

# Quality Management Program (QMP)



# Standard Spec 106: Control of Materials

- All materials must be approved before they are incorporated into the work.



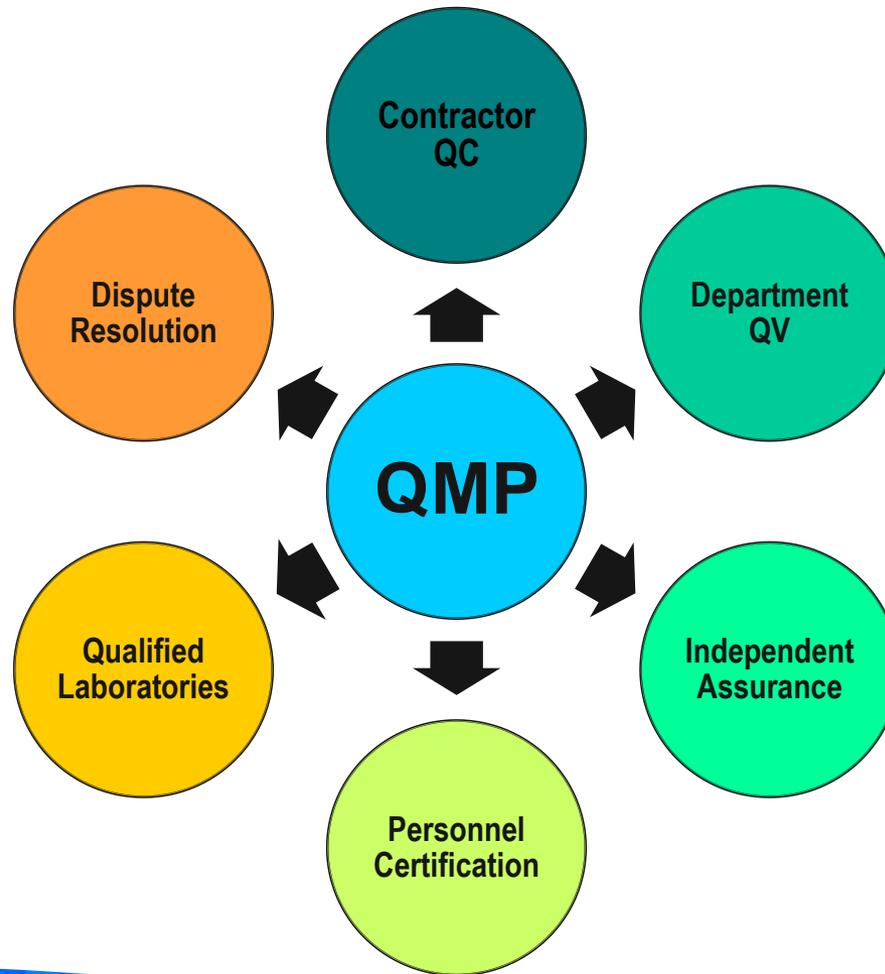
- Approval of materials is based primarily on testing.

# Quality Management Program

- ▶ Under QMP provisions, department will base approval of materials and acceptance of the work on a combination of the following:
  - Contractor QC testing
  - Department QV testing
  - Inspections of the materials production, storage, handling, and construction processes
- ▶ Note: materials not approved by certifications/APLs or QMPs are approved based on department testing by regional and/or BTS laboratories.



# Core Elements of QMP



# QMP Standard Specifications

## ▶ Primary 3 materials

- **Base Aggregates** (standard spec 730)
- **HMA** (standard spec 460.2.8)
- **Concrete** (standard specs 710, 715, and 716)

## ▶ Additional

- General QMP Requirements (standard spec 701)
- QMP Ride (standard spec 740)



# Big 3 QMP Standard Specifications

## ➤ Differences

- Test Types
- Test Increments
- Sampling/Testing Locations
- QC & QV Test Frequencies
- Small Quantity Thresholds
- Small Quantity QC & QV Test Frequencies
- Basis for Acceptance
- Payment

## ➤ Summaries in Handouts



# Test Increments

MATERIAL	TESTING	TEST INCREMENTS
Base Aggregates	Stockpile testing before placement Testing during placement	Stockpiles Tonnage
HMA	Mixture testing during production Density after placement	Tonnage Linear Lots/Sublots
Concrete	Class I testing during concrete production Slip-formed pavements Non-slip formed pvmts, structures, & barriers Ancillary concrete Aggregate testing During aggregate production During concrete production QV	Lots/Sublots by Lane-Feet Lots/Sublots by Cubic Yards Cubic Yards or per day  Tonnage or per day Cubic Yards or per day QCs



# Sampling/Testing Locations

<b>MATERIAL</b>	<b>SAMPLING/TESTING LOCATIONS</b>
<b>Base Aggregates</b>	Sample from roadbed, after mixed and bladed; test in laboratory
<b>HMA</b>	Sample from truckbox at the plant; test in laboratory
<b>Concrete</b>	Sample at point of placement; test at project site, except test cylinders in a laboratory



# Payment

MATERIAL	PAYMENT
<b>Base Aggregates</b>	<ul style="list-style-type: none"><li>• Disincentives for NC gradation, fracture, or plasticity per 3 administrative Items</li><li>• Ranges (%) provided in 730</li></ul>
<b>HMA</b>	<ul style="list-style-type: none"><li>• Density Incentives/Disincentives</li><li>• Disincentives for NC Air Voids, VMA, and aggregate gradation</li></ul>
<b>Concrete</b>	<ul style="list-style-type: none"><li>• Compressive Strength Incentives/Disincentives</li><li>• Disincentives for slump, air content, masonry temperature, time limits, aggregate gradation</li><li>• Percentages provided in CMM 8-10</li></ul>



# QMP SPVs and STSPs

## ➤ Base Aggregates

- Base Aggregate Compaction STSP

## ➤ HMA

- HMA Pavement Nuclear Density STSP
- Stone Matrix Asphalt STSP
- HMA Pavement Percent Within Limits STSP
- HMA Longitudinal Joint Density SPV

## ➤ Concrete

- Optimized Aggregate Gradation STSP
- Flexural Strength for Concrete Mix Design STSP
- Flexural Strength Testing for Class I Concrete SPV
- High Performance Concrete SPV

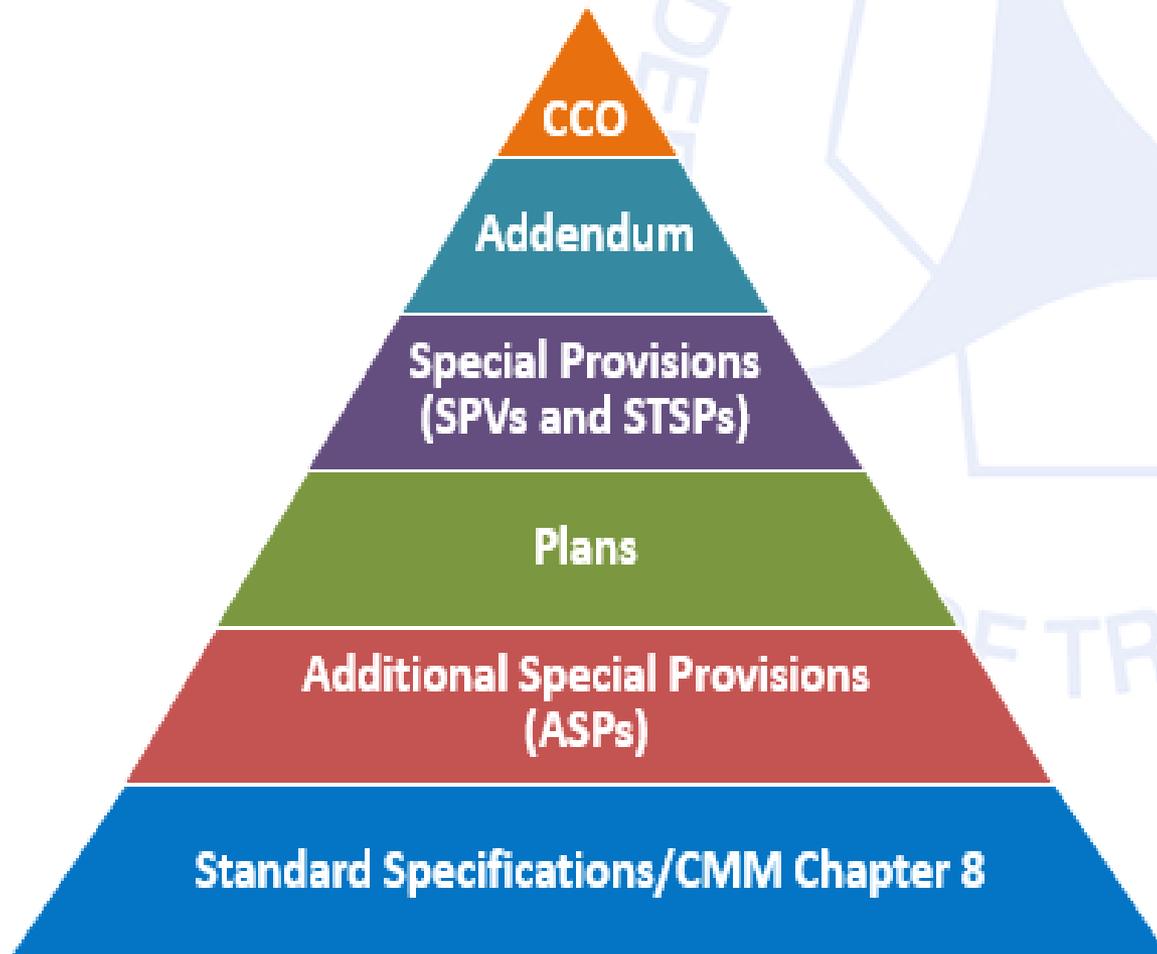


# QMP Specifications

- An individual contract can contain any combination of QMP specifications.
  - Know the QMPs involved in each contract.
  - Know the hierarchy of contract documents.
- Each QMP spec is independent of others; requirements vary between them.
- Thoroughly review each of the QMPs to ensure nothing gets missed.



# Contract Document Hierarchy



# QMP Base Aggregate

## Standard Spec 730

QMP Material	Test Increment	Testing Properties	Test Type	Sampling Location	Test Frequency	
					QC	QV
Base Aggregates	Stockpiles	*Gradation *Fracture	Stockpile tests before placement	Stockpiles	1 QC stockpile test per size, source, class, & type	1 QV stockpile test per size, source, class, & type
	Tonnage	*Plasticity	Placement tests	Point of Placement	1 QC / 3000 Tons	1 QV / 30,000 Tons



# QMP Base Aggregate (2)

## Standard Spec 730

Small Quantity Thresholds	Small Quantity Test Freq		Acceptance Basis	Payment
	QC	QV		
≤ 6000 Tons	1 stockpile test and 2 production tests or 1 loadout test instead of placement	No Change	* 4 point running ave * Indiv tests if RA not established	* Pay Reduction for NC Base Agg * Per 3 NC Base Agg Admin Items
≤ 500 Tons	2 production or 1 stockpile test	Waived	* NC QV added to RA * Indiv QC/QV if signif out-of-spec	* Pay reduction ranges (%) in 730.



# QMP Hot Mix Asphalt Pavement

## Standard Spec 460.2.8

QMP Material	Test Increment	Testing Properties	Test Type	Sampling Location	Test Frequency	
					QC	QV
HMA	Tonnage	Agg Gradation Asphalt Content Bulk Specific Gravity, $G_{mb}$ Max Specific Gravity, $G_{mm}$ Air Voids & VMA by Calculation Tensile Strength Ratio (TSR)	Volumetrics testing during mix production	In truckbox at the plant	1QC per 600/900/1200/1500 tons	1 QV / 5,000 tons
	Linear Lots/Sublot	Density	On pavement, after placement	On Pavement	1 to 3 QCs / sublot; varies by pavement width and length. 3 QCs for 1500 LF mainline, full width	10% of QC Sublots; 0 – 3 test per sublot for QMP HMA Pvmt Nuc Density STSP



# QMP Hot Mix Asphalt Pavement (2)

## Standard Spec 460.2.8

Small Quantity Thresholds	Small Quantity Test Freq		Acceptance Basis	Payment
	QC	QV		
≤ 5000 Tons	<p>* QC tests can be performed in an off-site laboratory</p> <p>* TSR testing waived</p>	1 QV if ≥ 500 tons	<p>4 point running ave for all except SMA</p> <p>For SMA, if two or more individual QC air voids tests within the 4-pt RA exceed the JMF limits, the material is nonconforming</p>	<p>* Two levels of pay reductions for NC gradation, air voids, and VMA w/in warning bands and outside of JMF limits are in specs</p> <p>* Pay for NC SMA at 80%</p> <p>* No pay adjustment for NC 4-pt RA of asphalt content; corrective actions</p>
≤ 500 Tons	Can be waived by engr	Waived	<p>Individual NC QV air voids (Va), VMA, or asphalt content test triggers dispute resolution</p>	<p>* Dept credit administered for NC QMP binder admin item</p>
< 750 tons	QC may be waived by engr	Waived	<p>Sublots &gt;1% below req'd density are NC and dept credit administered; quantity removed from lot total for payment</p> <p>Indiv tests &gt;3% below req'd density is unacceptable and subject to remove &amp; replace or 50% pay deduction</p>	<p>Density incentive or disincentive based on lot ave density.</p> <p>Incentives require conforming air voids tests for the day.</p>



# QMP Concrete

## Standard Spec 710, 715, and 716

QMP Material	Material Description	Test Increment	Test Properties	Test Type	Sampling Location	Test Frequency	
						QC	QV
Concrete	<u>Class I Concrete</u> Pavements Structures Barrier	Lots/Sublots by Lane-Feet or by Cubic Yard	* Slump * Air content * Temperature * Strength * Air (SAM)	During concrete production	Point of Placement	1 QC / subplot; except 1 QC SAM / lot	1 QV / 5 QCs; 1 QV min per lot
	Ancillary Concrete Class II and III	CY / mix or placement method				Varies per CY and between ancillary type (e.g. deck overlays, concrete base)	1 QV / 5 QCs for class II concrete  QV optional for class III concrete
	Aggregate	Tons or Days CY or Days	* Agg Gradation * Agg Moisture Content	Tests During Agg +/-or Conc Production	Stockpiles	QC Agg testing varies for class I based on when tested; class II & III accepted by docs	1 QV/5 QCs; Agg QV waived for class II or III concrete



# QMP Concrete (2)

## Standard Spec 710, 715, and 716

Small Quantity Thresholds	Small Quantity Test Freq		Acceptance Basis	Payment
	QC	QV		
<p>&lt;150 CY for structure and barrier concrete</p> <p>&lt;2500 CY for slip-formed pvmt</p> <p>&lt;1000 CY for non slip-formed</p>	No change	No change	<p>Sublot acceptance based on QC ave strength of 2 cylinders</p> <p>Pavement sublots &lt;2500 psi and/or Structure/barrier concrete &lt; f'c - 500 psi may need coring for acceptance</p>	<p>Lot payment (incentive or disincentive) based on PWL of QC strength</p> <p>Department credit per CMM 8-10 for NC concrete air, slump, structure temperature, or NC aggregate gradation</p> <p>Pay reduction ranges provided in CMM 8-10</p>
None	NA	NA		
None	NA	NA		



# Questions?

