

Quick Reference Guide

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PC Paving - QC/QA - revising Contract S&T's

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The QC/QA Special Provision defines Sampling and Testing frequencies that are different than the default frequencies. Contract Sampling and Testing (S&T) Requirements in SiteManager will need to be revised to reflect the QC/QA requirements. There are several different ways project pay items for PC paving can show up on your contract. It is important to be familiar with the project specific items as this will affect how you revise the contract S&T requirements in SiteManager.

When revising S&T's it is important to remember that materials are tracked and tested according to material quantities (examples; tons of aggregate, CY of concrete), and the **conversion factor** is used to relate material quantities to pay item quantities. It is important to retain this material quantity focus in order to maintain consistency in the database and the reports and queries that utilize this data throughout the system.

If the contractor has chosen to utilize the Optimized Gradation Concrete Mix Design (OGCMD) Special Provision, there will be additional Contract S&T revisions that will need to be made utilizing some of the instructions in this QRG and also in the QRG for OGCMD.

Example: A project with separate pay items for PC Pavement placement (SY) and PC Concrete (CY).

In this example taken from a couple of current Stimulous projects, there are the following pay items:

- 414 (A) 0210 PC Concrete Pavements (Placement) [SY]
- 414(A1) 5725 PC Dowel Jointed Concrete Pavement (Placement) [SY]
- 414 (P) 6000 PC Concrete for Pavement [CY]

Global (default) S&T requirements have been established for the last pay item (based on CY) and these were brought into your contract when materials were generated. The Placement Pay items were set up with no materials (nomats). However the QC/QA requirements want you to sample and test every subplot or 2500 SY. Relating CY to SY requires you to know the thickness of the pavement so the sampling frequency can be revised. By revising the sampling frequency, the number and frequency of tests required by SiteManager can match up with the QC/QA sublots. The conversion factors will not need to be revised unless there is a significant difference in the mix design being used compared with a typical concrete mix design.

A review of the typicals, plan notes, and Summary of Surface Quantities in the plans indicates the majority of pavement will be 12.5" thick, but there is also 7.5" and 8.5" pavement, all paid for under the same pay item.

Step 1:

First you need to decide what thickness you want to use to determine how many CY of Concrete are in a SY of paving, since the sampling frequency in the QC/QA special provision is in SY.

If the entire pavement was one thickness, this would be a simple matter. For this example, two possible procedures are presented.

1. Assume all of the pavement will be 12.5" thick. $12.5/36 = 0.3472$ CY of concrete per SY of pavement.
2. Divide the CY of concrete by the sum of the SY that will be placed (from Summary of Surfacing Quantities table in plans). $43,522/134219 = 0.3246$

These numbers are pretty close, decide which one to use. For the following the calculations, the second value will be used.

Step 2: Concrete Testing:

The default frequency in SiteManager for PC Paving is 1 sample of fresh concrete per 2500 **CY**. This will need to be changed to agree with the Special Provision requirement of 1 sample per 2500 SY. Take the value in step 1 and multiply by the QC/QA frequency:

$$0.3246 \text{ CY/SY} * 2500 \text{ SY} = 811.5 \text{ CY. (use 810)}$$

SIMPLIFIED (alternative) PROCEDURE TO STEPS 1 AND 2:

If you have determined the number of sublots there are going to be to cover all of the material on the Concrete for PC Paving [CY] pay item, and the number of sublots is going to be the number of samples that will be obtained. And if you understand the concept of the conversion factor and how it relates material quantity to pay item quantity, then the following simple equation can be used to determine the sampling/testing frequency:

$$\text{FREQUENCY} = (\text{Material Quantity} / \text{number of samples})$$

Example: In the screen shot below of the contract S&T window, notice material quantity. The conversion factor is one in this case because the pay item is in [CY] and the material of fresh concrete and cylinders are tracked in [CY]. Assume someone has gone through the QC/QA stuff and determined there will be 54 sublots, therefore there will be 54 samples:

$43522 / 54 = 806$, so the frequency would be 806, very similar to our previous value determined in step 1 and 2.

Contract Sample and Testing Requirements

Materials | Sample and Testing

Contract: 090182 | Project: 1362606 | Bid Item Code: 414(P) 6000 | Item Unit: CY

Desc. 1: (SP)P.C. CONCRETE FOR PAVEMENT
Desc. 2:
Supp Desc1:
Supp Desc2:

Material Code: pcco002 | HC Conc Class A (AE)

Conversion Factor: 1.00000 | Approved Source Required

Material Quantity: 43,522.000 | **Material Unit:** CU.YD.

Special Instruction:

Step 3: Revise SiteManager Contract S&T for the concrete tests (fresh concrete, and cylinders). Change frequency for both Test Methods (C94014 and C94025).

Contract Sample and Testing Requirements

Materials
Sample and Testing

Contract
Project
Bid Item Code
Item Unit

Material
Material Desc.

Desc. 1:

Desc. 2:

Supp Desc1

Supp Desc2

Producer Supplier Code	Sample Type	Acceptance method	Test Method
	MAT Material	CRES Construction Residency	C94014
	MAT Material	CRES Construction Residency	C94025

Producer Supplier Code:

Sample Type:

Acceptance Method:

Test Method: Compressive Strength of Concrete Cylinders

Sample Location:

Sample Units:

Rate

Frequency

Samples per:

Step 4: Revise Frequency for Aggregates.

The default frequency for aggregate testing is 1 per 500 Tons of aggregate used. The special provision requires us to test 1 per 2500 SY of pavement placed. The default conversion factor for fine aggregate in a CY of concrete is set to 0.6252 Tons per CY as shown below:

Contract Sample and Testing Requirements

Materials | Sample and Testing

Contract: 090182 | Project: 1362606 | Bid Item Code: 414(P) 6000 | Item Unit: CY

Desc. 1: (SP)P.C. CONCRETE FOR PAVEMENT
Desc. 2:
Supp Desc1:
Supp Desc2:

Material Code: aggr054 | HC Conc Aggregate, Fine - Natural

Conversion Factor: .6252 | Approved Source Required

Material Quantity: 27,209.954 | Material Unit: TON

Special Instruction:

Multiply this conversion factor by the concrete sampling frequency (from step 2) and that will result in Tons of fine aggregate per 2500 SY of paving.

$0.6252 \text{ Tons/CY} * 810 \text{ CY} = 506 \text{ Tons}$ (round to 500 which is by coincidence is the default freq)

Revise the frequency if necessary in Contract S&T window.

Or alternatively you could have used alternative method: $\text{Material Quantity} / \text{number of tests} = \text{Frequency}$ ($27209.954 / 54 = 504$)

Contract Sample and Testing Requirements

Materials
Sample and Testing

Contract
Project
Bid Item Code
Item Unit

Material
Material Desc.

Desc. 1:

Desc. 2:

Supp Desc1

Supp Desc2

Producer Supplier Code	Sample Type	Acceptance method	Test Method
	MAT Material	CRES Construction Residency	T27

Producer Supplier Code:

Sample Type:

Acceptance Method:

Test Method:
Sieve Analysis of Fine and Coarse Aggregates

Sample Location:

Rate

Frequency
Samples per.:
Sample Size:

Sample Units:

Sample Responsibility:

Test Responsibility:

Step 5: Repeat the same thing for the coarse aggregate.

While this will result in different sampling frequencies for each aggregate based on tons of aggregate, it has the net result of sampling each aggregate every 2500 SY of paving. When you run the sampling checklist after these revisions, it should result in the same number of tests required for fresh concrete, cylinders, and each of the aggregates.

Note: If OGCMMD is being used, the aggregate testing setup in SiteManager will be different than shown in steps 4 and 5. Refer to the QRG.