



CITY OF PHOENIX

STREET TRANSPORTATION DEPARTMENT
 DESIGN & CONSTRUCTION MANAGEMENT DIVISION
 MATERIALS LAB

EXHIBIT A - ACCEPTANCE SAMPLING/TESTING REQUIREMENTS

**TABLE 1
 BITUMINOUS MIXTURES**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
321, 710, 717	Asphalt Concrete Pavement	Volumetrics, Marshall, Rice & Air Voids	Hot Plant or In Place	One per day's production.
		Oil Content (Nuclear/ Ignition)	Hot Plant or In Place	One per 350 tons or fraction thereof. (Minimum one sample per day)
		Compaction (Nuclear)	Roadway	One per 500 linear feet or fraction thereof for each lift and lane or paver pass.
		Compaction (Nuclear)	Parking Lot	One per 2500 ft ² per lift per day.
		Compaction (Core)	In place	Cores will be taken at the discretion of the City of Phoenix Engineer.
	Cold Feed	Gradation	Hot Plant	One sample per day's production.
325, 326, 717, 719	Asphalt Rubber Asphalt Concrete (ARAC), Polymer Modified Asphalt Concrete (PMAC)	Volumetrics, Marshall, Rice & Air Voids	Hot Plant or In Place	One per day's production.
		Oil Content (Nuclear/ Ignition)	Hot Plant or In Place	One per 350 tons or fraction thereof. (Minimum one sample per day)
		Compaction (Nuclear)	Roadway	One per 500 linear feet or fraction thereof for each lift and lane or paver pass.
		Compaction (Nuclear)	Parking Lot	One per 2500 ft ² per lift per day.
		Compaction (Core)	In place	Cores will be taken at the discretion of the City of Phoenix Engineer.
	Cold Feed	Gradation	Hot Plant	One sample per day's production.

Remarks:

1. All asphalt trench placement under 350 tons shall be sampled and tested at the discretion of a City of Phoenix representative. All asphalt trench placement 350 tons or more will be sampled at the asphalt plant by a City of Phoenix representative. Asphalt trench placement, regardless of tonnage, shall be tested for temperature and compaction during the duration of asphalt placement.
2. All Planning and Development Department (PDD) projects will have a Hot Plant Inspector provided by The City of Phoenix Materials Lab for plant sampling when the cumulative quantity for the project is 350 tons or more per day.
3. Asphalt deficient in oil content and/or density shall be cored 50' maximum on both sides of failed section when deemed necessary by the City of Phoenix. The results of the 2 cores shall be averaged with the previous test results.
4. Minimum sampling and testing is required for each mix/plant per day.
5. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.
6. Asphalt is full time observation (CIP projects only): Technician must verify mix code, test asphalt temperatures, perform nuclear compaction tests and sample asphalt in accordance to appropriate testing and sampling procedures.



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**TABLE 2
CEMENTITIOUS MIXTURES**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
340, 725	Portland Cement Concrete (Flatwork)	Compressive Strength	At discharge	One set of six cylinders per 50 cubic yards or fraction thereof.
		Slump, Time & Temperature	At discharge	One per set of cylinders.
505, 725	Portland Cement Concrete (Structures)	Compressive Strength	At discharge	One set of six cylinders per structure per 50 cubic yards or fraction thereof.
		Slump, Time & Temperature	At discharge	One per set of cylinders.
604, 728	Controlled Low Strength Material (CLSM)	Compressive Strength	At discharge	One set of three cylinders per 50 cubic yards or fraction thereof.
		Flow	At discharge	One per set of cylinders.
		Phenolphthalein	At any point of the load	One test per load.
776	Grout	Compressive Strength	At discharge	One set of four prisms.
		Slump, Time & Temperature	At discharge	One per set of prisms.
776	Mortar	Compressive Strength	At batch site	One set of 6 cylinders or cubes.
525	Shotcrete	Compressive Strength	At discharge	One panel per 50 cubic yards, nozzle man and/or shift. (whichever is greater)

Remarks:

1. Concrete Specifications: Time in mixer (from batch time to finish unloading) is 90 minutes max; Allowable maximum concrete temperature is 90 degrees Fahrenheit.
2. Shotcrete test panel forms should be wood or steel and a minimum of 24" x 24" x 4", generally shot vertically.
3. For CSLM, compressive strength of all 3 test cylinders will be attempted at 28 days (for informational purposes only).
4. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.
5. For CIP projects, concrete and CLSM placement requires full-time observation. Technician must verify batch plant and/or truck number, and mix code on every load.



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**TABLE 3
 SOIL**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
601	Trench Backfill (including lateral trenches)	Compaction & Moisture Content	In-Place	One per 8" lift for every 500 linear feet; per pipe run; or day's production.
301, 304	Subgrade (Including Sidewalks)	Compaction & Moisture Content	In-Place	One per 500 linear feet or fraction thereof, per lift, <i>per lane (Roadway Only)</i> .
301	Subgrade (Parking Lot)	Compaction & Moisture Content	In-Place	One per 2500 ft ² or fraction thereof.
340, 206	Slab on Grade (Including Driveways and Ramps)	Compaction & Moisture Content	In-Place	One per 1000 ft ² or fraction thereof per slab per lift.
206, 301, 601	Structure Backfill	Gradation & P.I.	In-Place	One per soil type.
		Compaction & Moisture Content	In-Place	One per 500 linear ft. or fraction thereof per 8" lift per structure.
211	Roadway Fill & Embankments	Compaction & Moisture Content	In-Place	One per 500 ft. or fraction thereof per 8" lift.
210	Import	Proctor Density, Gradation & P.I. (See Remarks 1)	Onsite	One per soil type.
			Onsite	At the start of project and as material changes, per supplier/source and/or plant.
210, 211, 301	Native	Proctor Density, Gradation & P.I.	Onsite	One per soil type.
		Specific Gravity	Onsite	At the start of project and as material changes.

Remarks:

1. Import material shall meet the "X" value requirements of MAG Section 210.2 and verified prior to hauling into site.
2. Asphalt millings are not acceptable for use unless approved by the Engineer or their representative.
3. For material containing 25% or more rock larger than 6", refer to MAG Section 211.3.
4. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.
5. For Planning and Development Department (PDD) projects only, testing frequencies are as follows:
 - a) Sewer Services & Water Services (30%)
 - b) Driveways, Aprons and ADA Ramps (50%)
 - c) Valley Gutters (100%)
 - d) Dry Utility, Fire Hydrant, Fire Line and Storm Drain (100%)
6. "Pipe Run" defined as any length of pipe between two consecutive structures along the pipeline. (ie. manholes, fire hydrants, change of directions, or other items)



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TABLE 4 AGGREGATE BASE (AB)				
MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
701, 702	Aggregate Base Coarse (ABC)	Proctor Density	Onsite	At the start of project and as material changes, per supplier and/or plant.
		Gradation, PI	Onsite	One per project, per source, and/or one per 1000 tons or fraction thereof.
		Specific Gravity	Onsite	At the start of project and as material changes, per supplier and/or plant.
206, 301, 306, 601, 701, 702	Roadway, Pipe Bedding, Trench Backfill	Compaction & Moisture Content	Onsite	One per 500' or fraction thereof per lift; per lane (Roadway only).
211, 301, 310, 702	Parking Lot	Compaction & Moisture Content	In-Place	One per 2500 ft ² or fraction thereof per lift.
206, 340, 701, 702	Slab on Grade (Including Driveways and Ramps)	Compaction & Moisture Content	In-Place	One per 1000 ft ² or fraction thereof per slab per lift.
206, 301, 601	Structure Backfill	Compaction & Moisture Content	In-Place	One per 8" lift per structure.
		Gradation, PI	Onsite	One per project, per source, and/or one per 1000 tons or fraction thereof.
Remarks: 1. Asphalt millings are not acceptable for use as AB. 2. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.				



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TABLE 5 CEMENT STABILIZED ALLUVIUM (CSA)				
MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
ADOT 241	Cement Stabilized Alluvium (CSA)	Proctor Density, SA, & PI	Point of Placement	At start of production and as material changes.
		Compaction & Moisture Content	In-Place	One every 500 L.F. per lift and per lane pass or one per day's production.
		Compressive Strength	Point of Placement	One set of 3 per 1500 Cubic Yards or 1 set of 3 per day's production.
Remarks: 1. Maximum of 90 minutes between time of mixing and final mold fabrication. 2. A rock correction shall be used for + #4 material, greater than 10%, to obtain Max Proctor Density. 3. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.				



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**TABLE 6
REINFORCEMENT**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
727	Steel Reinforcement	Certificate and/or Tests	Onsite	One sample for each size, grade & heat number per shipment & manufacturer. Certificate required.
Project Plans & Specifications	Post-Tensioned Steel	Certificate and/or Tests	On-Site	One sample for each size, grade & heat number per shipment & manufacturer. Certificate required.
Project Plans & Specifications	Pre-Stressed Steel	Certificate and/or Tests	Project or Fabrication Plant	One sample for each size, grade & heat number per shipment & manufacturer. Certificate required.

Remarks:

1. All steel and iron incorporated into Federal-Aid projects must conform to requirements of "Buy America" per 23 CFR 635.410.
2. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.



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**TABLE 7
ELASTOMERIC BEARING PADS**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
ADOT 1013-2	Elastomeric Bearing Pad	ASTM D2240, D412, D573, D395-B, D1149, D746-B, D1043, D429	On-Site	Two samples of Bearing Pads selected at random by Engineer from every 100 Bearing Pads or portion thereof. Minimum of one sample tested per Lot.

Remarks:

1. Two sample bearing pads may be needed to complete the specified testing for smaller bearing pads.
2. Bearing pads will be selected at random by the Engineer at the project site for testing.
3. Bearing pads marked or otherwise presented as test bearing pads will not be tested.
4. **Bearing pads must be made available for testing at least four weeks in advance of intended use.**
5. Each bearing pad is to be marked in indelible ink or flexible paint. The marking shall consist of the order number, lot number, bearing identification number, and elastomer type and grade number. The marking shall be on the face that is visible after erection of the bridge.
6. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.



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TABLE 8 PIPE				
MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
743 (ASTM C-700)	Vitrified Clay Pipe (VCP)	Visual Inspection	Pipe Plant	Each pipe.
		Hydro Static	Pipe Plant	1 per year, per size and/or at the Engineer's discretion.
		Shear Load	Pipe Plant	1 per year, per size and/or at the Engineer's discretion.
759 (AWWA Standard)	Steel Cylinder Pipe (SCP)	Visual Inspection	On-Site / Plant	Per shop drawings.
		Certification	Pipe Plant	Per lot.
		Hydro Static	Pipe Plant	1 per year, per size and/or at the Engineer's discretion.
735 (ASTM C-76)	Reinforced Concrete Pipe RGRCP	Visual Inspection	Pipe Plant	Each pipe & reinforcing cages.
		D-Load	Pipe Plant	1 per 100 pipes cast, per size, per day's production.
		Compressive Strength	Pipe Plant	One set of 6 cylinders when required by Engineer or their representative.
		Slump, Time & Temperature	Pipe Plant	When required by Engineer or their representative.
Remarks: 1. All RGRCP pipe shall be inspected, tested and marked with the City of Phoenix stamp, before shipment to site. 2. Annual plant inspection by City of Phoenix Materials Lab is required for each production plant. 3. Quarterly quality control inspection by City of Phoenix Materials Lab is required for each production plant. 4. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.				



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**TABLE 9
CHIP SEAL and ALLEY COVER MATERIAL**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
330, 716 SPECIAL PROVISIONS	Aggregates Chip Seal (Roadway)	LA Abrasion	Source or Stockpile	One per source.
		Soundness	Source or Stockpile	One per source.
		Bulk Specific Gravity	Source or Stockpile	One per source.
	Aggregates Cover Material (Alley)	Fracture Faces	Source or Stockpile	One per source.
		Gradation	Stockpile	One per weeks production
		Moisture Content	Stockpile	One per weeks production
712-1 SPECIAL PROVISIONS	MC-800TR	Application Rate	Surface	One per weeks production
		Bituminous Material	Truck	One per weeks production
		Yield	Truck	One per days production

Remarks:

1. Yield to be determined by the City of Phoenix inspector or the designated representative.
2. A split sample of all materials may be required at an interval of one every four weeks.
3. The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.



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**TABLE 10
FRACTURED AGGREGATE SURFACE TREATMENT F.A.S.T. (FIELD)**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
330, 331, 712, 714, 716, SPECIAL PROVISIONS	Uncoated & Coated Aggregates	Gradation	Stockpile	One per day's production.
		Moisture Content	Stockpile	One per day's production.
		Rotational Viscosity	Blending Plant	One per batch/blend.
711, 712, 713, 714, 716, SPECIAL PROVISIONS	Scrub Seal & Modified Asphalt Rubber Binder	Resilience @ 77 Degrees F	Blending Plant	One per day's production.
		Cone Penetration @ 77 Degrees F	Blending Plant	One per day's production.
		Softening Point	Blending Plant	One per day's production.
330, 331, 714, 716, SPECIAL PROVISIONS	Asphalt Cement, Virgin Asphalt & Admixtures	PG Grade Asphalt	Blending Plant	One per week's production or lot.
		CRM	Blending Plant	One per week's production or lot.
		Polymer Additive	Blending Plant	One per week's production or lot.

Remarks:

- Design reviewing shall be completed prior to production.
- A split sample of all materials may be required at an interval of one every four weeks.
- The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.



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**TABLE 11
 SLURRY SEAL / MICRO SEAL AND APPLICATION OF A PAVEMENT PRESERVATION
 PROCESS**

MAG/COP SUPPLEMENTS	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING/TESTING FREQUENCY
331, 715 Special Provisions	Aggregates	Gradation ASTM C136/C117	Production Stockpile	Sampled daily, tested weekly, while in production.
		Sand Equivalent ASTM D2419	Production Stockpile	Sampled daily, tested weekly, while in production.
		Moisture Content AASHTO T-255 or ASTM C566	Production Stockpile	Sampled daily, tested weekly, while in production.
713, 714 Special Provisions	Emulsion Testing ⁽⁴⁾	Sieve Test, % AASHTO T-59 or ASTM D6933	Emulsion Tanker	Sampled daily, 1 sample tested weekly, while in production.
		Residue, % AASHTO T-59 or ASTM D6997	Emulsion Tanker	Sampled daily, 1 sample tested weekly, while in production.
713, 714 Special Provisions	Emulsion Residue Testing ⁽⁴⁾	Penetration, 77°F (100g, 5sec, dmm) AASHTO T-49 or ASTM D5	Emulsion Tanker	Sampled daily, 1 sample tested weekly, while in production.
		Softening Point, °F AASHTO T-53 ⁽⁵⁾ or ASTM D36	Emulsion Tanker	Sampled daily, 1 sample tested weekly, while in production.
		Ductility, 77°F 5cm/min AASHTO T-51 or ASTM D113	Emulsion Tanker	Sampled daily, 1 sample tested weekly, while in production.
		Elastic Recovery, 77°F (25°C), % AASHTO T-301 ⁽⁵⁾	Emulsion Tanker	Sampled daily, 1 sample tested weekly, while in production.

Remarks:

- Mix design review shall be completed prior to production.
- A split sample of all materials may be required at an interval of one every four weeks.
- The City of Phoenix Engineer or their representative reserve the right to modify sampling and testing requirements as needed to ensure quality of materials.
- Percent Residue (ARIZ 512) to be used for polymer/latex modified emulsions and Residue shall be obtained from Vacuum Recovery of Asphalt Emulsion Residue (ARIZ 504).
- Softening Point (AASHTO T-53) or (ASTM D36) and Elastic Recovery (AASHTO T-301) for polymer/latex modified emulsions only.
- Residue by Distillation (AASHTO T-59) modified to 350 F will be used as referee in case of dispute.