InEight Estimate
Benchmarking

InEight® **CONTROL**

InEight® **ESTIMATE**

Changelog

This changelog contains only significant or other notable changes to the document revision. Editorial or minor changes that do not affect the context of the document are not included in the changelog.

Rev	Date	Description
1.0	09-Jan-2022	Initial publication

Contents

Benchmarking

Benchmarking is used to validate an estimate's cost and productivity values by comparing them to relevant historical data, which includes past projects. These comparisons give you a better understanding for what factors you can optimize, help you implement best practices, identify problem areas, expose any deficiencies, and ultimately help you continuously improve job estimates.

Benchmarking helps identify the range of possible productivity rates or unit costs for a given scope and quantity of work, and helps estimators ensure their estimate is accurate.

Benchmarking Overview

InEight's benchmarking plot graph helps you visualize the cost or man-hour per unit rate of other benchmarkable jobs to give you a better understanding of how your current estimate compares to other similar work. The scatter plot graph shows a visual depiction of the distribution of the data, similar to a histogram or probability distribution function. Scatter plots show a visual analysis of data to detect the central tendency, dispersion, skewness, and modality of the data.

Some of the many benefits of using Estimate's benchmarking tool include improving internal operations, identifying what is working and not working, and the potential to analyze trends and projecting future trends.

The benchmarking plot graph is available in both the Cost Item Record and the Account Code Utilization Register (ACUR).

The plot graph is shown on an *X* and *Y*-axis to depict certain data trends and groupings that can be changed depending on the values selected in Job Properties > **Benchmarking**. The plot graph can also be changed on the cost item or account code being benchmarked. The Job Properties setting is a default setting but can be overridden and different from item to item.
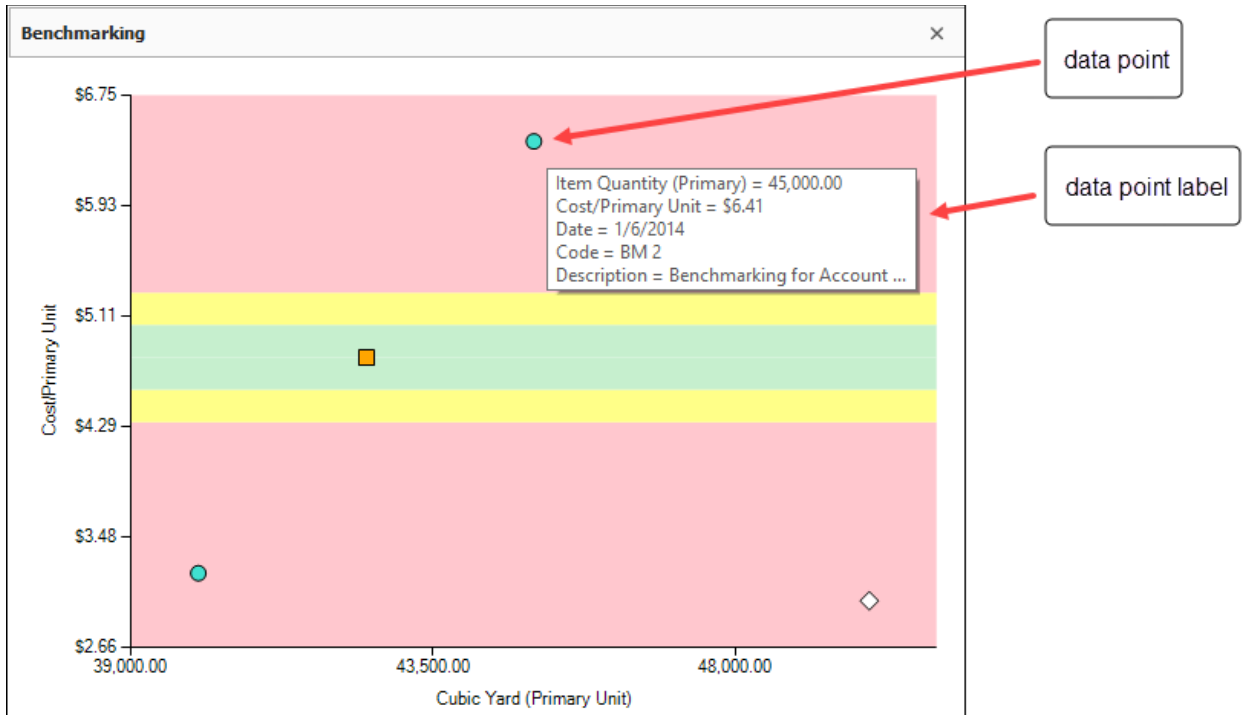
Access the CBS benchmarking plot graph by navigating to Estimate > CBS > cost item record > **Benchmarking**.

The ACUR graph can be accessed by navigating to Estimate > Account Code Utilization > **Benchmarking.**

Click the **Settings** button located at the bottom left to open the benchmarking settings window for the selected cost item.

You can click the Override Jobs Filter **Edit** button if you choose to override the jobs selected in the Default Jobs Filter section.
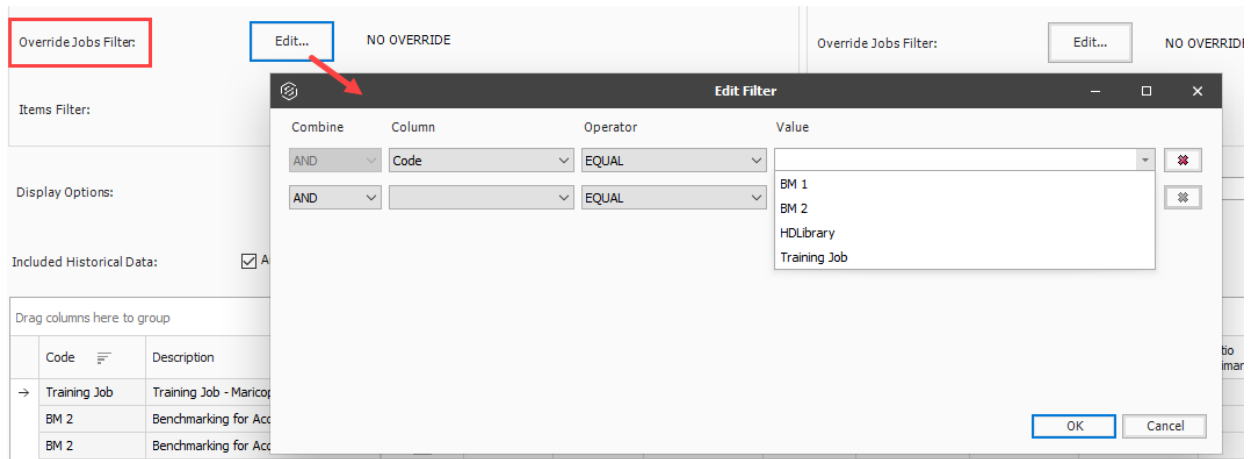
You can also choose to override the display options for the *X* and *Y* axis.

Deselecting the Auto include all matching data points check box lets you manually control which jobs to include on the plot graph.
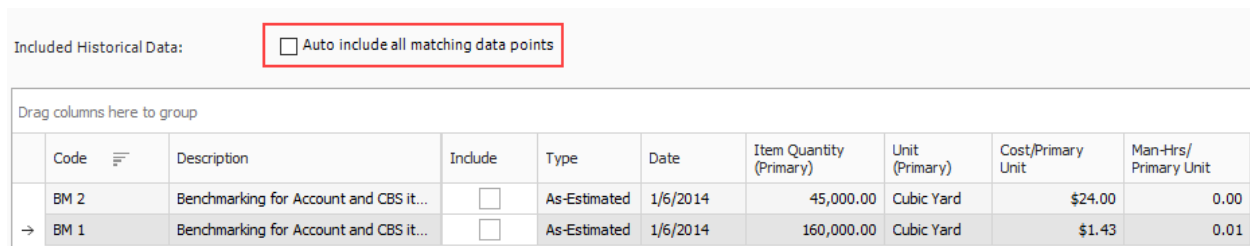
Action Plan to Start Benchmarking

Step 1: Develop a Coding Strategy

Developing a coding strategy helps to create matches between like items, which is critical to successfully benchmarking data. It is important to keep in mind the cost of resources and productivity per location when creating a coding strategy. The cost of a project's resources in one location could be higher than in another location. Aggregating and rolling up data is also an important consideration, as the ability to roll up data can help with the level of detail that you want to track actuals. Your coding strategy should also consistently define what constitutes a match at the item and project level, all while knowing exactly from where the historical data originates.

There are three points to consider when developing a coding strategy. The structure should support:

- A hierarchical scaling of detail.

- Quantification of work by using quantities as well as consistent units of measure. The latter may require ratios between primary and secondary units of measure.
- Assumptions regarding materials and third-party services.

You should always work towards consistency. For example, if an organization is going to include the cost of concrete as part of its concrete code, then it must do that all the time. If that organization strips out concrete costs and focuses on labor costs and labor productivity, then it might consider another line item for materials. Develop a coding strategy contemplating these types of questions, because taking an inconsistent approach to codes can cause issues down the road.

Some practical questions to ask yourself when developing a coding strategy include the following:

- Should I use account codes or a different field as the matching criteria for my benchmarkable data points? Maybe you are already using account codes for something else, so contemplate using a different field.
- How can I determine which jobs will be benchmarkable jobs?

These types of questions to ask yourself before you start will greatly help in the long run.

Step 2: Use the 80/20 Rule

The objective of the 80/20 rule is not to ensure that every scope of work your company performs is benchmarkable in some way, but rather the maximum value can be realized by attempting to benchmark the 20% of the work you do 80% of the time. That work should be the area of focus where you build out an effective coding strategy. As you develop and refine that strategy with this core work, implement those lessons to 80% of the work you only do 20% of the time.

Step 3: Communication throughout the Organization

A good well-communicated plan throughout the organization is far better than a perfect plan that has been exposed to a limited audience. Create a good plan, and make sure people understand it and the expectations associated with it. If stakeholders are not in agreement, then adopt the coding structure that allows stakeholder to buy-in.

Make sure people are always updated. If you introduce new codes or update benchmarks, be sure people are aware of the changes. Continue to work on the plan and adjust as necessary.

Step 4: Get Started Right Now

Don't let historical data overwhelm you. Focus on what you are doing now, capturing data in real time. Aim toward making sure estimates and project controls are coded in such a way that stakeholders can use that data. After the current data is integrated into your coding strategy, you can start converting legacy data into some of your codes. You can even set up a parallel effort with what you are doing now, in real time, to add in historical data.

With a plan, and team buy-in, your benchmarked data will ultimately help you build that trusted single source of truth that company estimators and leaders are looking for.

Benchmarking Setup

Preparing a job for Benchmarking

Before you establish benchmarks for a job, you must take into consideration the different historical data sources and which options you want to choose for benchmarking data.

The Benchmarking form in Job Properties is used to identify the historical data sources to be used for the job, and to define the default benchmark graph display and calculations.

The Benchmarking form can be accessed by navigating to Setup > Job Properties > **Benchmarking.**

Benchmarking parameters can be maintained either at the master job level or for each individual job separately.

Overview – Job Properties Benchmarking

	Name	Description
1	As-Estimated	Historical data from jobs that have been estimated before. Benchmarking based on previously estimated jobs can help an estimator understand the variability in scope of similar work across different projects.
		For example, If you had bid on ten jobs in the past and did not win any of the ten jobs, you might want to use the data in these jobs as benchmark data. In these ten jobs, you've estimated excavation work ranging from $2.50 a cubic yard to $5.00 a cubic yard. This information could potentially tell you that an estimate of $2.50 is on the low side. The plot graph gives you a sense of where your estimates fall for all your ten jobs and can help identify ranges of acceptable values or see trends across different ranges of quantities for similar work.

| 2 | As-Built | Historical data based on what has been tracked for work that has already been completed. As-Built data can be pulled in from actuals tracked using Estimate's Job Tracking register or from InEight Control when using InEight's cloud-based solutions for managing budgets and tracking progress.

Unit cost and unit man-hour benchmark data points are shown graphically in relation to the current estimate. This gives you a visual representation of where your job stands in relation to how your company performed on the historical jobs being compared. |
|---|---|---|
| 3 | Default Cost Item Matching Criteria | Indicates the field or fields to be used to determine which Cost Items to match on by default. This setting can be overridden for any individual cost items from the Benchmarking Settings dialog on the Cost Item record. |
| 4 | Default Account Code Matching Criteria | Indicates the field or fields to be used to determine which account codes to match by default. This setting can be overridden for any individual account using the Settings dialog on the Account Code Utilization Register (ACUR)s Benchmarking data block. |
| 5 | Default Jobs Filter | Identifies the field or fields to be used to determine which jobs are benchmarkable jobs by default. This setting can be further refined from the Benchmarking Settings dialog on either the cost item or account. |
| 6 | Benchmark Graph Options | Defines the data to be represented on both the x-axis and y-axis of the graph. |
| 7 | Calculate 'Average' as | Defines the calculation method as either Average or Weighted Avg (weighted by the current quantity). |
| 8 | Benchmark | Lets you choose which benchmark data values are available for use, either Cost per Unit, Man Hours per Unit, or Units per Man-Hour. |
| 9 | Flag an item's variance relative to the | This setting defines what constitutes low, medium, and high ranges for indicating the amount of variance from the currently estimated data point. |

	benchmark data when	
10	Don't benchmark items fewer than __ historical data points	Lets you designate the minimum number of data points needed to benchmark an item.

Benchmarking Data Sources

As-Estimated information captures data from past jobs in Estimate. As-Built information compares job cost and production rates experienced on actual projects where performance has been tracked using job tracking or InEight Control.
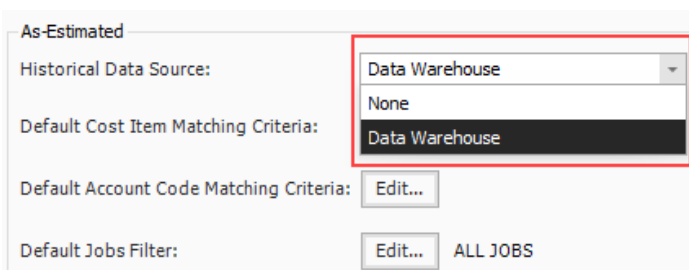
Estimate can use both the As-Estimated and As-Built data sources at the same time in the current estimate. For example, the estimate's unit cost for a cost item ranges from $5 to $7 per unit, while the as-built unit cost for the same work is anywhere from $6 - $9/unit.

As-Estimated data always comes from Data Warehouse, while As-Built data can come from either the Data Warehouse for on-premises users, or from InEight Control for users of InEight Cloud Solutions. This is configurable by setting the Historical Data Source field in Job Properties.
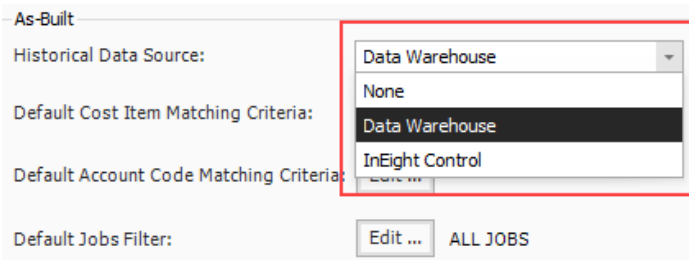
As-Estimated

When you pull records from Data Warehouse using the As-Estimated option, you are benchmarking based on the current estimate, as it currently stands. As-estimate jobs are jobs that have been estimated before.

As-Built

When you benchmark based on actuals coming into Estimate, you can either select your historical data sources to pull from the Data Warehouse, or Control.

Data Update Frequency

Control data has a propensity to change periodically depending on the types of transactions that are occurring at any given time. When using Control to benchmark data, data points can frequently change,

as active jobs can be subject to ongoing and frequent changes. When using Control to benchmark data it's recommended to use non-active jobs, otherwise the data points can potentially be a moving target.

Control data is live data and is not stored equally compared to data warehouse data, which tends to house data that is more stationary if the jobs are inactive.

When benchmarking on non-active jobs, such as select data warehouse jobs, the risk of benchmarking undesirable data points is very low.

Benchmarking on live jobs can result in data points changing over time as work is being completed and budgets are changing.

For example, Job XYZ is active in Control, meaning it is either currently being estimated or executed. The data points are more likely to change, and decision points today might not be favorable determinations based on what you've benchmarked. You might have estimated a $90/CY cost for concrete after benchmarking data has been recently updated. Tomorrow, Control now shows the average cost of concrete to your company is $110/CY.

Jobs Filter

Job filters are used to specify which jobs you want to include as benchmarkable data points. When refreshing benchmarks, this filter is used to reduce the number of jobs and data points that are included in the benchmark data brought back from the data warehouse.
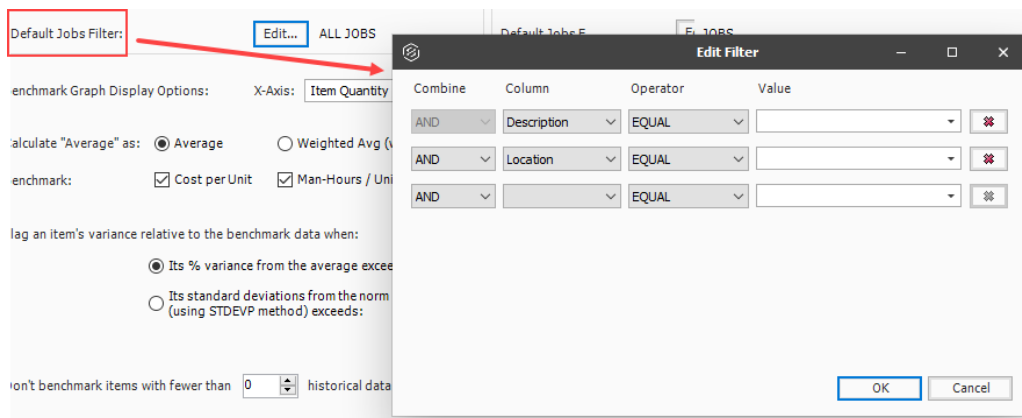
It is common to benchmark similar types of jobs. The following image is an example of how to filter down to benchmarkable jobs where the Tag 2 field value is equal to Infrastructure.
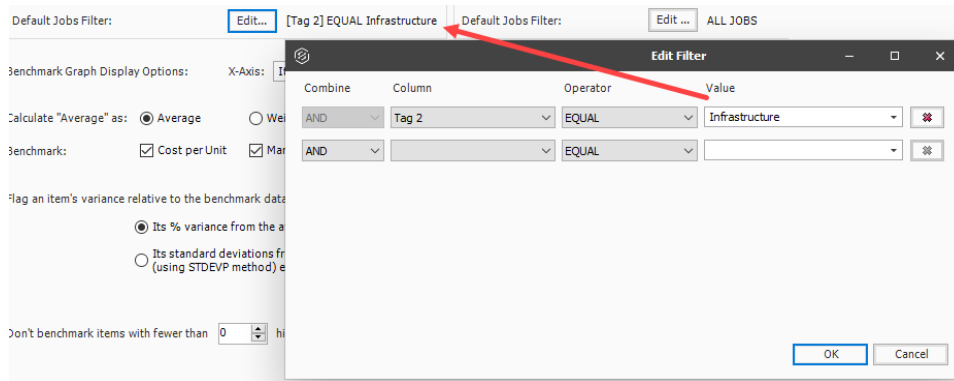
Cost Item Matching Criteria

The Benchmark tab on the cost item record is used for matching cost item criteria for benchmarkable jobs.

When matching cost items, you have several criteria fields to choose from. Matching criteria can simply be a single field such as an Account Code, or more complex criteria can be defined using multiple columns using *and/or* statements.

Default matching criteria can be defined at the job level in the Benchmarking tab of Job Properties. The matching criteria defined here is used for all cost items in the job by default.
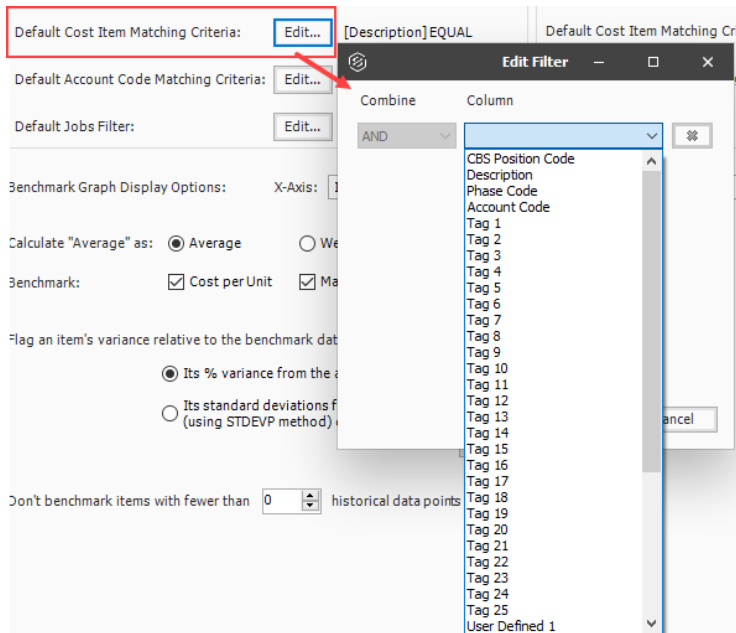
The following is an example of how to benchmark on cost items where Tag 4 field value in the estimate matches the Tag 4 field value in the benchmarkable jobs.
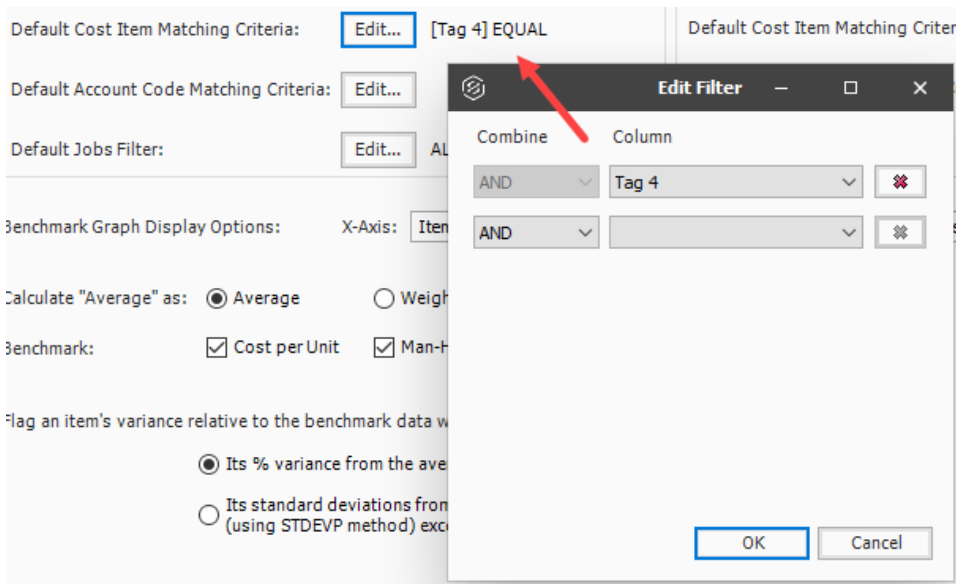
Default matching criteria can also be overridden and defined specifically on individual cost items by clicking on the **Settings** button in the Benchmarking Data block of a cost item record.

Account Code Matching Criteria

Account codes roll up cost items and resources in the Account Code Utilization Register (ACUR). The ACUR is also where you will see the benchmarking plot graph for any selected Account Code.

For example, in the image below, account code 1122.100 exists for cost items associated with some type of excavation activity, as noted in the Account Description column. In the CBS, there are existing cost items for Excavation, Structural Excavation, Mass Grading Excavation and potentially any other excavation type cost items. If you assign the same account code to all these different excavation cost items, the costs and quantities of all three cost items are included under account code 1122.100, which can be benchmarked against other jobs also utilizing account code 1122.100. When multiple cost items for similar types of work are spread all throughout the estimate, using account codes lets you combine similar activities, such as excavation, and benchmark against other projects in a more consolidated manner.

CBS Positi... Code	Description	Forecast (T/O) Quantity	Account Code	Account Description	Total Cost (Forecast)
▬	**JOB**	20.00			$5,957,114.19
+	**Prime Bond**	1.00	7000	Job Overhead	$47,575.11
+	**Price % Add-On**	1.00	7000	Job Overhead	$299,475.99
+	**Job Financing**	1.00	7000	Job Overhead	$22,014.19
+	**Indirect Cost Escalation**	1.00	7000	Job Overhead	$2,131.11
+	**Direct Cost Escalation**	1.00	7000	Job Overhead	$12,963.02
+	**Indirect Cost Add-On**	1.00	7000	Job Overhead	$5,879.61
+	**Direct Cost Add-On**	1.00	7000	Job Overhead	$105,721.15
▬ 1	**SITEWORK & ROADWAY**	1.00			$2,611,044.90
+ 1.1	Mobilization	1.00	1020	Mobilization	$11,909.51
+ 1.2	Clearing & Grubbing	10.00	1110	Clearing and Grubbing	$39,184.97
▬ 1.3	Unclassified Excavation	50,000.00	1122	Unclassified Excavation	$316,492.94
+ 1.3.1	Excavation	50,000.00	1122.100	Excavation	$232,500.00
+ 1.3.2	Embankment	50,000.00	1122.200	Embankment	$83,992.94
▬ 1.4	Aggregate Base	45,000.00	1120	Aggregate Base	$692,928.99
+ 1.4.1	Furnish & Haul Base Material	45,000.00	1120.100	Furn and Haul Base Material	$519,513.30
+ 1.4.2	Structural Excavation	25,000.00	1122.100	Excavation	$75,848.36
▬ 1.4.3	Install Aggregate Base	45,000.00	1120	Aggregate Base	$97,567.33
+ 1.4.3.1	Place Aggregate Base	45,000.00	1120.200	Place Aggregate Base	$73,460.92
+ 1.4.3.2	Blue Top Aggregate Base	400,000.00	1120.200	Place Aggregate Base	$24,106.42
▬ 1.5	Asphalt Concrete Hot Mix Type A	35,000.00	1240	Asphalt Concrete	$1,550,528.50
+ 1.5.1	Mass Grading Excavation	19,500.00	1122.100	Excavation	$64,306.22
+ 1.5.2	Furnish Asphalt	35,000.00	1240.100	Furnish and Haul Asphalt Concrete	$1,374,562.54
+ 1.5.3	Install Hot Mix Type A	35,000.00	1240.200	Install Asphalt Concrete	$111,659.74

In the ACUR for in the image below, all cost items where account code is equal to 1122.100, in addition to their associated costs, roll up to the Excavation account code 1122.100 with a total cost of $372,654.58.

Account Code	Description	Auto-Q... (Primary)	Qua...	Unit of Measure	Unit Cost	Total Cost	Co Prii
⊞ 9000	**Risk**	☐	1.00	Each	$1,000.00	$1,000.00	
⊞ 1343	**Structural Excavation and...**	☐	1.00	Cubic Yard	$17,435....	$17,435.14	
⊞ 3228	**Storage Tanks and Conta...**	☐	1.00	Each	$0.00	$0.00	
⊞ 1763.300	**Backfill 24 PVC Gravity Se...**	☐	1.00	Cubic Yard	$41,223....	$41,223.34	
→ ⊞ 1122.100	**Excavation**	☑	94,500.00	Cubic Yard	$3.94	$372,654.58	
⊞ 3228.100	**Remove Contents and Ta...**	☐	1.00	Each	$15,830....	$15,830.32	
⊞ 1120.100	**Furn and Haul Base Material**	☐	1.00	Ton	$519,51...	$519,513.30	
⊞ 2140	**Signs**	☐	1.00	Square Feet	$13,000....	$13,000.00	
⊞ 1122.200	**Embankment**	☐	1.00	Cubic Yard	$83,992....	$83,992.94	
⊞ 1240.100	**Furnish and Haul Asphalt ...**	☐	1.00	Ton	$1,374,5...	$1,374,562.54	
57						$5,957,114....	

Utilizing Items

Drag columns here to group

| CBS Position Code	Description	Account Code	Account Descrip...	Unit Cost	Forecast (T/O) Quantity	Account Total Cost
→ + 1.3.1	Excavation	1122.100	Excavation	$4.65	50,000.00	$232,500.00
+ 1.5.1	Mass Grading Excavation	1122.100	Excavation	$3.30	19,500.00	$64,306.22
+ 1.4.2	Structural Excavation	1122.100	Excavation	$3.03	25,000.00	$75,848.36

If you are using matching account codes as the Default Account Code Matching Criteria, and then run benchmarking in the ACUR, you can see how the plot points for each of the jobs being benchmarked.

in the next image, the Training job's cost/primary unit is $3.94, BM1 job's cost/primary unit is $1.37, BM2 job's cost/primary unit is $6.22, giving an average cost/primary unit of $2.56.

At this stage, a determination can be made for why there is a cost gap between the Training job and the BM1 or BM2 jobs. Some questions to ask are Does the account code in one estimate really match 1 for 1 in the other job? Are these estimates in locations where the costs of resources and labor are higher than the other?
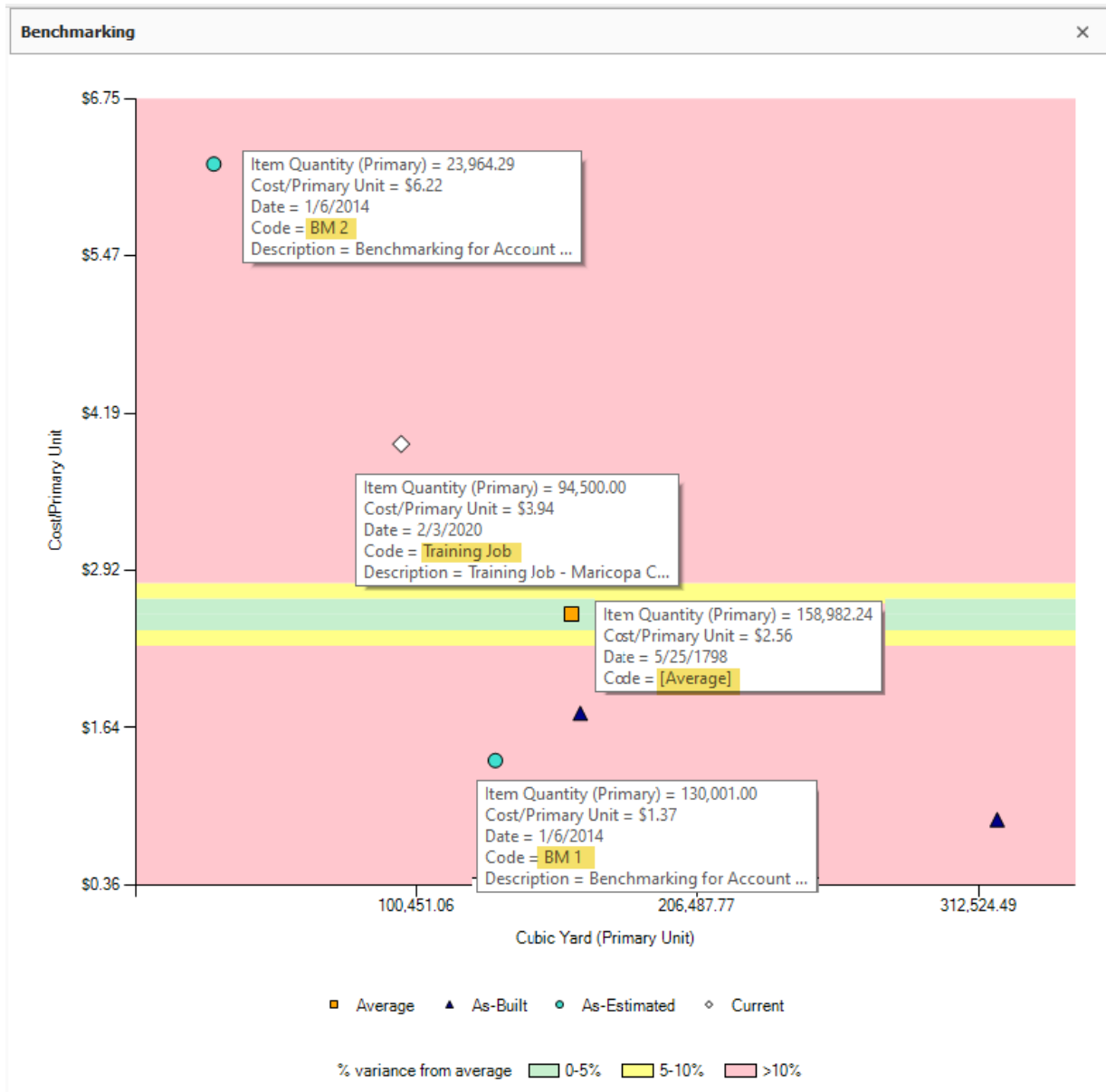
As with cost item matching criteria, you have many fields available to choose from and can even create complex matching criteria using *and/or* statements.
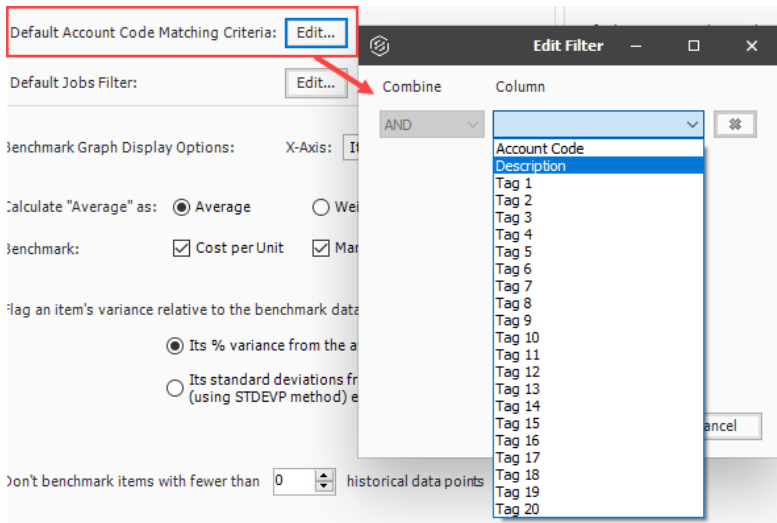
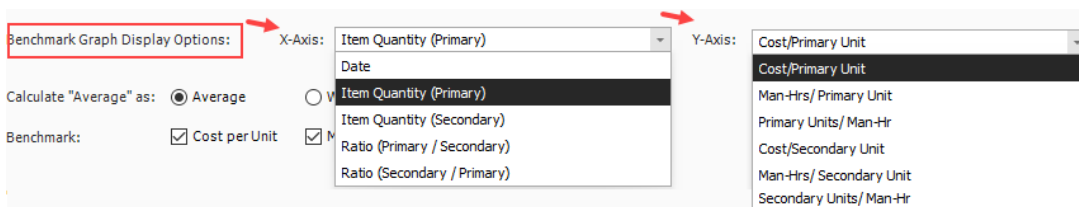The following image is an example of how to benchmark on accounts where the Tag 4 field value in the estimate matches the Tag 4 field value on Accounts in the benchmarkable jobs.
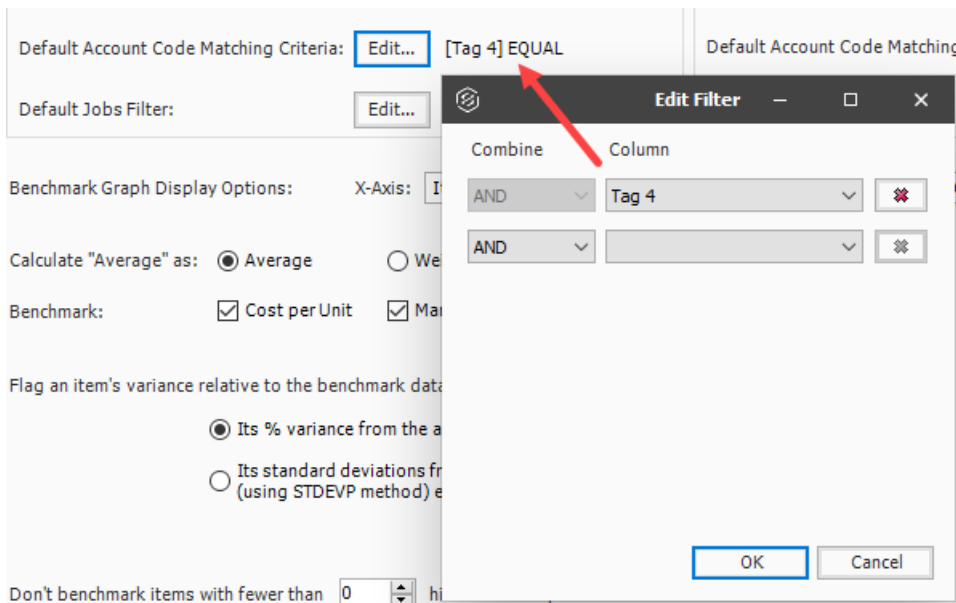
Benchmark Graph Display Options

Use the Benchmark Graph Display Options to choose how the data should be represented on both the x-axis and y-axis of the graph.

Calculate Average as

This setting lets you specify whether you want to calculate the average as the actual average, or the weighted average which is based on the current quantity.

Calculate "Average" as: ◉ Average   ◯ Weighted Avg (weighted by current Qty)

Benchmark

You can specify which benchmark datapoints to show on the plot graph on the x-and y-axes.

Benchmark: ☑ Cost per Unit   ☑ Man-Hours / Unit   ☑ Units / Man-Hour

Additional benchmarking options

You can alter a cost item's variance and historical data points, as it is shown on the plot graph.

Flag an item's variance relative to the benchmark data when: Low   Medium   High

◉ Its % variance from the average exceeds: 0   5   10

◯ Its standard deviations from the norm   0.0   0.5   1.0
(using STDEVP method) exceeds:

Don't benchmark items with fewer than   0   historical data points

The percentage variances from the average are depicted on the graph by what is defined in the Low, Medium, and High fields in Job Properties.

In this example, the Average cost (shown with an orange square ▪) for the selected jobs is $5.03 per cubic yard, which is an average of the other job costs that range from $1.79, $3.00, $3.81, 5.95 and $9.81.
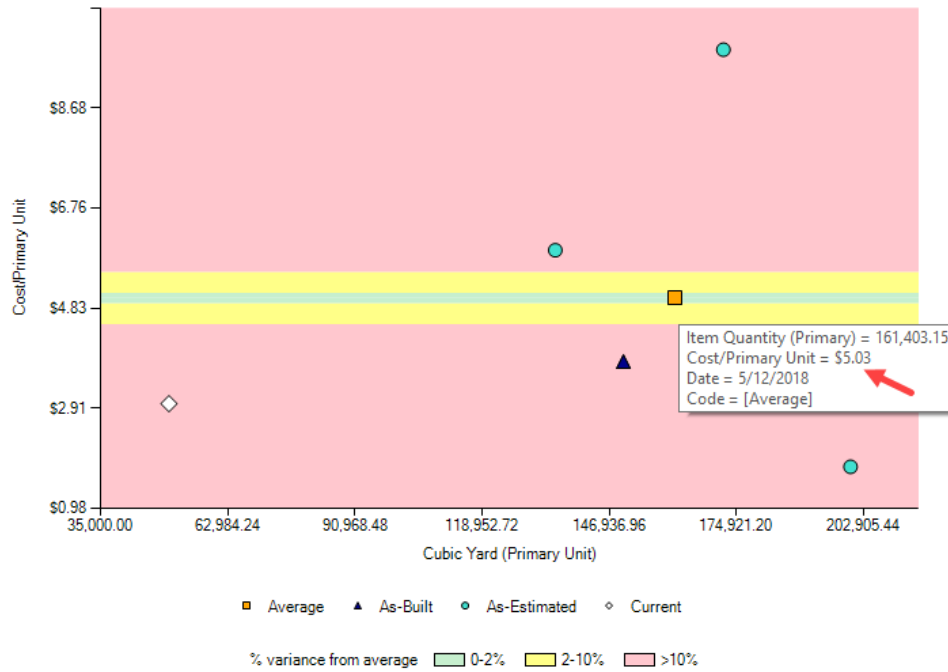
You can also choose to print the benchmark report by selecting the Print button at the bottom right.
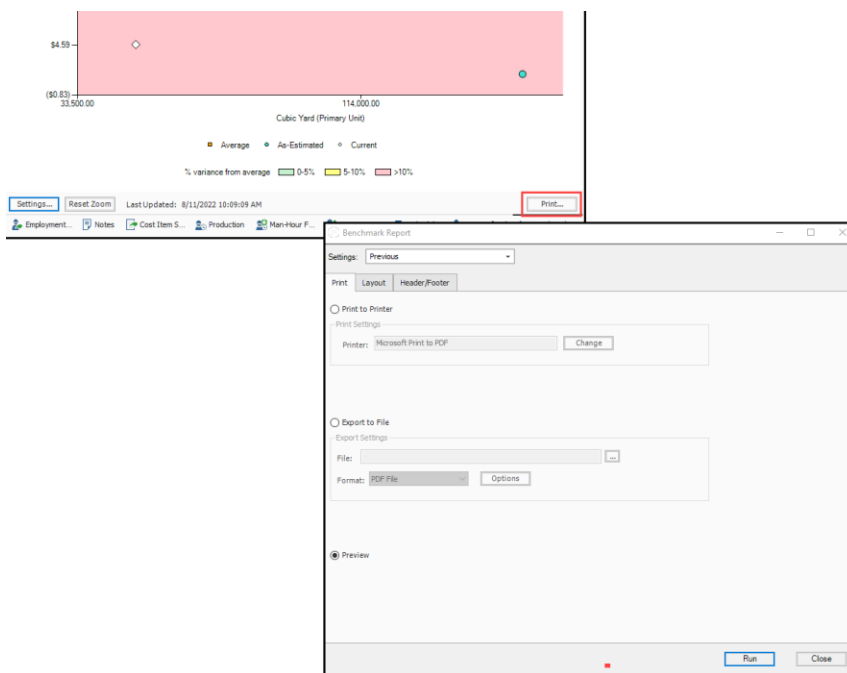
Some of the useful features of the benchmarking report highlight attributes, such as any job override or items filters that were used and where the unit rates derived from for each job. The report shows both the plot and the data used to generate the graph.

Benchmark Report
INEIGHT - PAUL TRIPPI
Job Code: Training Job
Description: Training Job - Maricopa County No. TM2924

As-Estimated Jobs Filter: ALL JOBS
As-Estimated Items Filter:
As-Built Jobs Filter: ALL JOBS
As-Built Items Filter:

1.3.1 Excavation

Cost/Primary Unit
$26.26
$20.84
$15.42
$10.01
$4.59
($0.83)
33,500.00 — 114,000.00
Cubic Yard (Primary Unit)

■ Average   ● As-Estimated   ◇ Current

% variance from average □ 0-5% □ 5-10% □ >10%

Code	Description	Data Point Type	Item Quantity (Primary)	Unit (Primary)	Cost/Primary Unit	Man-Hrs/ Primary Unit	Primary Units/ Man-Hr	Ratio (Primary / Secondary)	Item Quantity (Secondary)	Secondary Unit	Cost/Secondary Unit	Man-Hrs/ Secondary Unit	Secondary Units/ Man-Hr	Ratio (Secondary / Primary)
	Training Job - Maricopa County No. TM2924	Current	50,000.00	Cubic Yard	4.65	0.04	25.71	0.00	0.00		0.00	0.00	0.00	0.00
		Average	102,500.00	Cubic Yard	12.72	0.01	74.07	0.00	0.00		0.00	0.00	0.00	0.00
BM 1	Benchmarking for Account and CBS items	As-Estimated	160,000.00	Cubic Yard	1.43	0.01	74.07	0.00	0.00		0.00	0.00	0.00	0.00
BM 2	Benchmarking for Account and CBS items	As-Estimated	45,000.00	Cubic Yard	24.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00

Below, the cost per unit for the currently selected job (shown with a white diamond ◇) is $3.00. The variance for the current job shows a variance of greater than 10%, which is why its variance falls in the high quadrant on the plot graph. The estimated cost per unit is more than 10% lower than the average unit cost of $5.03 per Cubic Yard.

$2.91 ◇
Item Quantity (Primary) = 50,000.00
Cost/Primary Unit = $3.00
Date = 2/3/2020
$0.98
35,000.00
Code = Culver City freeway
Description = Training Job - Maricopa C... 52.72
Cubic Yard (F

Flag an item's variance relative to the benchmark data when: Low   Medium   High

● Its % variance from the average exceeds: 0   5   10

○ Its standard deviations from the norm
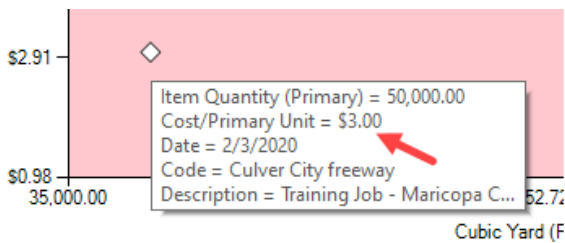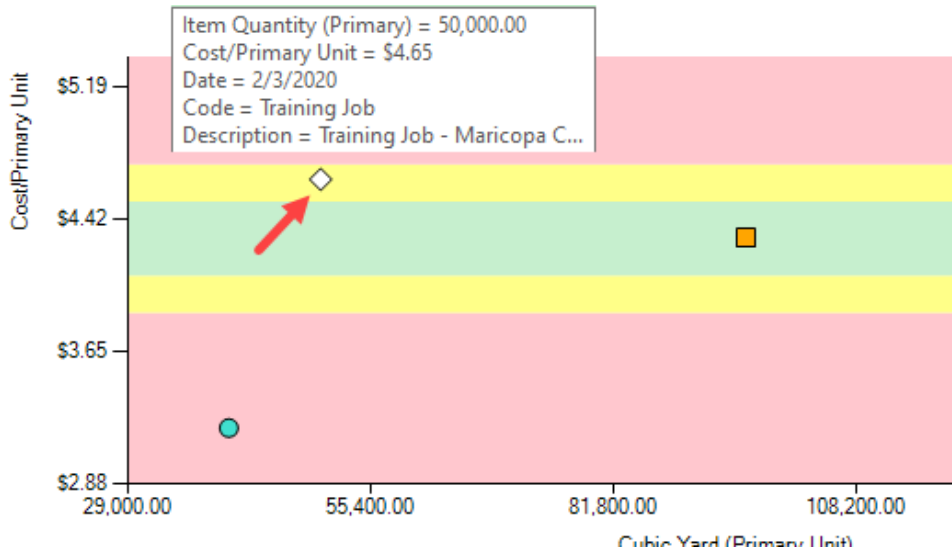   (using STDEVP method) exceeds: 0.0   0.5   1.0

In the example below, the cost per unit for the currently selected Training Job ◇ is $4.65. Since the average ■ is $5.03, the percent variance falls in the 5-10% quadrant.

Benchmarking Setup

Selecting Data Warehouse Jobs to Benchmark

Using the Benchmarking feature requires the installation of the Data Warehouse. For additional information, refer to the Data Warehouse topic on learn.ineight.com. The Data Warehouse combines data from individual jobs into a single warehouse, and lets you combine data from multiple, individual job databases into a single database for reporting purposes.

You select which jobs to include, and Estimate populates the consolidated database with all the data from each job in Jobs > **Data Warehouse.**

Select the **Include** and **Auto Update** check boxes for the jobs you are using for benchmarking.

Benchmarking Setup

Refreshing Benchmark data

In Estimate > CBS > **More Actions**, select Refresh Benchmarks to populate your estimate with updated benchmark data. A pop-up dialog box shows the number of jobs that match your previously selected job filter criteria in Job Properties. Select **Refresh Now** to refresh the benchmark data.
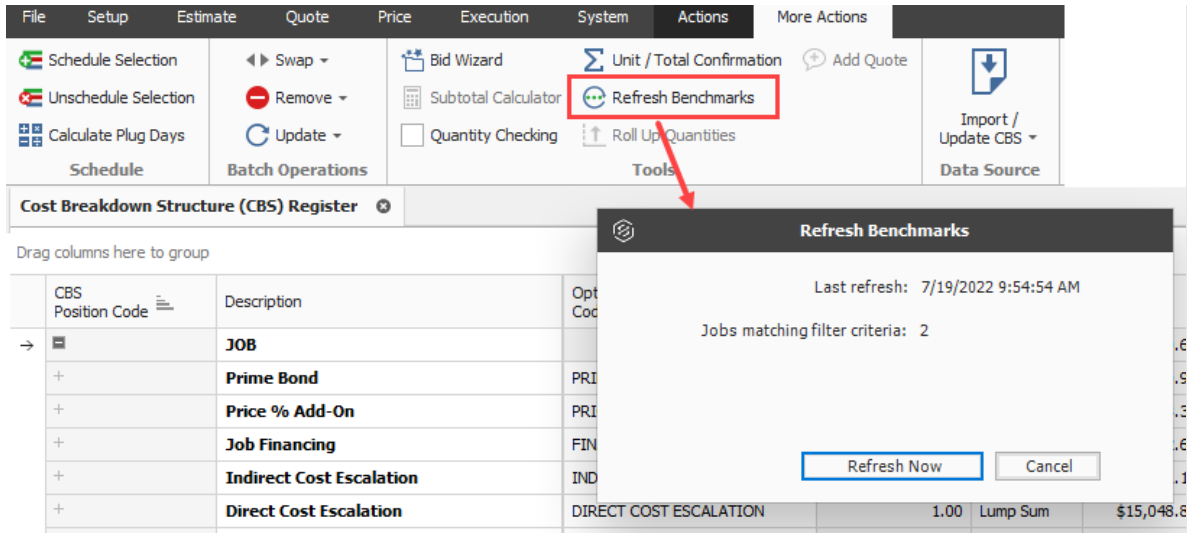
A Benchmark Data status dialog box opens to let you know that Estimate is currently updating Estimate with current benchmarking data.