color:** Different color for each floor type

Note: Pay close attention to the units you select when first creating the takeoff layer. Once it is set it cannot be changed.

Note: After creating the first takeoff layer, you have the option to duplicate a layer and then modify the layer name for the next flooring type.

Step 3

Ensure Sheet A111 is in view. Click a layer to activate it then use the polyline tool to outline the flooring type on the floor plan that corresponds to that takeoff layer by clicking at each point/corner of the area. Press escape when done to turn off the layer and then select the next takeoff layer and outline those areas. Each flooring type will be its own layer.

Note: When using the polyline tool, you can double-click on your last corner and it will automatically close it out to the first point you created.



Note: For shapes that are rectangular and oriented perpendicularly to the sheet, you can use the rectangle tool to drag and measure a rectangular area. This works well in several areas where there is carpet tile.



Upon completion of the exercises, the instructor will review your takeoff for accuracy and completeness.

Exercise #2 – Example SOLUTIONS

👁	▼	📁	Exercise 2 - Flooring	⋮
👁		🟡	Flooring - Carpet Tile 3438.98 sq ft	⋮
👁		🟢	Flooring - Sheet Carpet 223.89 sq yd	⋮
👁		🟠	Flooring - Ceramic Tile 772.05 sq ft	⋮
👁		🟡	Flooring - Sealed Concrete 580.32 sq ft	⋮

Instructor Note: The image on sheet A111 should look similar to the image below after students complete their takeoff for **Exercise 2**.



Procore Estimating Tool – Studs & Track Takeoff Exercise #3

Using the floor plan for the first floor, *First Floor - Dimension Plan – A111*, and *Door, Wall & Ceiling Type Schedules – A600*, and the Exercise #3 Handout, complete a takeoff of the light gauge metal studs and track on the first floor of the Vortex Business Center project. You will take off the number of studs and length of track for both the 3-5/8” and 6” walls and provide a quantity for each.

In the handout, indicate the unit and quantity of each element. In the notes section, write any assumptions you made while doing your takeoff.

Step 1

Using the Procore Estimating tool, create a new Takeoff Group: *Exercise #3*.

Note: *Ensure that all other Takeoff Groups are hidden.*

Step 2

Once the Exercise #3 group has been created, create a new takeoff layer for each framing element with the following criteria:

Note: *Pay close attention to the units you select when first creating the takeoff layer. Once it is set it cannot be changed.*

- **Catalog Item Name:** Steel Studs: 3-5/8”
- **Measurement Type:** Count by distance
- **Unit of Measure:** Each
- **Color:** Different color for each

- **Catalog Item Name:** Steel Studs: 6"
- **Measurement Type:** Count by distance
- **Unit of Measure:** Each
- **Color:** Different color for each

- **Catalog Item Name:** Track: 3-5/8"
- **Measurement Type:** Linear
- **Unit of Measure:** Feet
- **Color:** Different color for each

- **Catalog Item Name:** Track: 6"
- **Measurement Type:** Linear
- **Unit of Measure:** Feet
- **Color:** Different color for each

Step 3

Refer to Sheet A600 for clarity on how the 3-5/8" (sheet A600 refers to these as 3.625" studs which is accurate but in the industry they are more commonly referred to as 3-5/8" studs) and 6" studs are shown graphically on the floor plan. Refer back to this sheet as needed.

Open Sheet A111 and turn on the takeoff layers you just created for the count of 3-5/8" steel studs. Use the polyline tool to trace out all of the particular walls you have selected. Repeat this for the count of 6" studs.



Note: You will need to retrace the same walls to get a length of track.

Note: Since there is track at the top and bottom of the walls, you will need to double the amount taken off to get the total length. This can be done easily by opening the information on the layer and indicating a multiplier of 2.

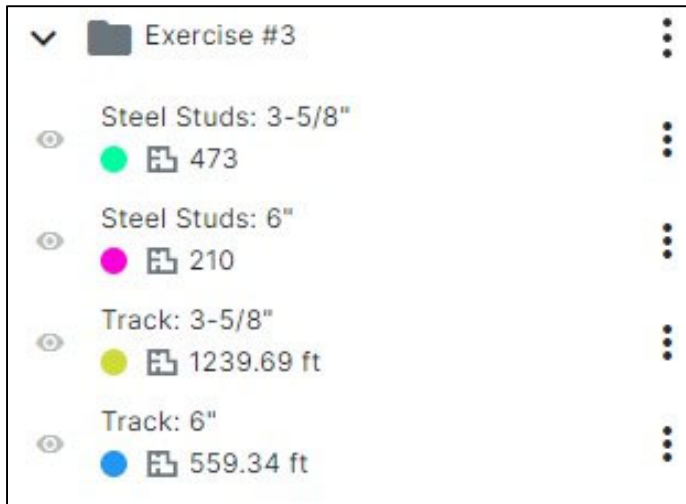


Note: For both 3-5/8" and 6" studs, the **spacing is 16"**.

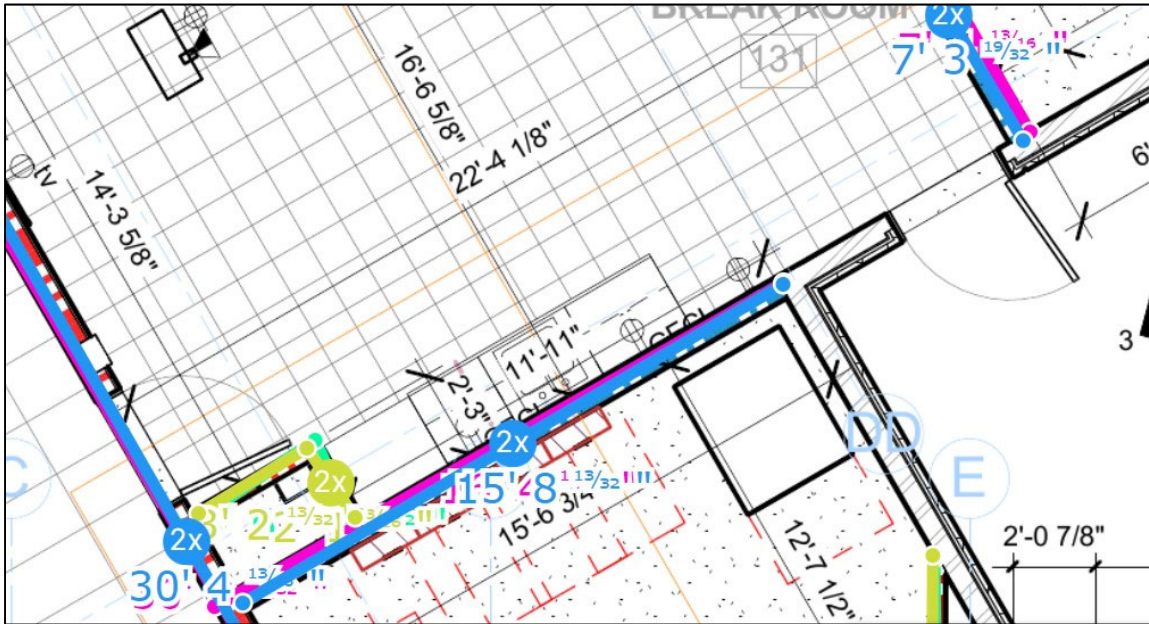
Note: Prior to doing work on a new layer, all previously developed layers should be hidden.



Exercise #3 – Example SOLUTIONS



Instructor Note: The image on sheet A111 should look similar to the below images after students complete their takeoff for **Exercise 3**.



Procore Estimating Tool – Column Footings Takeoff Exercise #4

For this exercise, you will perform a quantity takeoff of the Column Footings for the Vortex Business Center project. Using drawings *SE101: Footings and Foundation Plan*, *SE501: Foundation Details*, and *SE602: Graphic Column Schedule*, identify each column footing type (3), locate them on the drawing, and determine the quantity of concrete, and the forming material required for each column footing type.

Step 1

Using the Procore Estimating tool, create a new Takeoff Group: *Exercise #4*.

Note: *Ensure that all previous Takeoff Groups are hidden.*

Step 2

Once the Exercise #4 Group has been created, make a new takeoff layer for the concrete takeoff for each column footing type.

Note: *Prior to doing work on a new layer, all previously developed layers should be hidden.*



Note: *There are there are three (3) column types*

Note: Once the takeoff layer is created, you will be required to set the volume height of each column footing type under Additional Parameters.

Note: Pay close attention to the units you select when first creating the takeoff layer. Once it is set it cannot be changed.

Note: After creating the first takeoff layer, you have the option to duplicate the concrete takeoff layer and then modify the layer name for the next column footing type.

Note: When using the polyline tool, you can double-click on your last corner and it will automatically close it out to the first point you created.



Step 3

With one takeoff layer turned on, and Sheet SE101 in view, use the polyline tool to outline the footing type on the footings and foundation plan that corresponds to that takeoff layer by clicking at each point/corner of the area. Press escape when done to turn off the layer and then select the next takeoff layer and outline those areas.

Note: Prior to doing work on a new layer, all previously developed layers should be hidden



Note: For shapes that are rectangular and oriented perpendicularly to the sheet, you can use the rectangle tool to drag and measure a rectangular area. This works well for column footings that are parallel on the screen.



Step 4

Once the column footing concrete takeoff is complete, you will create a new takeoff layer for the square footage of formwork material needed to form each column footing type.

Note: You will need to retrace the same footings to get a square footage of material needed to form each footing type.

<ul style="list-style-type: none">• Catalog Item Name: Column Footings - Formwork<ul style="list-style-type: none">○ <u>Takeoff Type</u> <u>Material Type</u> <u>Footing Size</u>○ Column Footings / Forming – 30"x30"x30"• Measurement Type: Vertical Walls and Area• Unit of Measure: Square Foot• Color: Different color for each footing type
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Note: Once the takeoff layer is created, you will be required, under Additional Parameters, to set the wall height of each column footing type.

Note: After creating the first takeoff layer, you have the option to duplicate the forming material takeoff layer and then modify the layer name for the next column footing type.

Upon completion of the exercises, the instructor will review your takeoff for accuracy and completeness.

Exercise #4 – Example SOLUTIONS

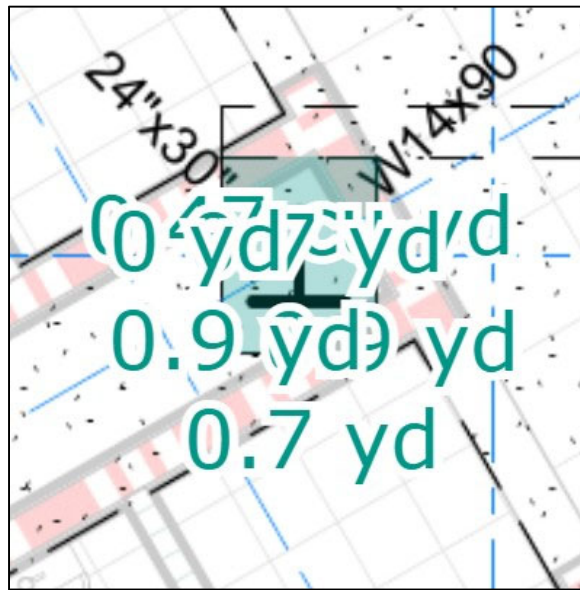
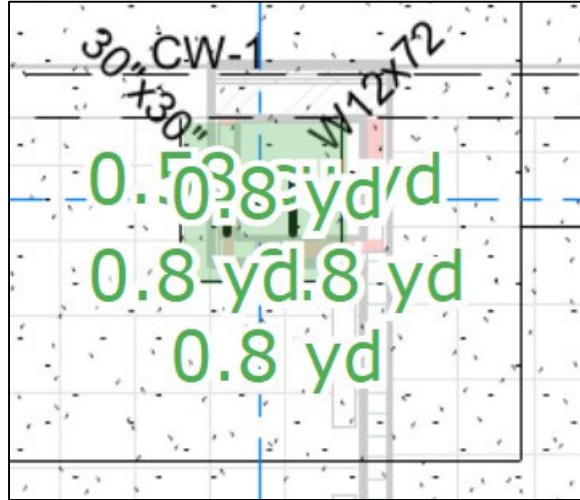
Item	Value	Unit
Column Footings/Concrete - 30"x3...	9.83	cu yd
Column Footings/Concrete - 24"x3...	0.47	cu yd
Column Footings/Concrete - 30"x3...	1.95	cu yd
Column Footings/Forming - 30"x30...	425.02	sq ft
Column Footings/Forming - 24"x30...	22.82	sq ft
Column Footings/Forming - 30"x30...	83.05	sq ft
Column Footings Count	19	

Exercise #4 Totals: SOLUTIONS

- Total Cubic Yards of Concrete: 12cy
- Total Square Foot of Forming: 531sf

Note: It should be assumed that the students' derived totals will be within 5% of the concrete CY and forming SF totals.

Instructor Note: The image on sheet SE101 should look similar to the below images after students complete their takeoff for **Exercise 4**.



Procore Estimating Tool – Footings Takeoff Exercise #5

For this exercise, you will perform a quantity takeoff of the Bearing Footings, Shear Footings, and Column Bearing Footings for the Vortex Business Center project. Using the drawings *SE101: Footings and Foundation Plan*, and *SE501: Foundation Details*, identify each footing type (3), locate them on the drawing, and determine the quantity of concrete, and the forming material required for each column footing type.

Step 1

Using the Procore Estimating tool, create a new Takeoff Group: *Exercise #5*.

Note: *Ensure that all other Takeoff Groups are hidden.*

Step 2

Once the Exercise #5 group has been created, make a new takeoff layer for the concrete takeoff for each footing type.

Note: *Prior to doing work on a new layer, all previously developed layers should be hidden.*



- **Catalog Item Name:** Foundation Footings - Concrete
 - Takeoff Type Material Type
 - Bearing Footings / Concrete
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Cubic Yard
- **Color:** Different color for each footing type

Note: *Once the takeoff layer is created, you will be required, under Additional Parameters, to set the volume height of each footing type.*

Note: After creating the first takeoff layer, you have the option to duplicate the concrete takeoff layer and then modify the layer name for the next footing type.

Note: Pay close attention to the units you select when first creating the takeoff layer. Once it is set it cannot be changed.

Step 3

With one takeoff layer turned on, and sheet SE101 in view, use the polyline tool to outline the footing type on the footings and foundation plan that corresponds to that takeoff layer by clicking at each point/corner of the area. Press escape when done to turn off the layer and then select the next takeoff layer and outline those areas.



Note: Prior to doing work on a new layer, all previously developed layers should be hidden.



Note: When using the polyline tool, you can double-click on your last corner and it will automatically close it out to the first point you created.

Note: For shapes that are rectangular and oriented perpendicularly to the sheet, you can use the rectangle tool to drag and measure a rectangular area. This works well for footings that are parallel on the screen.



Note: You will need to retrace the same footings to get a square footage of the material needed to form the footings.

Step 4

Once the column footing concrete takeoff is complete, you will create a new takeoff layer for the square footage of formwork material needed to form each footing type.

- **Catalog Item Name:** Building Footings - Formwork
 - Takeoff Type _____ Material Type
 - Bearing Footings / Forming
- **Measurement Type:** Vertical Walls and Area
- **Unit of Measure:** Square Foot
- **Color:** Different color for each footing type

Note: Once the takeoff layer is created, you will be required, under Additional Parameters, to set the wall height of each footing type.

Note: Prior to doing work on a new layer, all previously developed layers should be hidden.



Upon completion of the exercises, the instructor will review your takeoff for accuracy and completeness.

Exercise #5 – Example SOLUTIONS

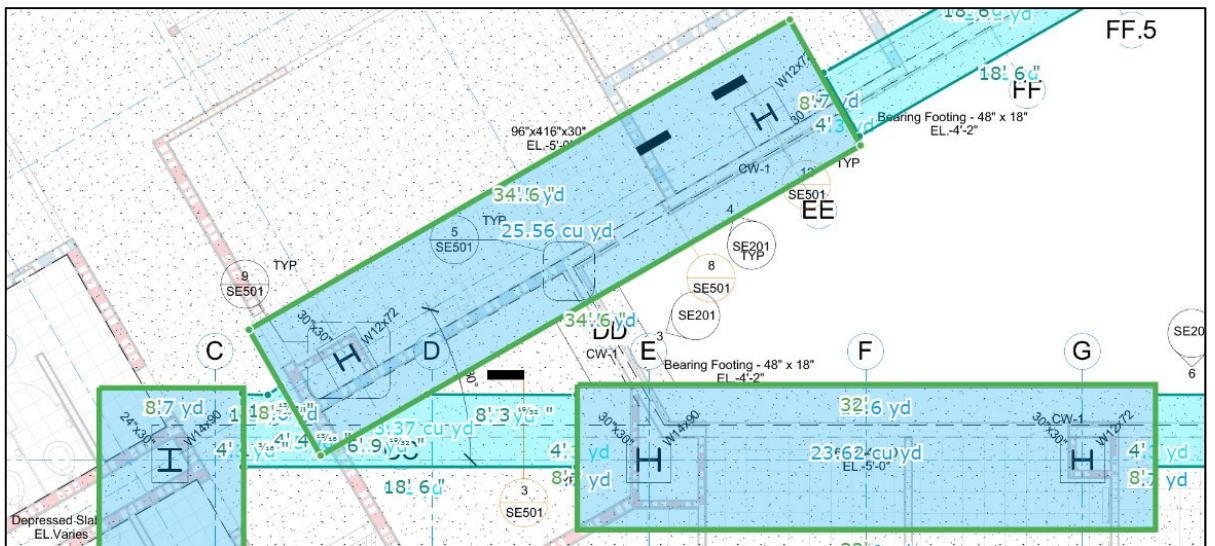
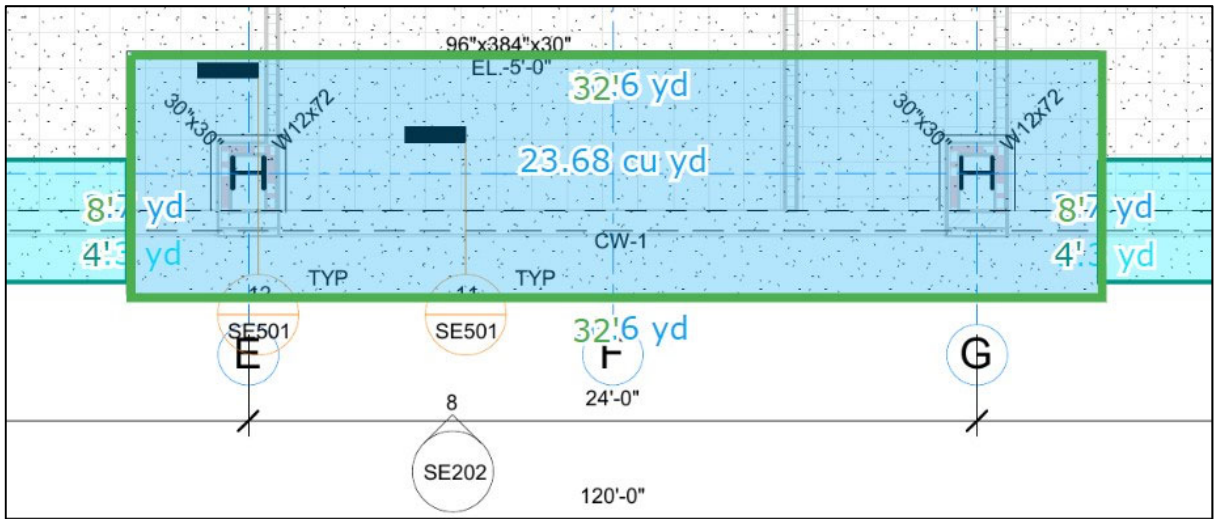
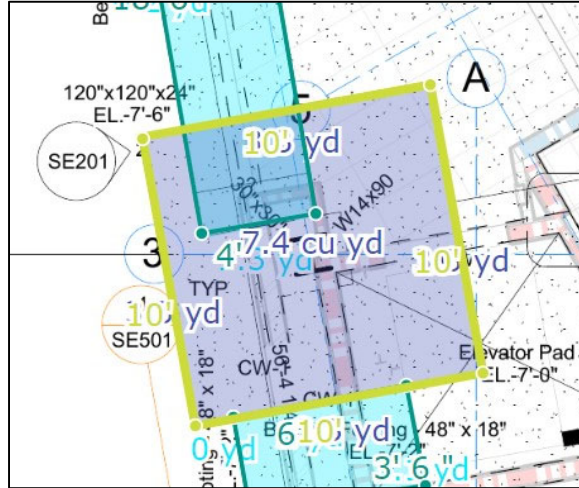
☉	▼	Exercise #5	⋮
☉		Bearing Footings/Concrete	⋮
		● 46.8 cu yd	
☉		Shear Footings/Concrete	⋮
		● 219.34 cu yd	
☉		Column Bearing Footings/Concrete	⋮
		● 16.84 cu yd	
☉		Bearing Footings/Forming	⋮
		● 802.4 sq ft	
☉		Shear Footing/Forming	⋮
		● 1803.92 sq ft	
☉		Bearing Footings/Forming	⋮
		● 207.81 sq ft	

Exercise #5 Totals: SOLUTIONS

- Total Cubic Yards of Concrete: 283cy
- Total Square Foot of Forming: 2,814sf

Instructor Note: The image on sheet SE101 should look similar to the below images after students complete their takeoff for **Exercise 5**.





Procore Estimating Tool – Slab on Grade Takeoff Exercise #6

Using the foundation plan, *Footing & Foundation Plan – SE101*, and the Exercise #6 Handout provided by your instructor, complete a takeoff of the slab on grade, both for the volume of concrete and square foot of surface area, and provide a quantity for each.

In the handout, indicate the unit and quantity of each element. In the notes section, write any assumptions you made while doing your takeoff

Step 1

Using the Procore Estimating tool, create a new Takeoff Group: *Exercise #6*.

Note: *Ensure that all other Takeoff Groups are hidden.*

Step 2

Once the Exercise #6 group has been created, create a new takeoff layer for each measurement with the following criteria:

Note: *Prior to doing work on a new layer, all previously developed layers should be hidden.*



- **Catalog Item Name:** SOG - Surface Area
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Square Feet
- **Color:** Different color for each

- **Catalog Item Name:** SOG - Volume
- **Measurement Type:** Area / Volume
- **Unit of Measure:** Cubic Yards
- **Height:** 6"
- **Color:** Different color for each

Note: *Once the takeoff layer is created, you will be required, under Additional Parameters, to set the volume height of the slab.*

Note: *Pay close attention to the units you select when first creating the takeoff layer. Once it is set it cannot be changed.*

Step 3

Refer to Sheet SE101 for details on the slab on grade. You will perform a takeoff of the volume of concrete and the surface area for the slab so that you can plan for purchasing concrete and finishing it once it is placed.

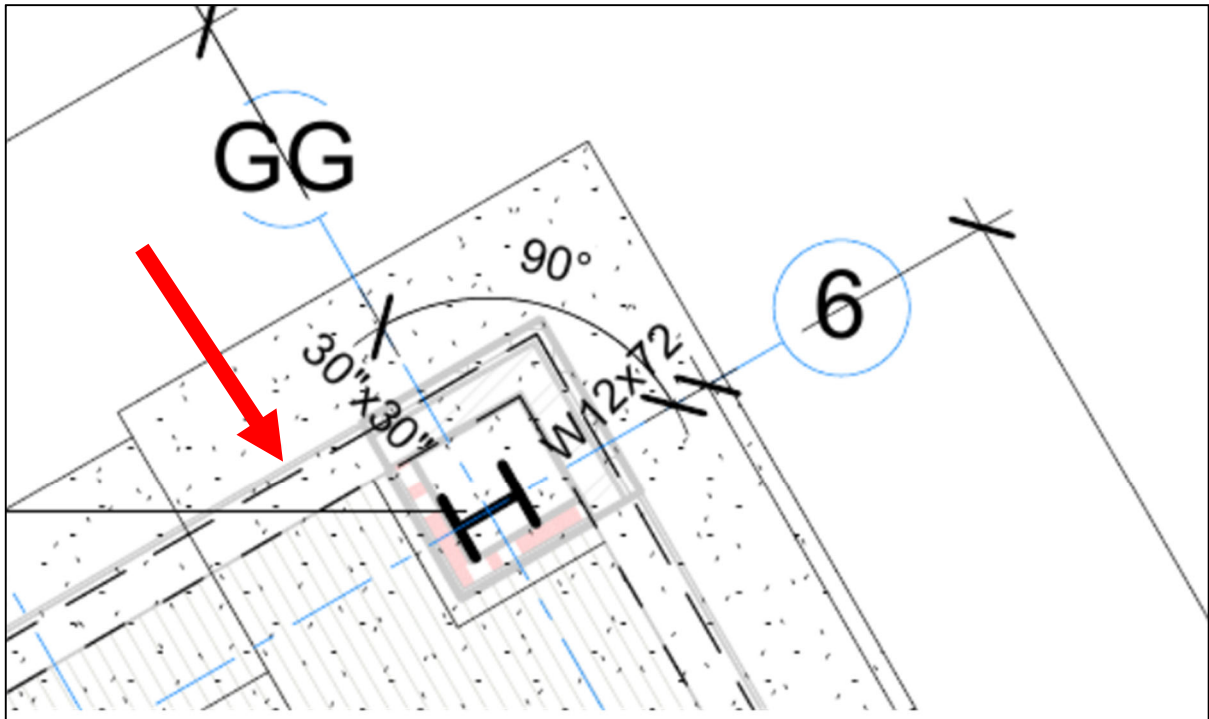
Using the polyline tool, draw a line around the perimeter of the foundation. You will see that the footings protrude beyond the slab so you will need to use the section details for information on the exact edge of the slab.

Note: *You will be tracing out the same slab for both measurements and they need to be done independently. If you hide the first layer that you have created before doing the second it will make it simpler for the second one.*



Upon completion of the exercises, the instructor will review your takeoff for accuracy and completeness.

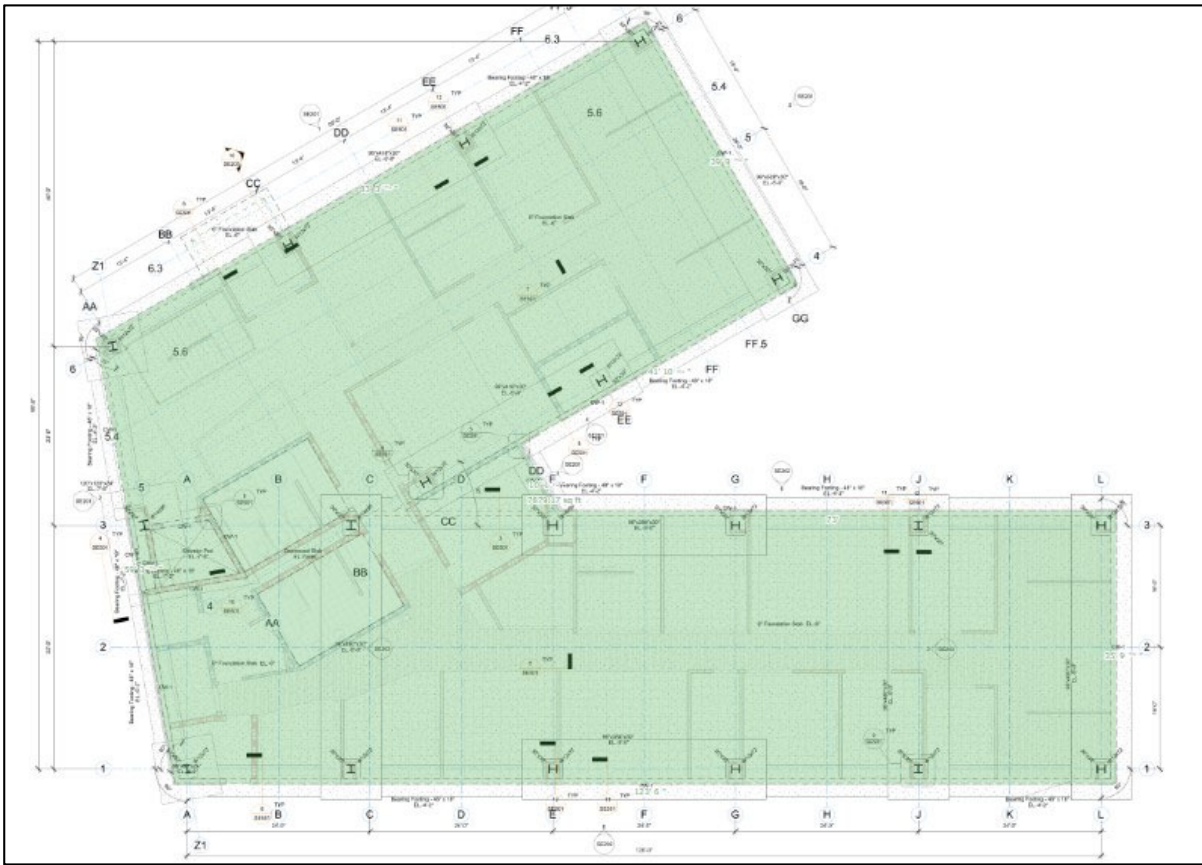
Instructor Note: The edge of the slab is shown below.



Exercise #6 – Example SOLUTIONS

☉	▼	■	Exercise #6	⋮
☉		●	SOG - Surface Area	⋮
		■	7879.17 sq ft	
☉		●	SOG - Volume	⋮
		■	145.98 cu yd	

Instructor Note: The image on sheet SE101 should look similar to the below images after students complete their takeoff for **Exercise 6**.



Procore Estimating Tool – Estimate Exercise #7

This exercise will allow you to take the data from Exercises 1 - 6 to develop an estimate for the Vortex Business Center project based on the quantities determined for each scope of work.

Step 1

Select Estimating on the top left of the Estimating screen. The estimating view includes each takeoff group, and corresponding takeoff layer previously developed.

Cost load each of your quantity takeoffs, starting with Exercise #1. The handout for Exercise #7 has the pricing information for each building component for you to use as a reference as you build out the estimates.

***Note:** Labor Rates have been previously set, but can be appropriately adjusted for each labor type.*

Once all of the labor information has been entered, the Total Cost, Total Labor Hours, and Total Labor Cost will be calculated. Once the information from each group has been entered, the project summary Cost, Labor Hours, and Labor subtotals will be calculated.

Step 2

Enter a Profit Markup for Labor and Materials provided on the Student-Estimating Ex #7 Handout. A subtotal will be calculated.

***Note:** Additional Adjustments can be entered as needed.*

Step 3

Enter the Profit Markup for the project (3% on both labor and material). Enter the Additional Adjustments (Overhead – 5%), Taxes (Materials – 8%), and Other (Bonding – 1%), provided to you on the Exercise #7 Handout. The totals will be added to the subtotal costs to derive a Total Estimated Cost.

Upon completion of the exercises, the instructor will review your takeoff for accuracy and completeness.