

**SPECIAL PROVISIONS
FOR
PIMA COUNTY DEPARTMENT OF TRANSPORTATION**



**SAN JOAQUIN ROAD
OLD AJO HIGHWAY TO NEAL AVENUE
PAVEMENT TREATMENT TESTING**

**Pima County Project No. 4PPP19
June 18, 2018**

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GENERAL NOTES

1. Project Location

This project is located within Sections 29, 30, 32 and 33 of Township 14 South, Range 12 East, and Section 4 of Township 15 South, Range 12 East, Gila and Salt River Meridian, Pima County, Arizona.

2. Scope of Work

The project work consists of constructing several different pavement treatments on San Joaquin Road from Old Ajo Highway to Neal Avenue in order to ascertain life-cycle costs and return on investment leading to more cost effective selection of pavement treatments for use in Pima County.

3. Contract Time

The work specified shall be completed within forty five (45) working days.

4. Permits

Before undertaking work at any location covered by this project the Contractor shall obtain all applicable permits, including but not limited to: water quality permits, air quality permits, street closure permits and permits for excavation/construction in the public rights-of-way, from City of Tucson, Town of Marana, or Pima County, whichever agency has jurisdiction over the area where the work is located.

5. Maintenance & Protection of Traffic

Two-way traffic on San Joaquin Rad and side streets shall be maintained by the Contractor on a minimum of a graded and compacted surface. One lane may be allowed by the Engineer for two way traffic through use of pilot truck and flagging services. The Contractor shall be responsible for all construction zone traffic control in accordance with Section 701 of the Standard Specifications and these Special Provisions. Access for residential, commercial, church and school activities, mail deliveries and garbage pick-up should be maintained. The contractor's compensation for maintaining traffic on an approved surface is included under Bid Item 7010005 – Traffic Control.

Miscellaneous work may be required during construction of this project. Such work include, but not limited to, removal and temporary and final relocation, as directed by the Engineer, of mailboxes, fences, gates, signs, posts, pipes, etc., within the right-of-way and construction easement areas. The cost of this work shall be considered incidental to Bid Item 7010005 – Traffic Control, except when the bidding schedule contains specific items on a unit basis.

6. Construction Survey and Layout

Construction survey and layout will be provided by Pima County.

7. Specifications and Details

The work embraced herein shall be performed in accordance with the requirements of the following separate documents:

Pima Association of Governments (PAG), Standard Specifications for Public Improvements, 2015 Edition, Volume 1, <http://apps.pagnet.org/standardspecifications>

Pima Association of Governments (PAG), Standard Details for Public Improvements, 2015 Edition, Volume 2, <http://apps.pagnet.org/standardspecifications>

Maricopa Association of Governments (MAG), Uniform Standard Specifications for Public Works Construction, 2018 Revision to the 2015 Edition. Used only where specifically noted.

Pima County/City of Tucson, Pavement Marking Design Manual, Latest Edition
<http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=63368>

Pima County/City of Tucson Signing Manual, Latest Edition
<http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=63368>

Pima County Street Lighting and ITS Conduit Design Manual, Latest Edition
<http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=63368>

Pima County Traffic Signal Design Manual, Latest Edition
<http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=63368>

Pima County Regional Wastewater Reclamation Department Standard Specifications and Details for Construction for Public Sanitary Sewers, 2016
<http://www.pima.gov/wastewaterreclamation/standards>

U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways, December 2009, and amendments
http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm

Arizona Supplement to the Manual on Uniform Traffic Control Devices (MUTCD), 2009 edition (January 2012), <http://www.azdot.gov/Highways/Traffic/Standards.asp>

Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, 2008 Edition, <http://www.azdot.gov/docs/business/2008-standards-specifications-for-road-and-bridge-construction.pdf?sfvrsn=0>, Used only where specifically noted.

Arizona Department of Transportation, Highways Division, Part 1 - Construction Standard Drawings, May 2012 with current updates. Used only where specifically noted.
<http://azdot.gov/business/engineering-and-construction/roadway-engineering/roadway-design-standards-and-guidelines/construction-standard-drawings>

8. Contract Administration

Prior to submittal of contract administration documents, examples of which are listed below, the Contractor shall review all documentation for accuracy and compliance with the contract. Any

variance from the plans and specifications shall be clearly noted and is subject to approval by the Engineer. A Contractor's transmittal letter shall accompany all submittals and shall include certification as to accuracy and compliance with the plans and specifications.

Contract administration submittals shall include, but are not limited to, the following examples: escrow agreements; subcontracts; purchase orders; certified payrolls for Contractor and subcontractors; force account billings; equal employment opportunity reports for Contractor and subcontractors; trainee preconstruction information; proof of apprenticeship; weekly individual training reports; rental equipment invoices; material invoices showing all unit prices; pay estimates; affidavit of certification of payments to disadvantaged business enterprise firms; requested lien releases; and consent from surety.

Monthly meetings may be scheduled with the Contractor at the discretion of the Engineer to discuss and resolve any problems associated with contract administration submittals. The monthly meetings shall be held at the Field Engineering Building at 1313 South Mission Road.

Meetings shall continue on an accelerated basis after project construction completion until all contract administration issues are resolved.

Submittals that are not certified, or are incomplete, will be returned to the Contractor unprocessed for proper resubmittal and may result in payment delays, or partial payment, as deemed appropriate by the Engineer.

9. Work Hours/Noise Abatement Ordinance

Construction noise abatement and start/stop times shall be in accordance with Pima County Ordinance No. 1999-61: Regulating the Excessive, Unnecessary and Annoying Noises in Pima County.

10. Contractor's Staging or Storage Yard

No Contractor's staging area or storage yard has been identified for this project. It is the Contractor's responsibility to locate a staging area(s) and obtain approval of said area(s) from the Pima County Engineer. Staging areas and vehicle storage yards are not permitted in the washes within the project area. The Contractor will need to provide a SWPPP addendum to cover their staging area and include the staging area acreage of disturbance on their NOI. Refer to Section 106 for offsite staging outside of the right-of-way.

SECTION 201 – CLEARING AND GRUBBING of the Standard Specifications is modified to add:

201-1 DESCRIPTION

The work under this Section shall also include clearing and grubbing at traffic detour locations as approved by the Engineer.

SECTION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS of the Standard Specifications is modified to add:

202-3 Construction Details

202-3.11 Removal of Survey Monument

Existing survey monument shall be removed. This survey monument exists on San Joaquin Road near Southern Cross Place side street.

ITEM 2020033 - Pulverize Existing Asphalt Pavement with Subgrade

Description

The work under this item consists of furnishing all labor, equipment and materials necessary to pulverize existing asphalt pavement with subgrade material at locations shown on the project plans.

Construction Requirements

The existing roadway pavement with subgrade materials shall be pulverized and thoroughly broken up over the full roadway width to a depth of six-inches (6") as shown in the project plans. Pulverized materials shall pass 100% two inch (2") sieve. Pulverized materials which are larger than two inch (2") in greatest dimension shall be pulverized to pass the 2" sieve or removed and disposed of by the Contractor. Removed material shall be replaced with suitable material. The top six inches of the roadway materials, including pulverized materials, shall be scarified, moistened, thoroughly and uniformly compacted for the full thickness of the course to a minimum density of 98 percent of the maximum density as determined in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual. Pavement sections that include cement treated subgrade are included under Section 302 of the project Special Provisions and Standard Specifications.

After the pulverizing operation and compaction, the surface on which new roadway pavement is to be placed on shall be uniform and free of loose material. Any exposed surface material shall be compacted to the extent required by the Engineer. The surface shall be graded and smooth, as being prepared for the placement of the new roadway pavement.

Method of Measurement

Pulverizing of existing roadway pavement with subgrade materials will be measured for payment by the square yard.

Basis of Payment

The accepted quantity of Pulverize Existing Asphalt Pavement with Subgrade, measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place, which includes pulverizing existing pavement with subgrade, replacing oversize removed material, compaction, smoothing and grading the roadway surface in preparation for the new roadway pavement, labor, equipment, materials, tools, supplies and incidentals necessary to complete the work in

conformance with the requirements of Item of work, the project plans, Standard Specifications, Special Provisions, or as may be directed by the Engineer.

ITEM 2020035 - Pulverize Existing Asphalt Pavement with Subgrade & Dispose of Materials

Description:

The work under this item consists of furnishing all labor, equipment and materials necessary to pulverize existing asphalt pavement with subgrade material and disposing of excess materials from Station 119 + 33 to Station 130 + 13 of San Joaquin Road (Pavement Section No. 12), as well as other excess materials generated from the project site.

Construction Requirements

The existing roadway pavement with subgrade materials shall be pulverized and thoroughly broken up over the full roadway width to a depth of ten-inches (10") as shown in the project plans. Pulverized materials shall pass 100% two inch (2") sieve. Pulverized materials which are larger than two inch (2") in greatest dimension shall be pulverized to pass the 2" sieve or removed and disposed of by the Contractor. Removed material shall be replaced with suitable material.

The top four inches (4") of pulverized material shall be removed and disposed of by the Contractor.

The top six inches of the roadway materials, including pulverized materials, shall be scarified, moistened, thoroughly and uniformly compacted for the full thickness of the course to a minimum density of 98 percent of the maximum density as determined in accordance with the requirements of the applicable test methods of the Arizona Department of Transportation Materials Testing Manual.

After the pulverizing operation and compaction, the surface on which new roadway pavement is to be placed shall be uniform and free of loose material. Any exposed surface material shall be compacted to the extent required by the Engineer. The surface shall be graded and smooth, as being prepared for the placement of the new roadway pavement.

Method of Measurement

Pulverizing of existing roadway pavement with subgrade materials and disposing of project excess materials will be measured for payment by the square yard.

The measurement includes pulverizing, disposing excess material, sweeping, cleaning, replacing oversized removed material, compacting, smoothing and grading the roadway surface in preparation for the new roadway pavement.

Basis of Payment

The accepted quantity of Pulverize Existing Asphalt Pavement with Subgrade & Dispose of Materials, measured as provided above, will be paid for at the contract unit price as indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place,

which includes pulverizing existing pavement with subgrade, removing and disposing pulverized material, replacing oversize removed material, compaction, smoothing and grading the roadway surface in preparation for the new roadway pavement, labor, equipment, materials, tools, supplies and incidentals necessary to complete the work in conformance with the requirements of Item of work, the project plans, Standard Specifications, Special Provisions, or as may be directed by the Engineer.

SECTION 302 – CEMENT TREATED SUBGRADE

302-1 Description of the Standard Specifications is modified to read:

The work under this Section shall consist of preparing the roadbed for cement treatment, furnishing and applying cement slurry; spreading and mixing cement slurry with in-place material; and compacting, and curing the mixture to the lines, grades and dimensions shown on the project plans and in conformance with the requirements of these specifications.

302-3.03 Preparation of Foundation of the Standard Specifications is modified to add:

Specifications for ITEM 2020033 - Pulverize Existing Asphalt Pavement with Subgrade is hereby added. In case of conflict between Subsection 302-3.03 of the Standard Specifications and ITEM 2020033 specifications, Specifications for ITEM 2020033 shall govern.

302-3.04 Application of cement of the Standard Specifications is modified to revise the first paragraph to read:

Cement or cement and fly ash (if utilized) shall be added uniformly to the pulverized asphalt pavement and soil material as indicated on the project plans.

302-3.06 Mixing and Spreading of the Standard Specifications is modified to include:

Cement slurry shall be spread on the roadbed. Use slurry tanks equipped with agitation devices to slurry cementitious material on the project or other approved location. The Engineer may approve other slurring methods. Provide a pump for agitating the slurry when the distributor truck is not equipped with an agitator. Equip the distributor truck with an approved sampling device.

Mix the required quantity of cementitious material with water, as approved by the Engineer. Provide slurry free of objectionable materials and with a uniform consistency that can be easily applied. Agitate the slurry continuously. Apply slurry within two (2) hours of adding water and when the roadway is at a moisture content drier than optimum. Distribute slurry uniformly by making successive passes over a measured section of the roadway until the specified content of the cementitious material is reached.

302-3.10 Curing and Surface Treatment of the Standard Specifications is modified to revise the first paragraph:

After the cement treated course has been finished as specified herein, it shall be protected against drying by the application of water and shall be kept in a moist condition for seven (7) days, or until

the pavement is applied, whichever comes first.

302-4 METHOD OF MEASUREMENT of the Standard Specifications is modified to revise the fourth and fifth paragraphs:

Cementitious material (i.e., cement or a combination of cement and fly ash) for cement treated subgrade will not be measured for payment and it is included in the subgrade treatment measurement by the square yard of subgrade treated.

No measurement will be made for payment of bituminous curing seal or water used for curing of cement treated subgrade and it is included in the subgrade treatment measurement by the square yard of subgrade treated.

302-5 BASIS OF PAYMENT of the Standard Specifications is modified to revise the fifth paragraph:

No direct payment will be made for bituminous curing seal, water and cementitious material (i.e., cement or cement and fly ash), the cost of which is considered incidental to and included in the payment for cement treated subgrade contract unit price.

ITEM NO. 3020021 – PRE-CRACKING CEMENT TREATED SUBGRADE

1. DESCRIPTION

The work under this item shall consist of furnishing all labor, equipment, and materials required for pre-cracking the cement treated subgrade through vibratory roller compaction as directed by the Engineer.

2. MATERIALS (None Specified)

3. CONSTRUCTION REQUIREMENTS

The day following placement and compaction of the cement treated subgrade (CTS), a minimum 12 ton vibratory steel drum roller in vibratory mode shall make several passes over the CTS until micro-cracks (hair-line cracks) are introduced into the CTS. The number of passes and amplitude used shall be determined by the Engineer. As determined by the Engineer, if the CTS is not sufficiently set (hard) to allow the introduction of the micro-cracks then the pre-cracking shall be delayed up until an additional 24 hrs.

4. METHOD OF MEASUREMENT

Pre-cracking Cement Treated Subgrade will be measured for payment by the hour.

Time for pre-cracking cement treated subgrade will be defined as the number of hours within a work shift that a vibratory roller is actively used as required by the Engineer.

The time which is required for pre-cracking treated subgrade will be measured to the nearest hour for the actual number of hours of active usage required in any one work shift as measured from the time the vibratory roller is put into use to such time that it is no longer required; however, when the time required is less than four hours in any work day, the time will be measured as four hours.

5. BASIS OF PAYMENT

The accepted quantity of pre-cracking cement treated subgrade, measured as provided above, will be paid for at the contract unit price per hour which price shall be full compensation for pre-cracking cement treated subgrade.

SECTION 404 - BITUMINOUS TREATMENTS

404-2.02(C) of the Standard Specifications is modified to include:

Chip Seal single application: Aggregate for cover material shall meet Class I grading requirements.

Chip Seal double application: For bottom layer, aggregate for cover material shall meet Class I grading requirements. For top layer, aggregate for cover material shall meet Class II grading requirements.

404-3.15 Chip Seal Coat of the Standard Specifications is modified to include:

Revise first sentence of the first paragraph to read: The type of bituminous material shall be CRS-2P.

Chip Seal single application:

Bituminous material shall be applied at 0.45 gallons/square yard. Aggregate for cover material shall be applied at the approximate rate of 27 pounds per square yard.

Chip Seal double application:

For bottom layer, Bituminous material shall be applied at 0.45 gallons/square yard. Aggregate for cover material shall be applied at the approximate rate of 27 pounds per square yard.

For top layer, Bituminous material shall be applied at 0.30 gallons/square yard. Aggregate for cover material shall be applied at the approximate rate of 22 pounds per square yard.

Second paragraph - Rubberized chip seal coat: The bituminous material to be placed on the pulverized pavement surface shall be a polymer modified asphalt binder, designated as AC15-5TR, or approved equal, conforming to the requirements shown under Section 410 of the Special Provisions. The cover material shall be pre-coated with approximately 0.5 percent to 1.0 percent asphalt cement, by weight of the aggregate. The bituminous material used to coat the cover material shall be performance grade PG 76-22, conforming to the requirements of Section 1005 Bituminous Materials for Surfacing of the Standard Specifications. The final percentage of asphalt cement used for pre-coating will be approved by the Engineer. The cover material shall have a minimum temperature of 250 °F at the time of pre-coating with asphalt cement.

See also notes shown on project plans for Section 404.

404-3.16 Fog Coat of the Standard Specifications is modified to add:

Notes shown on project plans.

404-3.17 Crack Seal of the Standard Specifications is modified to add:

See notes shown on project plans.

404-4 METHOD OF MEASUREMENT of the Standard Specifications is modified to add and revise:

Fog coat bituminous treatment will be measured for payment by the ton.

Tack coat bituminous treatment will be measured for payment by the ton.

The first application of Chip Seal will be measured for payment by the square yard. No separate measurement will be made for bituminous material or cover material.

The second application of Chip Seal will be measured for payment by the square yard. No separate measurement will be made for bituminous material or cover material.

Rubberized Chip Seal will be measured for payment by the square yard. No separate measurement will be made for the two types of bituminous material AC15-5TR and PG 76-22, and cover material.

Crack seal will be measured for payment by the pound

404-5 BASIS OF PAYMENT of the Standard Specifications is modified to add and revise:

Accepted quantity of the first and second application of chip seal, and rubberized chip seal with pre-coated aggregates measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place, including cleaning and preparation of existing surface, furnishing and spreading of the bituminous material and cover material, furnishing and spreading of cover material that is pre-coated with bituminous material, rolling, removal and disposal of loose cover material, labor, equipment, materials, tools, supplies and incidentals necessary to complete the work in conformance with the requirements of this section, the project plans, Standard Specifications, Special Provisions, or as may be directed by the Engineer.

Accepted quantity of crack seal, measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place, which includes cleaning and preparation of existing surface cracks, furnishing and spreading of the bituminous material, labor, equipment, materials, tools, supplies and incidentals necessary to complete the work in conformance with the requirements of this section, the project plans, Standard Specifications, Special Provisions, or as may be directed by the Engineer.

Revise third paragraph to read: The term "bituminous material" used in accordance with this Section is not subject to price adjustment for fluctuating asphalt prices.

ITEM 4040151 – Micro Surface, MAG Specs, Type 2 Aggregate

Description:

The work under this item consists of furnishing all labor, equipment and materials necessary for the application of a “quick traffic solid/polymer microsurface per Section 331, Microsurfacing Specifications, as well as other related Sections of Maricopa Association of Governments (MAG), Uniform Standard Specifications for Public Works Construction, 2018 Revision to the 2015 Edition.

Materials:

Micro surfacing aggregate gradation shall be Type II as shown in Table 715-1 of Section 15, Slurry Seal Material, of the referenced MAG Specifications.

Construction Requirements:

The surface on which micro surface is to be placed shall be uniform and free of loose material.

Method of Measurement:

Micro surface, Mag Specs, Type 2 Aggregate will be measured for payment by the square yard.

Basis of Payment:

The accepted quantity of Micro surface, Mag Specs, Type 2 Aggregate, measured as provided above, will be paid for at the contract unit price as indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place, including furnishing, mixing and applying all aggregate and bituminous material, and for all labor, equipment, tools, and incidentals necessary to complete the work in conformance with the requirements of this section, the project plans, Standard Specifications, Special Provisions, or as may be directed by the Engineer.

SECTION 406 – ASPHALTIC CONCRETE

406-1 DESCRIPTION of the Standard Specifications is modified to add:

Recycled asphalt pavement (RAP) shall not be allowed for the PAG 3 Terminal Blend TR+ mix (Item Number 4060005).

406-2 MATERIALS

406-2.01 General of the Standard Specifications is modified to add:

Recycled asphalt pavement (RAP) shall not be allowed for the PAG 3 Terminal Blend TR+ mix (Item Number 4060005).

406-2 MATERIALS

406-2.02 Composition of Asphaltic Concrete Mixtures

Table 406-1, Note 1 of the Standard Specifications is modified to read:

Effective air voids shall be $4.5 \pm 0.2\%$ for all arterial, collector and major street designations and $4.0 \pm 0.2\%$ for local streets.

406-2.05 BITUMINOUS MATERIAL revise the first sentence of the first paragraph of the Standard Specifications to read:

The bituminous material for PAG 2 be an asphalt binder performance grade PG 70-16, in accordance with the requirements of Section 1005.

The bituminous material for PAG 3 Terminal Mix shall be an asphalt binder performance grade PG 76-22 TR+, in accordance with the requirements of Section 1005.

406-4 METHOD OF MEASUREMENT of the Standard Specifications is modified to add:

No measurement will be made for payment of fiber reinforcement and it is included in the ton of asphaltic concrete.

406-5 BASIS OF PAYMENT of the Standard Specifications is modified to add:

No direct payment will be made for fiber reinforcement, the cost of which is considered incidental to and included in the payment for asphaltic concrete.

406-5.01 Asphaltic Concrete Price Adjustment of the Standard Specifications is modified to add:

The term "bituminous material" used in accordance with this Section is not subject to price adjustment for fluctuating asphalt prices.

SECTION 410 – ASPHALT-RUBBER STRESS-ABSORBING MEMBRANE AND WEARING COURSE

410-5 BASIS OF PAYMENT of the Standard Specifications is modified to add:

The term "bituminous material" used in accordance with this Section is not subject to price adjustment for fluctuating asphalt prices.

ITEM 4100120 – Asphalt-Rubber Stress-Absorbing Membrane Wearing Course

Description

The work under this item shall consist of furnishing all materials, labor and equipment necessary to construct a rubberized asphalt membrane layer in accordance with the requirements of these specifications and the details shown on the project plans.

Materials

A. Bituminous Material

The bituminous material poly-chip binder to be placed on the existing pavement surface shall be a polymer modified asphalt binder, designated as AC15-5TR, or approved equal conforming to the following requirements:

| TEST DESCRIPTION | VALUE | SPECIFICATION |
|---|-------------|---------------|
| Composition | | |
| Ground Tire Rubber Content (%) (Note 1) SBS | 5.0 to 10.0 | 5.0 Minimum |
| Polymer (%) (Note 1) | 2.25 | 2.0 Minimum |
| Penetration @ 77° F, 100 g, 5 sec | 40 - 75 | ASTM D5 |
| Penetration @ 77° F, 100 g, 5 sec, dmm | 90 - 140 | AASHTO T49 |
| Viscosity @ 140° F, Poise | 1500 Min | ASTM D4402 |
| Kinematic Viscosity @ 275°F, cSt | 2000 Max | AASHTO T201 |
| Elastic Recovery @ 77° F, 20 cm elongation, 5 cm/min, % recovery after one hour | 55 Min | ASTM D6084 |
| Softening Point, °F | 135 – 170 | ASTM D36 |
| Dynamic Shear, G*/sin, 169°F, kPa | 1.0 Min | ASTM D7175 |
| Resilience, 77°F, % | 15 Min | ASTM D5329 |

Note 1 – The binder supplier shall provide certifications verifying that all material provided is manufactured within the composition specification limits.

B. Pre-Coated Cover Material

Aggregate for the cover material shall be of clean gravel or crushed rock and shall be free from lumps or balls of clay and shall not contain calcareous or clay coatings, caliche, synthetic materials, organic matter or foreign substances. The aggregate for cover material shall meet the requirements given below for aggregate characteristics prior to pre-coating with bituminous material.

The contractor shall submit a minimum 75-pound sample of cover material, prior to pre-coating, to the Engineer at least ten (10) calendar days prior to beginning application of the cover material for testing.

The grading of the cover material shall meet the following requirements when tested in accordance with the requirements of Arizona Test Method 201.

| Sieve Size | Percent Passing |
|------------|-----------------|
| 1/2 inch | 100 |
| 3/8 inch | 70-90 |
| 1/4 inch | 0 - 10 |
| No. 8 | 0 - 5 |
| No. 200 | 0 - 1.0 |

The cover material shall meet the following requirements:

| Aggregate Characteristics | Test Method | Requirement |
|--------------------------------------|-------------------------|--|
| Abrasion | AASHTO T 96 | 100 Rev., Max 9% 500 Rev., Max 40% |
| Carbonates | Arizona Test Method 238 | Maximum 30% |
| Fractured Coarse Aggregate Particles | Arizona Test Method 212 | Minimum 85% (at least two fractured faces) and minimum 92% (at least one fractured face) determined on plus No. 4 material |
| Flakiness Index | Arizona Test Method 233 | Maximum 25% |
| Bulk Oven Dry Specific Gravity | Arizona Test Method 210 | 2.30 – 2.85 |
| Water Absorption | Arizona Test Method 210 | 0 – 2.5% |

The cover material shall be pre-coated with approximately 0.5 percent to 1.0 percent asphalt cement, by weight of the aggregate. The bituminous material used to coat the cover material shall be performance grade PG 76-22, conforming to the requirements of Section 1005 Bituminous Materials for Surfacing of the Standard Specifications. The final percentage of asphalt cement used for pre-coating will be approved by the Engineer. The cover material shall have a minimum temperature of 250 °F at the time of pre-coating with asphalt cement.

Construction Requirements

A. Weather Limitation

Unless otherwise approved by the Engineer, the asphalt-rubber stress-absorbing membrane shall only be placed between:

March 15 – May 31

September 1 – October 31

Placement of the asphalt-rubber membrane shall be made only when all of the following weather conditions are met:

1. The ambient air temperature is at least 70° F and rising.
2. The pavement is absolutely dry.
3. The wind conditions are such that a satisfactory membrane can be achieved.
4. Application shall cease when the temperature is 75° F and falling.

B. Equipment

1. Distributor Truck

Distributor trucks shall be so designed, equipped, maintained and operated that so the bituminous material at even heat may be applied uniformly on variable widths of surface at readily determined and controlled rates from 0.03 to 1.00 gallons per square yard, with uniform pressure, and with an allowable transverse variation from any specified rate not to exceed 10 percent or 0.02 gallons per square yard, whichever is less. Distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of the tank contents. Distributors shall be equipped with a power unit for the pump, and spray bar which is adjustable laterally and vertically. The distributor shall provide for continuous circulation of the bituminous material through the tank and spray bar.

Prior to the spreading of bituminous material, all distributor trucks proposed for use shall have been tested for rate of transverse spread, in accordance with the requirements of Arizona Test Method 411, and certified within 12 months from the date of spreading. However, the Engineer may at any time require that each distributor truck be tested to determine the rate of the transverse spread.

2. Power Brooms

Power brooms shall be of the rotary type equipped, maintained and operated so that the bristles are of reasonably uniform length and capable of cleaning without gouging or tearing the surface.

3. Rollers

Rollers shall be of the oscillating type having a width of not less than four feet with pneumatic tires of equal size and diameter. Wobble-wheel rollers will not be permitted. The tires shall be spaced so that the gaps between adjacent tires will be covered by the following tires. The tires shall be inflated to 90 pounds per square inch, or such lower pressure as designated by the Engineer, and maintained so that the air pressure will not vary more than five pounds per square inch from the designated pressure. Pneumatic tired rollers shall be constructed so that the total weight of the compactor can be varied to produce an operating weight per tire of not less than 2,000 pounds. The total operating weight of the roller shall be varied as directed by the Engineer.

4. Aggregate Spreaders

The application of cover material shall be accomplished by means of a calibrated spreader. The spreader shall be a self-propelled, computerized rate-controlled unit capable of an application width of 14 feet or greater. The spreader shall be in good mechanical condition and capable of applying aggregate uniformly across the spread width.

C. Placement of the Asphalt-Rubber Stress-Absorbing Membrane

The placement of the asphalt-rubber stress-absorbing membrane shall not begin until all construction equipment such as the asphalt rubber distributor, cover material spreader, haul trucks with cover material, rollers and brooms are in position and ready to commence placement operations.

1. Preparation of Surface

The surface to be treated shall be thoroughly cleaned to the satisfaction of the Engineer prior to applying the bituminous material. Self-propelled rotary power brooms along with hand brooms, if necessary, shall be used immediately in advance of applying the bituminous material.

2. Application of Bituminous Membrane

The AC15-5TR asphalt binder shall be applied between 340° F and 360° F and at a rate of 0.45 ± 0.05 gallons per square yard. Areas that cannot be reached by the distributor truck shall be applied using hand spray methods to provide a complete and uniform coverage. The Engineer shall approve hand applied areas in advance. The bituminous material shall be applied to required area in one application.

The Engineer may vary the exact application rate based on the surface to be treated and the characteristics of the aggregate material. The rates to be applied may vary because of different surface conditions within the project limits. The actual bituminous material application shall not vary more than ten (10) percent from the application rate specified by the Engineer.

In order to obtain uniform distribution, the distribution shall be promptly started or stopped at the junction of two (2) applications in a manner that will not result in overlaps or gaps.

The distribution shall be promptly cut off prior to the decrease in uniform flow caused by the distributor tank becoming empty, when there is a decrease in uniform flow due to any reason whatever, or when the forward movement of the distributor slows down or stops.

In the event that any spots are missed in the application, or any areas develop that do not have a uniform spread or penetration, such areas shall be remedied without unnecessary delay as directed by the Engineer.

Care shall be taken to prevent the spraying or splattering of bituminous material on adjacent pavements, structures, curb, guardrail, trees and shrubbery or any other object outside of the area designated for spraying.

Unused bituminous material shall not be disposed of within the right(s)-of-way lines.

3. Application of Cover Material

Cover material shall be applied at the rate of approximately 0.014 cubic yards per square yard or approximately 35 pounds per square yard. The spread rate may vary due to the surface texture of the existing pavement and the asphalt binder application rate. The Engineer may specify a different application based upon the initial results.

Cover material shall be immediately and uniformly spread over the freshly applied bituminous material. Any oversize aggregate or foreign material picked up during stockpiling or loading operations shall be eliminated before entering the aggregate spreader hopper. Supplemental spreading and smoothing shall be done by hand methods where necessary. The contractor shall remove loose rock along the adjacent edges prior to the application of the binder and cover material.

4. Rolling Cover Material

Following the spreading of cover material, the surface shall be promptly rolled with self-propelled pneumatic-tired compactors which have a minimum air pressure in each tire of 100 pounds per square inch. A sufficient number of compactors shall be provided to cover the width of the material spread in one (1) pass of the compactors and this rolling shall continue until a minimum of four (4) passes have been completed. If the spreading of cover material is stopped for any reason, the spreader shall be moved ahead so that all cover material may be immediately rolled.

The rolling of the cover material shall be completed within the time specified:

| Existing Pavement Temperature | Rolling To Be Completed Within |
|-------------------------------|--------------------------------|
| 100° F and Above | 20 minutes |
| Between 65° and 100° F | 10 minutes |

5. Removing Loose Cover Material

All loose cover material shall be removed from the paved surface by brooming after it is determined that the operation can be safely performed without damaging the surface but not more than 36 hours after application; however, if because of weather conditions, temperature or other reasons, the Engineer determines that conditions are not conducive to obtaining the best results, brooming shall be discontinued until the Engineer has considered all conditions and has determined the best time for the removal of the cover material. The cover material shall be removed by means of a power broom which shall be in good condition and of a design suitable for the work. The action of the broom shall be such that particles which are stuck to the bituminous material will not be dislodged.

Loose cover material shall be collected from the paved surface by means of a pick-up broom. The contractor shall make a reasonable effort to prevent loose cover material from being swept off the pavement area. At the discretion of the Engineer, the contractor shall remove excess

cover material from unpaved areas, such as sidewalks, driveways, roadway shoulders and other locations deemed necessary.

6. Joints

Unless otherwise directed by the Engineer, transverse joints with the preceding work shall be made by placing building paper over the end of the previous application, and the joining application shall start on the building paper. Once the application process has progressed beyond the paper, the paper shall be disposed of as directed by the Engineer. Transverse joints at other locations shall be made by a method approved by the Engineer prior to the start of the work.

Longitudinal joints shall be butt joints.

Joints shall be cleaned as deemed necessary by the Engineer prior to the application of bituminous material in the adjacent strip.

Regardless of the width of the roadway to be sealed, the number of longitudinal joints shall be kept to a minimum and shall be located to the greatest degree possible so that they will coincide with painted lines between traffic lanes.

7. Curing Period

Traffic of all types shall be kept off the stress-absorbing membrane until it has had time to set properly. The minimum traffic-free period shall not be less than three hours. However, when it is absolutely necessary that hauling equipment or piloted traffic travel on the newly applied membrane, the speed shall not exceed 15 miles per hour. The placement of the stress-absorbing membrane shall be scheduled such that the normal flow of traffic will be resumed before sunset.

The Contractor shall wait a minimum of two (2) weeks after the placement of the stress-absorbing membrane before overlaying with asphaltic concrete as specified. At the discretion of the Engineer, the curing period before placement of the overlaying asphaltic concrete may be adjusted to a longer or shorter period depending upon the ambient temperature and weather conditions.

Prior to placement of the fog coat overlaying the asphalt-rubber stress-absorbing membrane, the membrane surface shall be cleaned with a power broom and all loose materials removed from the pavement surface. For areas of dirt build-up that cannot be removed by brooming, the membrane surface shall be cleaned with a power water spray or other means to remove the dirt. The surface shall be allowed to dry before proceeding the work.

Method of Measurement

The asphalt-rubber stress-absorbing membrane will be measured by the square yard, complete in place, which includes the bituminous material poly-chip binder AC15-5TR and cover material pre-coated with bituminous material performance grade PG 76-22.

Basis of Payment

The accepted quantity of asphalt-rubber stress-absorbing membrane, measured as provided above, will be paid for at the contract unit price indicated in the bidding schedule and will be considered as compensation, in full, for the item complete in place, which includes cleaning and preparation of existing surface, furnishing and spreading of the bituminous material poly-chip binder AC15-TR, furnishing and spreading of the cover material that is pre-coated with bituminous material performance grade PG 76-22, joint materials, rolling, removal and disposal of loose cover material, labor, equipment, materials, tools, supplies and incidentals necessary to complete the work in conformance with the requirements of this Section, the project plans, Special Provisions or as may be directed by the Engineer.

SECTION 420 ROLLER COMPACTED CONCRETE PAVEMENT

420-1 GENERAL

420-1.01 Scope

The scope of work shall consist of furnishing all materials, tools, equipment, and batching, or batching and mixing plant for producing roller compacted concrete (also referred to as RCC); and performing all labor for producing, transporting, forming, placing, compacting, curing, finishing and testing of RCC. The constructed RCC pavement shall conform to lines, grades, thickness, and cross section, as shown on the plans, or otherwise established by these specifications.

420-1.02 Description

Roller-compacted concrete shall consist of Portland cement, possibly supplementary cementing materials (for example fly ash or ground granulated blast furnace slag), aggregates, water, and chemical admixtures proportioned to produce the required formability (adequate to the method of consolidation by vibratory rollers) and strength.

420-1.03 Specifications, Codes, Standards and Geotechnical Reports

420-1.03.01 American Society for Testing and Materials (ASTM)

1. ASTM C31, Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C33, Specification for Concrete Aggregates
3. ASTM C39, Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C40, Test Method for Organic Impurities in Fine Aggregates for Concrete
5. ASTM C42, AASHTO T24, AZ 317 Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C78, Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
7. ASTM C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate of Magnesium Sulfate
8. ASTM C94, Specification for Ready-Mixed Concrete
9. ASTM C127, AZ 210 Test Method for Specific Gravity Absorption of Coarse Aggregate
10. ASTM C128, AZ 211 Test Method for Specific Gravity Absorption of Fine Aggregate
11. ASTM C131, Test Method for Resistance to Degradation of Small Size Coarse Aggregate

by Abrasion and Impact in the Los Angeles Machine

12. ASTM C138, Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
13. ASTM C143, Test Method for Slump of Hydraulic Cement Concrete
14. ASTM C150, Standard Specification for Portland Cement
15. ASTM C156, Test Method for Water Retention by Concrete Curing Materials
16. ASTM C172, Practice for Sampling Freshly Mixed Concrete
17. ASTM C173, Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
18. ASTM C174, Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Core
19. ASTM C192, Practice for Making and Curing Concrete Test Specimens in the Laboratory
20. ASTM C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
21. ASTM C260, Specification for Air-Entraining Admixtures for Concrete
22. ASTM C295, Guide for Petrographic Examination of Aggregates for Concrete
23. ASTM C 309 – Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
24. ASTM C470, Specification for Molds for Forming Concrete Test Cylinders Vertically
25. ASTM C494, Specification for Chemical Admixtures for Concrete
26. ASTM C535, Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
27. ASTM C566, AASHTO T255 Test Method for Evaporable Moisture Content of Aggregate by Drying
28. ASTM C595, Standard Specification for Blended Hydraulic Cements
29. ASTM C617, Capping Cylindrical Concrete Specimens
30. ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
31. ASTM C 685 Specification for Concrete Made by Volumetric Batching and Continuous Mixing
32. ASTM D698, Standard Test Method for Laboratory Compaction Characteristic of Soil Using Standard Effort
33. ASTM D9771998, Standard Specification for Emulsified Asphalt.
34. ASTM C989, Standard Specification for Slag Cement for Use in Concrete and Mortars
35. ASTM C1040, Test Methods for Density of Unhardened and Hardened Concrete in Place by Nuclear Methods

36. ASTM C1157, Standard Performance Specification for Hydraulic Cement
37. ASTM C1170, Test Methods for Determining Consistency and Density of Roller-Compacted Concrete Using a Vibrating Table
38. ASTM C1176, Standard Practice for making Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Table
39. ASTM C1260, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar-Method)
40. ASTM C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
41. ASTM C 1435, Molding Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Hammer
42. ASTM D1557, Standard Test Method for Laboratory Compaction Characteristic of Soil Using Modified Effort
43. ASTM C1567, Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar-Method)
ASTM C1602, Standard Specification for Mixing Water Used for the Production of Hydraulic Cement Concrete
44. ASTM D3042, Test Method for Insoluble Residue in Carbonate Aggregates
45. AASHTO T89, Test Method for Liquid Limit of Soils
46. AASHTO T90 Plastic Limit, and Plasticity Index of Soils

420-1.04 Submittals

The Contractor shall submit the following to the Engineer at least 20 working days before the start of production and construction of RCC pavement:

1. Construction schedule for all RCC related operations.
2. RCC production procedures, description of batching or batching and mixing plant used, and also RCC delivery methods. List of all equipment proposed for the use to perform the placement of RCC including paving equipment and compaction equipment. The make, model, and equipment specification sheet for each piece of equipment shall be included.

The paver and mixing equipment must match that listed on the submittal, unless a substitution is made, which meets these specifications and is approved by the Engineer.

This shall include manufacturer's data and specifications for mixing plant, hauling, placing, spreading, and compaction equipment.

Layout of plant showing location of each aggregate storage bin, each cementitious material bin, water supply, and mixing plant shall be provided no less than 15 working days prior to the beginning of paving operations.

3. Outline of procedures for calibrating the mixing plant and monitoring materials during construction shall also be submitted.
3. Complete paving procedures including, but not limited to, line and grade control, direction

of paving operations, paving widths, planned longitudinal and transverse construction joints, and curing method.

4. Quality management plan, addressing, at least:
 - a. Quality management organization chart.
 - b. Qualifications of the general contractor and subcontractors in producing RCC and constructing RCC pavement.
 - c. Qualifications of the independent testing firm.
 - d. Control of materials.
 - e. Control of RCC.
 - f. Design and preconstruction evaluation of the production RCC mix.
 - g. Storage of materials for RCC.
 - h. Production of RCC.
 - i. Delivery of RCC.
 - j. Line and grade control.
 - k. Control of subbase prior to RCC placement.
 - l. Paving operations.
 - m. Post-pavement inspection.
 - n. Corrective actions.
5. Certification of aggregate source.
6. Certification of Portland cement and supplementary cementing materials.
7. Certification of mixing water for RCC.
8. Certification of chemical admixtures for RCC.
9. Certification of curing compound.
10. Contingency plan, including but not limited to backup paving equipment and backup batching facility.
11. Proposed mix design, including data of preconstruction mix design studies, or backup data demonstrating the performance of the mix during the previous pavement projects constructed within 12 months of the date of submittal. The contractor must certify that the mix design will meet the requirements for strength, schedule, and road opening.
12. Plan for placement of concrete in hot weather if placement conditions and ambient temperature could result in concrete temperatures exceeding **100 degrees Fahrenheit**. Outline of procedures and methods for curing and weather protection for cold [less than 40°F], hot [more than 100°F] and rainy conditions.
13. Methods of handling, storing, delivering and mixing of materials.
14. Operating procedures for corrective action(s) necessary to assure a tight, smooth surface on the RCC pavement, free of tears larger than 1/4" width and 1/4" depth and other surface imperfections, including surface pitting.

420-2 PRODUCTS

420-2.01 Materials For Roller Compacted Concrete Pavement

420-2.01A General

All materials to be used for Roller Compacted Concrete pavement construction shall be approved by the Engineer based on laboratory tests or certifications of representative materials which will be used in the actual construction.

420-2.01B Portland Cement

Portland cement shall conform to the requirements of ASTM C150 for Type II/V, or Type II (MH)/Type V. In addition Portland cement shall meet optional requirements of ASTM C150 for low alkali content.

420-2.01C Blended Hydraulic Cement

Blended hydraulic cements shall comply with standard specifications ASTM C595 and 1157.

420-2.01D Supplementary Cementing Materials

RCC may contain: up to 25% by the total weight of cementing materials of fly ash meeting requirements of ASTM C618 for Class F, or up to 50% of ground granulated blast furnace slag meeting requirements of ASTM C989 for Grade 100 or 120, or up to 50% of a blend of fly ash Class F and ground granulated blast furnace slag.

420-2.01E Minimum Content of Cementing Materials

Content of total cementing material (Portland cement plus supplementary cementing material) shall be established by preconstruction mix design studies, as further provided, but shall not be less than 450 pounds per one cubic yard of RCC.

420-2.01F Aggregates

Unless otherwise approved in writing by the Engineer, the quality of aggregates shall conform to ASTM C33. The aggregate portion passing the No. 40 sieve shall have a liquid limit of not more than 20, and the plasticity index of the aggregate shall not exceed five. Fines shall be non-plastic. Fines shall not be manmade sand. Coarse aggregates must be washed, prior to delivery to the job site, to remove silt and fines. Aggregates may be obtained from a single source or borrow pit, however the coarse and fine aggregate may not be blended prior to entering mixing plant. The combined aggregate shall be well-graded without gaps and conform to the following gradations as per Table 1, unless otherwise approved by the Engineer:

Table 1: Sieve Size Percent passing by weight

| Sieve Size | Lower & Upper Specification Limits | Lower & Upper Specification Limits |
|------------|---------------------------------------|---------------------------------------|
| | ½ in Maximum | ¾ in Maximum |
| 1" | | 100 |
| ¾" | 100 | 93-100 |
| ½" | 81-100 | 70-95 |
| 3/8" | 71-91 | 60-85 |
| No. 4 | 49-70 | 40-60 |
| No. 8 | 33-54 | 30-50 |
| No. 16 | 24-40 | 20-40 |
| No. 30 | 15-30 | 15-30 |
| No. 50 | 10-25 | 10-25 |
| No. 100 | 2-16 | 2-16 |
| No. 200 | 0-8 | 0-8 |

Aggregates shall be innocuous, not causing deleterious expansion of RCC. Test individual concrete aggregates in accordance with ASTM C1260. Maximum expansion after 14 days of exposure to the solution of NaOH shall not exceed 0.10%.

If any of individual concrete aggregates do not meet the limit specified in the above paragraph, the aggregates can be tested with the production cementing material (Portland cement and supplementary cementing material proportioned according to the mix design) per ASTM C1567. The Contractor is allowed to test either individual aggregates or their blended proportioned according to the mix design. In either case the expansion in 14 days of exposure to the solution of NaOH shall not exceed 0.10%

420-2.01G Chemical Admixtures

Chemical admixtures shall conform to ASTM C 494. The contractor is allowed to use proprietary chemical admixtures improving the formability of RCC, provided the record of the previous experience certifying the beneficial use of admixtures is included with the submittal.

Moisture Control

One of the following admixtures, or an approved equal, is required by the Agency for use as shown on the plans. Please refer to the manufacturer’s recommendations for dosage rates.

- ACEiT Plus Manufactured by ACEiT Industries

- V-MAR VSC500 Manufactured by Grace Concrete Products

Troweling

The following admixture, or approved equal, is required by the Agency for use as shown on the plans. Please refer to the manufacture's recommendations for dosage rates.

- ACEiT Blue Manufactured by ACEiT Industries
- RCC Surface Pro / Colloidal Silica based product

420-2.01H Water

Water shall conform to the requirements of ASTM C1602. It shall be clean, clear and free of acids, salts, alkalis or organic materials that may be detrimental to the quality of the concrete. Non-potable water may be considered as a source for part or all of the water, providing the mix design indicates proof that the use of such water will not have any deleterious effect on the strength and durability properties of the RCC.

420-2.01I Curing Compound

Concrete curing compounds shall conform to ASTM C 309 Type ID.

420-2.01J Joint Sealants and Fillers

These materials shall be of the size, shape and type shown on the Plans. Unless otherwise shown on the Plans, the joint sealant materials to be used shall be self-leveling silicone pavement sealant as manufactured by Dow Corning, Crafcoc, Inc., or an approved equal and shall be concrete color.

The pavement shall be dried for at least 72 hours and the joint walls shall be vacuumed to remove loose particles, to the satisfaction of the Engineer, prior to placing joint sealant.

420-3 EXECUTION

420-3.01 Requirements for Roller Compacted Concrete and Development of Production Roller Compacted Concrete Mix

420-3.01A Requirements for Roller Compacted Concrete

Proposed mix design(s) shall meet the following minimum strength requirements based on test results of cylinders prepared according to ASTM C1435.

RCC shall have minimum compressive strength of 4,000 psi at 28-days or 5,000 psi at 42-days. In addition the RCC shall have a minimum compressive strength of 2,500 psi at 3-days.

Consistency and formability of RCC shall be adequate to the methods of its production, delivery, placement and consolidation. The objective consists of proportioning RCC that contains sufficient volume of paste to coat the aggregates and fill voids between them, is able to produce the required strength and durability, constructs roads that are able to be opened to traffic within 3 days or sooner should the RCC reach the required strength before 3 days, and makes it easy to achieve the maximum density. Contractor submits to the Engineer along with the statement of the proposed mix design

data justifying the selected consistency and formability of the mix and method of its control.

420-3.01B Preconstruction Laboratory Mix Design Studies

An independent testing laboratory shall proportion RCC to meet the specified requirements for strength and Contractors requirements for consistency and formability. The laboratory shall demonstrate its compliance with the requirements of ASTM C1077. The mix design backup information shall show the moisture-density curve with associated maximum dry density, wet density and optimum moisture content, details of cementitious materials, 3-day, 7-day and 28-day, or 42-day compressive strengths, including strength gain curve for the proposed mix. The mix design shall identify the quantity and gradation of aggregates, the optimum moisture content, and the amount of Portland cement, other cementitious material(s) and the total cementitious materials required per cubic yard of the concrete. The mix design shall specify the proportions of each material (aggregate, cement, water, and admixtures) in the mix in terms of pounds per cubic yard based on saturated surface dry weights. Any changes to the mix design shall be approved by the Engineer. Should a change in material source be proposed, the Engineer must approve a new mix design. Proportioning of RCC shall be performed in general compliance and in the sequence recommended by ACI 327R-14, Chapter 6 "Mixture Proportioning."

420-3.01C Field Evaluation of Production Mix

The proposed production mix shall be evaluated by field testing using the production equipment, batching and mixing procedures. RCC shall be sampled and tested for compressive strength at 3, 7, 28, and 42 days, 5 cylinders per each age of testing. For RCC paving on Hickory Street, sample testing shall also be completed at 1 and 2 days. In order to be qualified the mix shall demonstrate the average compressive strength at the final specification age exceeding the minimum required one by at least 750 psi. No individual cylinder shall demonstrate strength exceeding the minimum specified one by less than 650 psi. Aggregates shall be tested for content of free moisture by direct moisture evaporation. Batch weights of materials shall meet the tolerances specified in ASTM C94 or C685, depending on the method of production. Aggregates shall be also sampled and tested for compliance with gradation and cleanliness requirements of these specifications.

420-3.02 Roller Compacted Concrete Production and Delivery

420-3.02A Storage of Materials

Portland cement and supplementary cementing materials shall be stored in weather tight bins or silos that protect them from dampness and contamination and provide easy access for inspection and identification of each shipment. RCC supplier shall assure that properties of materials will not change during storage and handling operations.

The supplier is required to have separate stockpiles (bunkers) for different aggregate sizes, which should be arranged in a manner preventing intermixing of different aggregate sizes, and their contamination by foreign materials. If stockpiles are located immediately next to each other, they have to be physically separated. Stockpiles shall be arranged on hardened surfaces.

Procedure for forming stockpiles shall preclude segregation of aggregates (Reference: Recommendations for forming stockpiles, excluding segregation of aggregates, are provided in ACI

304).

For temperature adjustment during hot weather (ambient forecast high temperature greater than 90 degrees Fahrenheit) periods of time, stockpiles for aggregates shall be provided with water sprinklers and are recommended to be shaded.

Silos for hydraulic cements and supplementary cementitious materials shall be completely weather-tight.

Chemical admixtures shall be stored and handled according to the manufacture's specifications and in a manner protecting them from contamination.

420-3.02B Batching, Mixing and Transporting of RCC

The Engineer shall approve the mixing plant before the Contractor begins producing RCC. The mixing plant shall follow ACI 327R-14.

The plant shall be capable of producing an RCC mixture in the proportions defined by the final approved mix design and within the specified tolerances. The capacity of the plant shall be sufficient to produce a uniform mixture at a rate compatible with the placement equipment. The minimum homogeneous production rate of any acceptable plant shall be 300 tons per hour. For batch mixers, the volume of RCC material in the mixing chamber shall not be more than the rated capacity for dry concrete mixtures. Multiple plants shall not be used to supply RCC material to the paver. The Engineer can halt operations if the plant is unable to produce the RCC mixture sufficiently in quality or quantity, until a plant meeting all requirements is obtained.

A pugmill plant is required and shall match that listed during the prequalification process unless a substitution is made which meets these specifications and is approved by the Engineer. It shall be a central plant with a twin shaft pugmill mixer, capable of batch or continuous mixing, equipped with synchronized metering devices and feeders to maintain the correct proportions of aggregate, cement, mineral admixture, and water. Other pugmill plant requirements are as follows:

1. Aggregate Storage. The aggregate and sand must be furnished in 2 or more stockpiles. If previously blended aggregate is furnished, storage may be in a stockpile from which it is fed directly to a conveyor feeding the mixer. If aggregate is furnished in two or more size groups, aggregate separation must be provided at the stockpiles.
2. Aggregate Bin. Aggregate bins shall have a feed rate controlled by a variable speed belt, or an operable gate calibrated to accurately deliver any specified quantity of material. If two or more aggregate size stockpile sources are used, the feed rate from each bin shall be readily adjustable to change aggregate proportions, when required. Feed rate controls must maintain the established proportions of aggregate from each stockpile bin when the combined aggregate delivery is increased or decreased.
3. Plant Scales. Plant scales for any weigh box or hopper shall be either of beam or springless-dial type, and be sensitive to 0.5 percent of the maximum load required. Beam-type scales shall have a separate beam for each aggregate size, with a single telltale actuated for each beam, and a tare beam for balancing hopper. Belt scales shall be of an approved design. Standard test weights accurate to plus or minus 0.1 percent shall be provided for checking plant scales.

4. Cement and Mineral Admixture Material Storage. Separate and independent storage silos shall be used for Portland cement and mineral admixture. Each silo must be clearly identified to avoid confusion during silo loadings. If the Contractor chooses to preblend the cementations material he must employ blending equipment acceptable to the Engineer and demonstrate, with a testing plan, the ability to successfully produce a uniform blended material meeting the mix design requirements. Testing of the preblended cementations material shall be done on a daily basis to assure both uniformity and proper quantities.
5. Cement and Mineral Admixture Feed Unit. Satisfactory means of dispensing Portland cement and mineral admixture, volumetrically or by weight, shall be provided to assure a uniform and accurate quantity of cementations material enters the mixer.
6. Water Control Unit. The required amount of water for the approved mix shall be measured by weight or volume. The unit shall be equipped with an accurate metering device. The water flow shall be controlled by a meter, valve or other approved regulating device to maintain uniform moisture content in the mixture.
7. Surge Hopper. For continuous operating pugmills, a surge hopper attached to the end of the final discharge belt shall be provided to temporarily hold the RCC discharge to allow the plant to operate continuously. No other stockpiling shall be permitted. For batch mixers, discharge all material in the mixing chamber before recharging.

Alternative Mixing Equipment. Other types of batching and mixing equipment and configurations other than twin shaft pugmill mixers may not be used. This includes but is not limited to dry batch plants, central mix tilt drum plants, ready mix truck mixers, volumetric concrete trucks and trailers.

The mixing time shall be pre-established by uniformity studies conducted, as provided in ACI 327R-14, Section 8.2 "Roller-compacted concrete mixing plants."

Locate the mixing plant within 30 minutes hauling time from the construction site, when non-agitating vehicles are used for delivery. The supplier may request a longer hauling time not exceeding 60 minutes, provided the documentation is submitted evidencing that properties of fresh RCC are suitable and allow for convenient and proper placement and consolidation.

Prior to commencement of RCC production, the Contractor shall carry out a complete and comprehensive calibration of the plant in accordance with the manufacturer's recommended practice. All scales, containers and other items necessary to complete the calibration shall be provided by the Contractor. After completion of the initial calibration, the plant shall be recalibrated as directed by the Engineer.

The transportation of the RCC to the areas to be paved, with the exception of concrete mixed in truck mixers, shall be in dump trucks fitted and equipped, when necessary, with retractable protective covers for protection from rain or excessive evaporation. The trucks shall be dumped clean with no buildup or hanging of RCC material. The dump trucks shall deposit the RCC material directly into the hopper of the paver or into a secondary material distribution system which deposits the material into the paver hopper. Dump truck delivery must be scheduled so that RCC material is spread and compacted within the specified time limits. Access routes shall be clearly marked over the area to be constructed. Haul time should not exceed 20 minutes without addition of admixtures which have proven to successfully maintain moisture content levels in RCC.

420-3.02C General Requirements

Method of production of RCC shall assure that concrete proportions comply with the design quantities of ingredients, as provided by the approved statement of concrete mix design, and that concrete is mixed uniformly. For central batch plants mixing time shall be established by uniformity testing per the procedure provided in ASTM C94.

420-3.02D Accuracy of Batching, Tolerances

Accuracy of batching (namely weights of cementing materials and aggregates, weight or volume of water, and volumes of liquid chemical admixtures) comply with tolerances specified in ASTM C94 or C685, as applicable.

The Contractor shall supply daily plant records of production and quantities of materials used that day to the Engineer.

420-3.02E Change of Material Source

If the type or source of cementing materials, or aggregates, or type of chemical admixtures changes, the production of RCC must be suspended, and a new mix design shall be developed, tested, and submitted for approval.

420-3.02F Preparation of Roller Compacted Concrete Base

The RCC base shall be prepared in accordance with the project specifications and plans.

420-3.02G Pavement Test Section

- 1) Construct a 533 square yard test section, a maximum of 200 feet long, prior to starting construction. Construct the test section using the proposed mixture design, the staff that will be completing the work, and the materials and equipment that are listed in the pavement construction plan and approved by the Engineer. If the pavement placement requires more than one pass of the paver, construct the test section a minimum of two paver widths wide. If the pavement placement requires more than one lift, construct the test section to the required number of lifts. If the pavement placement requires more than one day of paving or transverse cold joints, construct the test section over two days and begin paving from a transverse cold joint on the second day. Place the test section in a production location approved by the Engineer. The test section will be incorporated into the final project if accepted by the Engineer.

The Engineer shall evaluate the following criteria from the test section:

- Adequacy of the production method and equipment to meet productivity requirements and produce uniform RCC.
- Maximum density directly behind the paver prior to roller compaction.
- Suitability of the proposed lift thickness.
- Sequence of primary/secondary roller passes (with and without vibration).
- Maximum density following roller compaction.
- Texture and surface finish acceptability.
- Integrity of both fresh and cold joints (vertical and horizontal).
- Compressive strength of RCC based on molded cylinders and extracted cores tested at 3-days, 7-days, and 28-days.
- Procedures for troweling and finishing RCC surface to meet specification

- Process for applying curing compound at appropriate rate and coverage
 - Process for installing saw cuts in pavement
- 2) Construction (Cold) Joint Edges. The Contractor shall establish the maximum angle for edges to be used in joint faces of construction (cold) joints.
 - 3) If the test area does not meet acceptance requirements, the Contractor shall remove and reconstruct a new test section with corrected procedures at no additional cost to the Agency. The contractor will be required to provide new test sections, for which no additional compensation will be allowed, until an acceptable, reproducible test section is achieved.

420-3.02H Placement

- (1) Condition of the Subgrade/Subbase. Prior to RCC placement, the surface of the subgrade/subbase shall be clean and free of foreign material, ponded water and frost prior to the placement of the RCC pavement mixture. The subgrade/subbase must be uniformly moist at the time of RCC placement. If sprinkling of water is required to remoisten certain areas, the method of sprinkling shall not be such that it forms mud or pools of free-standing water. Prior to placement of RCC, the subgrade/subbase shall be checked for proper density and soft or yielding areas and these areas shall be corrected per these specifications.
- (2) Bond Breaker. The bond breaker shall be a clear with sacrificial red dye membrane forming curing compound conforming to ASTM C 309 Type ID Class A. The bond breaker shall be applied at a rate of 160 square foot/gallon to existing adjacent concrete surfaces such as curb and gutter or concrete pavement.

All surfaces must be free of loose or foreign material prior to applying the bond breaker.

For hot weather (ambient forecast high temperature greater than 90 degrees Fahrenheit) periods of time, prior to the first bond breaker application, soak the adjacent concrete surface with water to dampen and reduce its porosity. After soaking immediately apply the bond breaker.

This application must ensure a uniform continuous (free of uncovered areas) membrane across the entire adjacent concrete face. If the application rate is found to be insufficient, the Contractor, with approval of the Engineer, can increase the application rate to a level which achieves a void-free surface. In case the minimum rate of application is specified otherwise by manufacturer's recommendations, the highest application rate shall govern.

During this work the Contractor shall control the work such that it does not result in visible curing compound particulate migration

- (3) Jointing Plan. Prior to placement of the RCC, joint locations shall be marked by the contractor in the field to insure cold joints will align with the jointing plan. Following RCC placement, and before sawcutting the joints, the jointing plan shall be marked on the RCC by the contractor with a temporary marking material to demonstrate to the engineer that the sawcuts are being placed per the plan.
- (4) Paver Requirements. RCC shall be placed with an approved paver as noted in these specifications and shall meet the following requirements:
 - (A) The quantity of RCC material in the paver shall not be allowed to approach empty between loads. The material shall be maintained above the auger shaft at all times during paving.

- (B) The paver shall operate in a manner that will prevent segregation and produce a smooth continuous surface without tearing, pulling or shoving. The spread of the RCC shall be limited to a length that can be compacted and finished within the appropriate time limit under the prevailing air temperature, wind, and climatic conditions.
- (C) The paver shall proceed in a steady, continuous manner. Paver speed during placement operations shall not exceed the speed necessary to ensure that minimum density requirements are met and surface distress is minimized.
- (D) The surface of the RCC pavement once it leaves the paver shall be smooth, uniform and continuous without excessive tears, ridges or aggregate segregation.
- (E) Lift Thickness. Place RCC in lifts between 4 inches and 9 inches thick. Multiple lifts are not allowed for pavements less than 9 inches thick. For multiple lift placements, compact the bottom layer to the minimum specified wet density before placing the next lift. No lift shall be less than 4 inches.
- (F) Adjacent Lane Placement. All longitudinal joints must be considered a cold joint and shall be prepared in accordance with “Cold Vertical Joints” section found elsewhere in these specifications. Fresh joints will only be allowed under special circumstances at the Engineer's discretion. In that case, the adjacent paving lane shall be placed within 30 minutes and additional precautions may be necessary to avoid excessive moisture loss at the joint such as the use of set retarding admixtures, water misting, and blankets.
- (G) Hand Spreading. Broadcasting or fanning the RCC material across areas being compacted shall not be permitted. Additions of material may only be done immediately behind the paver and before any compaction has taken place. Any segregated coarse aggregate shall be removed from the surface before rolling.
- (H) Segregation. If segregation occurs in the RCC during paving, operations shall cease until the cause is determined and corrected.
- (I) Placement. RCC placement shall be done in a pattern so that the curing water from the previous placements will not pose a runoff problem on the fresh RCC surface or on the subbase layer.
- (J) Paving Inaccessible Areas. Areas inaccessible to either paver or roller shall be placed with cast-in-place concrete with a minimum compressive strength of 4,000 psi or as specified by the Engineer. The Contractor's attention is directed to the “Portland Cement Concrete (PCC) Pavement” or “Rapid Set Concrete (RSC) Pavement” section found elsewhere in these Specifications for details in furnishing and placing cast-in-place concrete pavement. In areas that may be subjected to high load transfer, the Engineer may require the cast-in-place concrete to be doweled into the RCC.
- (K) Expansion Joints. Expansion Joints shall be placed at all transverse cold joints, where concrete pavements abut asphalt concrete pavements, and at intersections of concrete pavement streets.

420-3.02I Compaction

- (1) Compaction shall begin immediately behind the placement process and shall be completed within 60 minutes of the start of mixing cementing materials with water. The time may be increased or decreased at the discretion of the Engineer depending on use of set controlling admixtures, initial concrete temperature, and/or ambient weather conditions (temperature, wind velocity and humidity).
- (2) Rolling. Apply the sequence and number of passes by vibratory and non-vibratory rolling to obtain the specified density proposed in the paving construction plan and verified during construction of the test section. Do not run rollers on adjacent RCC that was placed less than 7-days prior. Do not operate rollers in the vibratory mode while stopped. Use steel drum rollers in static mode and/or rubber-tire rollers for final compaction.
- (3) Rolling Longitudinal and Transverse Joints. If a cold joint is planned, the complete lane shall be rolled and cold joint procedures shall be followed per these specifications. If the Engineer approves fresh joint construction, the roller shall not operate within 24 in. of the edge of a freshly placed lane until the adjacent lane is placed. Then both edges of the two lanes shall be rolled together within the allowable time.
- (4) Longitudinal joints shall be given additional rolling as necessary to produce the specified density for the full depth of the lift in order to achieve a tight smooth transition across the joint. Any uneven marks left by vibrating rolling shall be smoothed out by non-vibrating or rubber tire rolling. The surface shall be rolled until a relatively smooth, flat surface, reasonably free of tearing and cracking is obtained. For freshly placed RCC next to an existing cold joint, roll the complete lane, taking extreme care not to bridge the roller drum between the new unconsolidated fresh material and a previous cold joint edge. Such bridging of roller drum over cold joint edges, especially in vibratory mode, can significantly degrade the cold joint edge.
- (5) Speed of the rollers shall be slow enough at all times to avoid displacement of the RCC pavement. Displacement of the surface resulting from reversing or turning action of the roller shall be corrected immediately.
- (6) Compact areas inaccessible to large rollers with small drum rollers, walk-behind vibratory rollers or plate tampers. Cast-in-place, conventional concrete meeting the same strength requirements as specified for RCC may be used in these areas as a replacement for RCC.

420-3.02J Formation of Joints

- (1) Fresh Vertical Joints. Fresh longitudinal joints will only be allowed under special circumstances under the approval of the Engineer. A vertical joint shall be considered a fresh joint when an adjacent RCC lane is placed within 30 minutes of the batch time of the previous lane. This time may be reduced depending on ambient conditions, as well additional precautions may be necessary to avoid excessive moisture loss at the joint such as the use of evaporation retarders, fogging, and curing mats.
 - (A) Fresh longitudinal joints shall be constructed prior to placement of an adjacent lane by leaving the outer 24 inches of the freshly placed lane uncompacted during rolling. Then both edges of the two lanes shall be rolled together within the allowable time.
 - (B) Adjacent lanes shall be placed such that the new lane abuts tightly against the incomplete edge of the prior lane.

- (C) The joint formed by both lanes shall be compacted by centering the roller drum over the joint and compacting both edges simultaneously.
 - (D) Extra passes of the roller may be required at the joint to achieve the required density.
- (2) Cold Vertical Joints. Any planned or unplanned construction joints that do not qualify as fresh joints shall be considered cold joints and shall be treated as follows:

- (A) Longitudinal and Transverse Cold Joints. Formed joints that do not meet the minimum density requirements and all unformed joints shall be cut vertically for the full depth or produced using an edging shoe. The vertical cut shall be at least 6 inches from the exposed edge and located on a joint identified on the jointing plan. Do not perform this operation any sooner than 2 hours after final compaction. Demonstrate to the Engineer that saw cutting will not cause significant edge raveling and remove all slurry and excess material from the cutting operation.

If the Contractor can demonstrate that he can construct a cold vertical joint that can meet the minimum joint density requirements using an “edge shoe,” then the use of the edge shoe in lieu of cutting a cold vertical joint is allowed. The edge shoe should be as close to vertical as possible with the maximum allowable positive edge angle being of 10 degrees from vertical.

Cold joints cut after two hours of placement shall be saw-cut 1/4 to 1/3 depth of the RCC pavement with the rest removed by hand or mechanical equipment. Any modification or substitution of the saw cutting procedure must be demonstrated to and accepted by the Engineer. All excess material from the joint cutting shall be removed.

- (B) Prior to placing fresh RCC mixture against a compacted cold vertical joint, the joint shall be thoroughly cleaned of any loose or foreign material. The vertical joint face shall be wetted and in a moist condition immediately prior to placement of the adjacent lane.
 - (C) Uneven surfaces or slopes greater than as determined for “Cold Joint Edges” shall be cut vertically for the full depth of the RCC.
 - (D) The rollers shall pass over the end of the freshly placed RCC mixture when a vertical cold joint is to be made. Unless the RCC cold joint has been formed by an edging shoe, the edge of the previously placed RCC pavement shall be cut back to expose an even vertical surface for the full thickness of the course without disturbance of the RCC that is to remain in place. Uneven areas and raveling shall be corrected.
 - (E) The top layer shall be placed so that longitudinal joints in that layer will coincide with joints in the lower layers of the pavement. Transverse joints in the top layer shall coincide with transverse joints in the lower layers of the pavement.
 - (F) Place expansion joint at all transverse cold joints.
- (3) Fresh Horizontal Joints. For multi-layer construction, a horizontal joint shall be considered a fresh joint when a subsequent RCC lift is placed within 30 minutes of the batch time of the previous lift. This time may be adjusted at the discretion of the Engineer depending on use of retarders or ambient weather conditions. Fresh joints do not require special treatment other than cleaning the surface of all loose material and moistening the surface prior to placement of the subsequent lift.

- (4) Horizontal Cold Lift Joints. For horizontal cold joints the surface of the lift shall be kept continuously moist and cleaned of all loose material prior to placement of the subsequent lift. The use of a cement slurry or mortar grout between lifts is required. If supplementary bonding materials are used, they shall be applied immediately prior to placement of the subsequent lift.
- (5) RCC Pavement Joints at Structures. The joints between RCC pavement and concrete structures shall be treated as isolation vertical joints.
- (6) Control Joints. Control joints shall be constructed in the RCC pavement to induce cracking at pre-selected locations. Joint locations shall be as shown on the Plans or as directed by the Engineer. Early entry saws shall be utilized as soon as possible behind the rolling operation and set to manufacturer's recommendations. Saw crack control joints to the interval specified on the plans. The depth of the crack control joints shall be equal to 1/3 of the thickness of RCC pavement. The width of the crack control joints shall be 1/8". Extend all crack control joints the entire width of paving. When sawing crack control joints, begin as soon as the RCC cuts without excessive raveling along the saw cut and finish before conditions induce uncontrolled cracking, regardless of the time or weather. Control joints shall be sprayed with curing compound or water depending on the curing method.
- (7) Isolation Joints. Line the perimeter of fixed structures such as manholes, valves, trench drains, and with strips of fiberboard or other approved isolation joint material, as noted in the plan details, prior to paving. Joint filler for isolation joints must be preformed expansion joint filler for concrete (bituminous type) in compliance with ASTM D 994.
- (8) Expansion Joints. Install expansion joints to the details, dimensions and locations shown on the Plans. If the plans do not include details and conditions warrant expansion joints, propose a plan and install expansion joints in the pavement, with approval of the Engineer. Include width, filler, sealing material, location and/or spacing recommendations in the expansion joint plan, considering thermal effects, regional climatic conditions, RCC coefficient of thermal expansion and expected daily temperature ranges at the time of placement.

420-3.02K Finishing

Where indicated on the plans and as directed by the Engineer, the RCC pavement shall be troweled and broom finished.

Use self-propelled machine trowels.

Determine the number of machine trowels required to perform the work at a rate equal to the concrete delivery rate. When the time from concrete placement to machine trowels finishing exceeds 30 minutes, stop concrete delivery. When machine trowels are in proper position, you may resume concrete delivery and paving.

Trowels must be equipped with devices that adjust the underside to a true flat surface.

Perform texturing with a broom device that produces striations parallel to the centerline.

420-3.03 Curing

- (5) General. Immediately after final rolling, compaction testing, and finishing use an approved curing method outlined below. Water cure or curing compound shall be applied vertically from above the pavement. Application shall not be allowed from the side of the pavement. During this work the Contractor shall control the work such that it does not result in visible

water or curing compound particulate migration. Reapply curing compound to sawcuts and disturbed areas

- (6) Water Cure. Water cure shall be applied by water trucks equipped with misting spray nozzles, soaking hoses, sprinkler system or other means that will assure a uniform moist condition to the RCC. Water trucks shall not drive on RCC to which they are applying the water cure. Application of this moisture shall create fog or mist immediately above concrete surface and must be done in a manner that shall not wash out or damage the surface of the finished RCC pavement. The surface of the RCC pavement shall be kept continuously moist for three (3) days.
- (7) Curing Compound. A white pigmented dye membrane forming curing compound conforming to ASTM C 309 Type ID Class A shall be applied at a rate of 150 square foot/gallon no later than one hour after completion of finishing operations on the surface and edges of RCC. This application must ensure a uniform continuous (free of uncured areas) membrane across the entire RCC pavement. If the application rate is found to be insufficient, the Contractor, with approval of the Engineer, can increase the application rate to a level which achieves a void-free surface without ponding. In case the minimum rate of application is specified otherwise by manufacturer's recommendations, the highest application rate shall govern.
- (8) Sheet Materials. Curing paper, plastic and other sheet materials for curing RCC shall conform to ASTM C 171. The coverings shall be held securely in place and weighted to maintain a close contact with the RCC surface throughout the entire curing period. The edges of adjoining sheets shall be overlapped and held in place with sand bags, planking, pressure adhesive tape, or other City-approved method. Sheet material shall be provided and kept readily available to cover pavement less than 12 hours old if rainfall occurs.

420-3.04 Protecting Roller Compacted Concrete Pavement

Protect Roller Compacted Concrete pavement under Subsection 1006-5 Weather Limitation of the Standard Specifications.

Maintain the Roller Compacted Concrete pavement temperature at not less than 40 °F for the initial 72 hours.

Protect the concrete pavement surface from activities that cause damage and reduce texture and coefficient of friction. Do not allow soil, gravel, petroleum products, concrete, or asphalt mixes on the RCC pavement surface.

Construct crossings for traffic convenience. If the Engineer approves your request, you may use rapid strength concrete for crossing locations in addition to those already identified on the plans to be rapid strength concrete. Alternatively, the contractor may use steel plates to span the fresh concrete until it is ready for vehicular traffic. Both alternatives are considered included in the contract price paid for the various concrete pavement pay items. Do not allow traffic on new concrete crossings until the Department determines the RCC pavement's compressive strength is at least 3,000 psi.

If concrete pavement damage including visible cracking occurs, stop operating paving equipment on the concrete pavement and repair the damage.

RCC shall have minimum compressive strength of 4,000 psi at 28-days or 5,000 psi at 42-days. In

addition the RCC shall have a minimum compressive strength of 3,000 psi at 3-days.

420-3.05 Contractor’s Quality Control

420-3.05A Quality Control

The Contractor shall provide any and all quality control (QC) inspection and testing that the Engineer deems necessary to properly control the quality, consistency, and uniformity of the RCC produced and placed. Frequency of quality control tests is specified in Table 2. The Contractor shall make available to the Engineer any information and data collected by quality control inspection and testing. Before the paving work starts, the Contractor may employ an independent testing laboratory for controlling RCC materials, thickness of pavement, and strength of the RCC. The independent testing laboratory shall demonstrate compliance with ASTM C1077 and be CCRL audited and AMRL accredited for the scope of testing to be performed.

Lots shall be 250 cubic yards.

Should compressive strength of RCC pavement established by testing of formed cylinders be below the minimum specified compressive strength, the Contractor is allowed to obtain condition and test cores according to ASTM C42 and C39. The cores shall be tested at the specification age and before the pavement is opened to traffic. A location represented by 3 cores is considered to be adequate to the specified strength, if the average of three cores is not less than 85% of the specified strength with no individual strength being below 75% of the specified strength.

The Contractor shall be responsible for developing the RCC mix required by these specifications.

Contractor shall allow the Agency to inspect the mixing plant for verification of weights or proportions and character of material in the preparation of RCC mix.

Inspection or testing by the Agency will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

Conduct quality control testing during placing operations to ensure the RCC material is placed, compacted, finished and cured in accordance with the requirements in Table 2.

Table 2: Quality Control Requirements at Placement Site

| Item | Method | Frequency or Lot Size | Acceptance |
|---|-------------------------------------|--|---|
| Roller Compacted Concrete Moisture Content | ASTM C566 | Sample at mixing plant or point of placement from initial truck load and as required | ±1.0% of optimum moisture content per ASTM D1557 |
| In-place Wet Mat Density | ASTM C1040 direct transmission mode | At beginning of placement immediately behind the paver and within 30 minutes of final compaction; One Test per lot | At least 98% of the maximum laboratory wet density by ASTM D1557 based on an average of four consecutive tests with no test below 96% |

| Item | Method | Frequency or Lot Size | Acceptance |
|---|--|--|---|
| In-place Wet Joint Density | ASTM C1040 direct transmission mode | One Test per lot and within 30 minutes after final compaction | At least 96% of the maximum laboratory wet density by ASTM D1557 based on an average of four consecutive tests with no test below 94% |
| Cylinders for Compressive Strength | ASTM C1435 for molding cylinders; ASTM C31 for curing and handling cylinders; and ASTM C39 for testing cylinders | One set of three cylinders minimum for every lot of paving, or one day of production, whichever is less. | Average strength equal to 100% of the specified strength per these specifications, no single result below 90%. |
| Surface Smoothness | See Acceptance Criteria, TBD | One Test per lot | See Acceptance Criteria, TBD |
| Thickness | ASTM C42, ASTM C174 | One core for per lot, or one day of production, whichever is less. | See Acceptance Criteria, TBD |

420-3.05B Testing Plan

The Contractor is responsible for determining and submitting quality control testing plan as a part of Quality Control Plan.

420-3.06 Quality Assurance and Acceptance Criteria

420-3.06A General

- (1) The Contractor shall provide safe and convenient access, acceptable to the Engineer, for inspection and sampling of the RCC and shall cooperate in the inspection and sampling process when requested to do so.
- (2) The Contractor shall have major equipment items such as batch plant, rollers, pavers, trucks and similar items, available for inspection by the Agency. Deficiencies in quality, quantity, or types of equipment shall be corrected prior to starting Work. This inspection and approval shall in no way relieve the Contractor from the obligation to provide the equipment required to perform the Work.
- (3) RCC plant inspections will be conducted at random to check the settings, operation, materials, proportions and uniformity of concrete produced. The Engineer will order the plant shut down if deficiencies are found, such as but not limited to deviation from approved job-mix formula, segregation in the mix, or inconsistent plant operation. The Contractor shall generate computer printouts of batching and delivery tickets in compliance with ASTM C94, or C685 and provide them to the Engineer. The Contractor shall provide to the satisfaction of the Engineer his corrective actions prior to re-starting production.

420-3.06B Thickness Requirements

Determine the pavement thickness from cores by average caliper measurements in accordance with ASTM C174. Extract one core for each lot of RCC pavement per Table 2. For pavement placement units consisting of less than one lot of RCC pavement, include the pavement with the previous or next placement unit.

As an option, use alternative or additional thickness determination methods to satisfy the requirements of Table 2, with the Engineer's approval. Such alternate thickness determination procedures can include surveying, GPS devices, and/or LIDAR.

420-3.06C Defective Area Correction for Pavement Thickness

A pay adjustment according to Table 3 will be considered for RCC pavement that does not fully meet the specification for thickness and surface texture. These adjustments will be applied to each area of proposed pavement. Limits of area subject to pay factor to be determined by the Engineer. Contractor shall be responsible for taking additional samples to assist the Engineer in determination of limits of deficient area. If a core is found to be deficient in thickness, two additional cores shall be taken at the Contractor's expense to determine the extent of the deficiency. Limits of deficient areas are to be determined by the Agency.

Table 3: Pay Adjustment Table for Thickness

| Inches | Percent Payment |
|-----------------|--------------------|
| 0.00 to 0.24 | 100 |
| 0.25 to 0.49 | 90 |
| 0.50 or greater | Remove and replace |

420-3.06D Density Requirements

- (1) In-place Wet Mat Density Determination. Determine the In-place Wet Mat Density on pavement that is at least 24 inches from any joint in accordance with ASTM C1040 Direct Transmission mode at 75% of total RCC pavement depth for each lot of RCC pavement per Table 2. For pavement placement units consisting of less than one lot of RCC pavement, include the pavement with the previous or next placement unit.
- (2) In-place Wet Joint Density Determination. Determine the In-place Wet Joint Density on joints at distance 12 inches or greater for free edge and 6 inches or greater for a confined edge accordance with ASTM C1040 Direct Transmission mode for each lot of RCC pavement per Table 2. For pavement placement units consisting of less than one lot of RCC pavement, include the pavement with the previous or next placement unit.
- (3) Defective Area Correction for Density. For In-place Wet Mat Density and In-place Wet Joint Density, full payment will be made for pavement based on the acceptance criteria in Table 2. Pavement lots that have density that is less than the required density are subject to further evaluation. Take an additional test within a 5 to 8 foot radius, of the original test (within the same placement unit). If this test is below the acceptance criteria in Table 2, additional roller passes shall be made across the full lane width between the last testing location that produced an acceptable reading and the paver. If the additional roller passes does not correct the

problem, or causes the density to decrease, the paving operation shall be discontinued until corrections can be made to assure that the specified density can be achieved.

420-3.06E Strength Requirements

- (1) Strength Determination. Determine the Compressive Strength for cylinders prepared in accordance and for each lot of RCC pavement per Table 2. For pavement placement units consisting of less than one lot of RCC pavement, include the pavement with the previous or next placement unit.
- (2) Remedial Action for Deficient Strength. Full payment will be made for cylinders meeting the requirements of the mix design, whose average strength equal to 100% of the specified strength, with no single result below 90%.
- (3) Pavement lots that have strength that are less than the required strength are subject to further evaluation.
- (4) Extract three cores at random locations in the suspect area after the RCC pavement is at least 28 days old. Remove, handle and test the compressive strength of the three cores according to ASTM C42.
- (5) Determine the average and standard deviation of the compressive strength of the three cores. If the average of the three cores exceeds 85% of the minimum specified compressive strength, the RCC in the subplot is acceptable and is subject to full payment and acceptance. If the average strength of the three cores is less than 85% of the specified compressive strength, the RCC is not acceptable and requires removal.
- (6) Removal and Replacement. Areas determined to have strength deficiencies that are not resolved through referee testing, as noted above, require removal and replacement. After the referee period or at least seven days, remove the hardened RCC material by full depth saw cutting the perimeter of the deficient area along joint lines. Repair the area using an air-entrained cast-in-place concrete meeting the strength requirements per these specifications or as directed by the Engineer. The new concrete shall be doweled into the existing RCC layer using dowel bars. Please refer to Caltrans Standard Plan P10 in Appendix G.

420-3.06F Surface Requirements

- (1) Smoothness for RCC Pavements. The RCC pavement shall conform to the concrete pavement smoothness requirements in Section 40.
- (2) Defective Area Correction for Smoothness. When the surface smoothness is outside the specified surface tolerance, the Contractor shall grind the surface to within the tolerance by use of self-propelled diamond grinders, provided grinding does not create deviation from other tolerances. Milling of the final surface is not acceptable, unless it is for the removal of the pavement. After correction, verify the corrective work by measuring the smoothness as noted in the above section.
- (3) Surface Texture. The final surface texture after rolling and curing shall be smooth and uniform over the entire area of pavement and will reasonably match the surface condition of the test strip. The surface area shall be free of rips, bird baths, areas of loose aggregate, surface pitting, voids or indentations, pockmarks, surface tears greater than 1/4" depth and 1/4"

width, check cracking, segregation or rock pockets, pumped areas, aggregate drag marks, and areas where fines have been washed away during the curing process.

- (4) Defective area Correction for Surface Texture. Correct surface texture deficiencies using an approved grinding device, or removal and replacement.
- (5) Areas with excessive smoothness and texture issues, as determined by the Engineer when compared to the approved test section, shall be removed and replaced from joint to joint at the contractor's expense per Subsection 420-3.06E Strength Requirements above.

420-4 MEASUREMENTS AND PAYMENTS

The quantity of Roller Compacted Concrete pavement to be paid for will be measured by the square yard. The area to be paid for will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer. No allowance will be made for concrete pavement placed outside those dimensions unless otherwise ordered by the Engineer.

Full compensation for the pavement test section as required by these specifications shall be considered as included in the contract unit price paid for other items of work and no additional compensation will be allowed.

The Contract unit price paid per square yard for Roller Compacted Concrete & Roller Compacted Concrete with Admixtures shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and for doing all Work involved in constructing Roller Compacted Concrete & Roller Compacted Concrete with Admixtures, complete in place, including but not limited to mixing, admixture, hauling, **placement, compaction, finishing, curing, sawing concrete, cleaning and sealing concrete joints, furnishing and placing all expansion joints, sawed joints, construction joints, joint sealants, other type required joints, or load bearing devices, test panels, quality control testing, and repair of any damage or deficiencies**, as shown on the drawings, as specified in these specifications and as directed by the Engineer. All pavement accepted by the Engineer will be paid at the Contract unit price for this Item, except for lots requiring price adjustments for deficiencies.

The Contract unit price paid per square yard for Trowel and Broom Finish Concrete Pavement shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and for doing all work involved in finishing the concrete pavement, complete in place, as shown on the drawings, as specified in these specifications and as directed by the Engineer.

The Engineer adjusts payment for each primary area deficient in average thickness in compliance with the following:

Full compensation for core drilling and backfilling the cores ordered by the Engineer for measuring concrete pavement thickness and determining full-depth cracks is included in the contract price paid per square yard for concrete pavement and no additional compensation will be allowed therefore. The Department does not pay for additional concrete pavement thickness measurements requested by the Contractor.

The Agency does not pay for the portion of concrete that penetrates treated permeable base.

Full compensation for the quality control plan is included in the contract unit price paid per square yard for concrete pavement and no separate payment will be made therefore.

Full compensation for furnishing and applying asphaltic emulsion on cement treated permeable base is included in the contract price paid per square yard for concrete pavement and no separate payment will be made therefor.

Full compensation for repairing joints is included in the contract unit price paid per square yard for concrete pavement and no separate payment will be made therefore.

Full compensation for furnishing, calibrating, and operating profilograph equipment for Profile Index, for submitting profilograms, and for performing corrective work is included in the contract unit price paid per square yard for concrete pavement and no separate payment will be made therefor.

Full compensation for removing and replacing slabs is included in the contract unit price paid per square yard for concrete pavement and no separate payment will be made therefor.

Full compensation for drilling holes and bonding tie bars with chemical adhesive is included in the contract unit price paid per square yard for concrete pavement and no additional compensation will be allowed therefore.

Full compensation for repairing damage caused by operating paving equipment on new concrete pavement is included in the contract unit price paid per square yard for concrete pavement and no separate payment will be made therefore.

The material and work necessary for the construction of crossings for public convenience, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved.

Full compensation for performing concrete pavement smoothness tests, furnishing the electronic files to the Engineer, and for performing corrective work is included in the contract unit price paid per square yard for the type of concrete pavement and no additional compensation will be allowed therefor.

SECTION 701 - MAINTENANCE AND PROTECTION OF TRAFFIC

701-1 DESCRIPTION of the Standard Specifications is revised to add:

The contractor shall be responsible for the control, direction, and safety of vehicular and pedestrian traffic in all work areas, and shall provide all necessary equipment and personnel for this work. Traffic control and site access arrangements shall be subject to the approval of the Owner and governmental agency with jurisdiction of the jobsite.

701-4 METHOD OF MEASUREMENT of the Standard Specifications is revised to read:

Basic Maintenance and Protection of Traffic, Construction Area Elements, and Provide Detours will be measured as a single, complete, lump sum Item 7010005 - Traffic Control.

Basic maintenance and protection of traffic shall consist of the preparation and approval of a traffic control plan, flagging services and furnishing, installing, maintaining, moving, and removing barriers, barricades, warning signs, delineators, lights, cones, installation of temporary pavement

markings for the maintenance of traffic and/or construction sequencing, the removal of existing pavement markings and raised pavement markers by obliteration, the covering of any existing signs, impact attenuation devices, and other traffic control devices in order to provide safe and efficient passage through and/or around the project construction site and protect the public and workers from injuries and property damage for the duration of the project. The cost for maintaining all traffic control materials, labor and equipment is included under the lump sum Item 7010005 - Traffic Control, except for the following individual bid items: Item 7010025 - Flashing Arrow Panel; Item 7010027 - Changeable Message Board; Item 7010075 - Flagging Services (Civilian); Item 7010077 - Flagging Services (Uniformed Officer) (Off Duty); Item 7010079 Official Police Vehicle (Off Duty); and Item 7010081 Pilot Truck and Driver. Flashing Arrow Panel and Changeable Message Boards will be measured separately as Each/Day. Flagging Services (Civilian), Flagging Services (Uniformed Officer) (Off Duty), Official Police Vehicle (Off Duty), and Pilot Truck and Driver will also be measured separately per Hour.

701-5 BASIS OF PAYMENT of the Standard Specifications is revised to read:

The accepted quantity of Basic Maintenance and Protection of Traffic, Construction Area Elements, and Provide Detour will be paid for at the contract lump sum price under Item 7010005, Traffic Control. The lump sum bid price submitted by the Contractor shall be full compensation for the work of maintenance and protection of traffic and work site access planning and control. The lump sum bid price shall also include the entire duration of the contract time that accounts for both the contract working days and non-working calendar days.

The accepted quantities for Flashing Arrow Panel, Changeable Message Board, Flagging Services (Civilian), Flagging Services (Uniformed Officer) (Off Duty), and Official Police Vehicle (Off Duty), and Pilot Truck and Driver measured as provided above, will be paid for at the contract unit price included in the Bidding Schedule. Price adjustment for variation in total bid quantity per Subsection 109-3 and 109-4 of the Standard Specifications do not apply to work under these bid items.

The Contractors attention is called to the following work considered incidental to Item 7010005: Installation of temporary pavement markings for the maintenance of traffic due to construction sequencing. No direct payment shall be made for temporary striping called for in section 701-4. This work shall be considered incidental to other traffic control related items.

Adjustments in compensation for the original contract period will not be made to the lump sum Item 7010005 - Traffic Control. The lump sum amount of this Item of work will be paid to the contractor for the original contract period regardless of the contractor's construction schedule; early construction completion; impacts to contractor's construction schedule critical path; increase or decrease in line item quantities; weather limitations; utility conflict; material change in the character of the work; etc.

Adjustments in compensation for work performed after the expiration of the original contract period and within an approved contract time extension will be made at the discretion of the Engineer for the approved time extension period.

SECTION 803 – LANDSCAPE BORROW AND PLATING MATERIAL

803-2.02 Decomposed Granite and Granite Mulch of the Standard Specifications is modified to add:

Granite mulch shall be free of lumps or balls of clay and shall not contain calcareous coatings, caliche, organic matter or foreign substances. All material shall be from a single production source and shall present a uniform appearance throughout the project. The color of the granite mulch shall match existing on site or Apache Brown. The gradation of granite mulch shall be as shown in the following table:

| Granite Mulch Gradation | |
|-------------------------|-----------------|
| Rock Size (Inches) | Percent Passing |
| 1" | 100 |
| 7/8" | 80-90 |
| 1/2" | 0-10 |

The contractor shall deliver, to a location on the project site approved by the Engineer, a minimum, five pound sample of the granite mulch for approval by the Engineer prior to hauling any quantity of the material to the site.

803-3.02 Decomposed Granite and Granite Mulch of the Standard Specifications is modified to add:

Place granite mulch 1" deep in road shoulder disturbed areas. Start placement of granite mulch one foot (1') from edge of pavement to the end of disturbed road shoulder areas as directed by the Engineer.

SECTION 810 - EROSION CONTROL AND POLLUTION PREVENTION

810-1 DESCRIPTION of the Standard Specifications is modified to add:

810-1.01 General. On projects where an Arizona Pollutant Discharge Elimination System or equivalent National Pollutant Discharge Elimination System (AZPDES/NPDES) permit is required, the contractor shall implement the requirements of the permit for sediment and erosion control due to stormwater runoff during construction, as specified under the current AZPDES/NPDES Construction General Permit. The Agency and the contractor shall prepare and submit separate Notices of Intent (NOI) and Notices of Termination (NOT) forms for the project. The contractor shall copy their AZPDES NOI Application and NOI Certification to the owner of the Municipal Separate Storm Sewer System (MS4) (i.e. Pima County Department of Environmental Quality, City of Tucson Stormwater Management, Town of Marana Environmental Engineering, or the Town of Oro Valley Stormwater Utility). The contractor shall copy their AZPDES NOT Acknowledgement to the owner of the MS4 upon project stabilization. Copies of all NOI and NOT documentation shall be placed in to the SWPPP, along with verification that these were sent to the owner of the MS4. If the project lies in multiple MS4s, the NOI Application, Authorization, notification of sending the permit, and NOT shall be sent to all MS4s in which the project is located.

The Agency has prepared a Stormwater Pollution Prevention Plan (SWPPP), which includes a narrative description of the proposed measures to be implemented, sequence of construction activities, and a site-specific

diagram indicating the proposed locations where erosion and sediment control devices or measures may be required during construction. The SWPPP also includes pollution prevention controls.

This SWPPP is included in a separate document. A list of subcontractors and key field personnel contact numbers shall be placed into the SWPPP. The contractor shall also be responsible for assembling member(s) of a Stormwater Team. The Stormwater Team shall be responsible for modifications to the SWPPP, and for compliance with the requirements in the AZPDES permit. Members of the Stormwater Team shall be listed in the SWPPP, along with title, responsibility, and qualifications. A member of the contractor's Stormwater Team shall be available for inspections with an Agency Representative. Prior to the start of construction, each contractor and all subcontractors shall be asked to sign a certification that they understand all requirements of the AZPDES/NPDES permit. Signed certifications shall be placed into the SWPPP.

Documentation in the SWPPP book required by the AZPDES permit shall also be included. This includes updating project maps and all appendices as required in the permit. It also includes placing the inspection report in the SWPPP book within 7 calendar days of completing the inspection.

Permanent erosion control will be constructed under the specific items found in the plans and listed in the Special Provisions and bid schedule.

810-2 MATERIALS

810-2.09 Track Out Pad is hereby added to the Standard Specifications:

Track Out Pads shall consist of clean fractured aggregate between 1" and 3" in size and 6" in depth.

810-2.10 AZPDES Sign Information is hereby added to the Standard Specifications:

The contractor shall post the AZPDES Authorization number near entrances to the project. The Authorization number can be added to existing project signs near project entries, such as the RTA sign. Lettering is to be a simple and legible font, minimum 2" height. If the job trailer is not on the project site, the location of the job trailer shall also be provided on the sign using similar lettering. Lettering shall be of a waterproof type, such as ready to apply, waterproof, vinyl letters.

810-3 CONSTRUCTION REQUIREMENTS

810-3.01 General of the Standard Specifications is modified to add:

Prior to the start of construction, the Engineer and contractor will jointly review the Stormwater Pollution Prevention Plan (SWPPP), make any revisions needed, and approve and sign the SWPPP. The contractor shall use the signed SWPPP provided at the pre-construction meeting, and implement the SWPPP as required throughout the construction and establishment periods. The Engineer and contractor will perform a minimum of one routine inspection of disturbed areas that have not been stabilized at least once every 14 calendar days *and* within 24 hours of the end of a 0.5 inch rainfall. Reduced inspection frequency can occur when the site has been temporarily stabilized. The reduced inspection frequency is once every 28 days *and* before predicted rainfall events *and* after 0.5 inch rainfall events.

After each inspection, the contractor shall document the findings and revise the SWPPP as necessary. The Engineer and contractor shall jointly approve and sign each revision to the SWPPP before implementation. The contractor shall complete revisions to the SWPPP within 15 calendar days following notification if ADEQ determines the SWPPP is deficient. The contractor shall amend the SWPPP, as needed and record inspection

results in the SWPPP within 7 calendar days after an inspection by local, state or federal officials. Changes to the SWPPP must be implemented in the field within 7 calendar days, or before the next rainfall event.

Final stabilization is met when all soil disturbing activities have been completed, temporary Best Management Practices have been removed and disposed of, and either a uniform perennial vegetative cover with a density of 70% of the native background has been established on all unpaved areas, or equivalent permanent stabilization measures are in place. Until final stabilization of the project, the contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, or from the nonexecution of the work. The contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final stabilization. No reimbursement shall be made for work necessary due to the contractor's failure to comply with the requirements of the SWPPP. The original completed SWPPP shall be returned to the Agency.

Except as specifically provided under Subsection 108-4, in the case of suspension of work from any cause whatsoever, the contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project, provide for normal drainage and shall erect any necessary temporary structures, signs, or other facilities. During such period of suspension of work, the contractor shall properly and continuously maintain, in an acceptable growing condition, all newly established plantings, seedlings and soddings, furnished under its contract and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

810-3.04 Other Pollution Controls of the Standard Specifications is modified to add:

The contractor shall document all treatment chemicals, i.e. polymers, flocculants or other cationic treatment chemicals used on the project. Documentation shall be in accordance with the current AZPDES/NPDES Construction General Permit and shall include a list of treatment chemicals used, justification for use, training provided in appropriate use, description of how they will be stored, dosage used, and a copy of Material Safety Data Sheets (MSDS).

Storage, handling and disposal of construction products, materials, and wastes shall comply with the current AZPDES/NPDES Construction General Permit. Control measures include the use of plastic sheeting under containers or bags of chemicals stored outside, providing adequately sized secondary containment under drums of chemicals, storing chemicals in water-tight, sealed containers that are labeled in accordance with applicable federal, state, tribal, or local requirements, and separating and labeling hazardous and non-hazardous waste. The contractor shall implement measures to minimize the potential for leaks and spills by installing barriers between material storage and traffic areas.

The contractor shall provide waste containers (e.g. dumpster or trash receptacles with covers/lids) of sufficient size and number to contain construction and domestic wastes. Domestic waste shall be cleaned up and disposed of daily in designated waste containers, and cleaned up immediately if overflowing.

810-3.06 Off Site Staging and Storage Yard of the Standard Specifications is modified to add:

If the contractor has entered into a separate agreement with an owner or lessee of private property to obtain property for use as a storage or staging area, both the Agency and the contractor shall state in its SWPPP that this area is under the control of the contractor.

810-3.07 SWPPP Implementation Plan of the Standard Specifications is modified to add:

The contractor will provide an implementation plan describing the SWPPP activities associated with the construction sequencing of the project and how all requirements of the SWPPP will be accomplished during all

phases of construction, including housekeeping requirements. All disturbed slopes that will not be stabilized within the SWPPP mandated 14 days must have temporary stabilization installed.

The implementation plan shall also include the contractor's training plan for their own Stormwater Team, as well as for remaining staff and sub-contractors. The contractor shall provide new employee training at least one (1) time per year and shall provide refresher training for existing employees directly involved in SWPPP activities at least once every two (2) years. The contractor's training plan shall cover all requirements included in the most current version of the AZPDES Construction General Permit and shall include at minimum:

- County ordinances related to stormwater and construction
- Requirements for structural and non-structural control measures on construction sites, such as erosion and sediment controls
- Construction control measures maintenance requirements
- Inspection procedures
- Enforcement procedures
- Requirements and restrictions related to other permits included in the SWPPP, including the 404 Permit, prohibiting stockpiling in drainage conveyances and washes
- Concrete Waste Management
- Hazardous waste management, including spill reporting and mitigation
- Proper storage of construction materials
- Proper storage of construction waste
- Litter control
- Management of stockpiles, excavations, and spoils
- Management of portable toilets
- Respect for project work boundaries and preservation fence limits
- Respect for existing vegetation
- Installation of sediment wattles and logs

810-3.08 (H) Track Out Pad is hereby added to the Standard Specifications:

The work under this item shall consist of furnishing all materials, tools, equipment, and labor necessary to install and remove the Track Out Pads at all construction entrances; locations to be determined by the contractor and approved by the Engineer.

At the completion of the project, the contractor shall remove the Track Out Pads and restore/re-grade the area to return the ground elevation and grading to existing conditions as close as possible.

810-3.10 (J) AZPDES Sign Information is hereby added to the Standard Specifications:

The work under this item shall consist of furnishing all materials and labor necessary to add the AZCON authorization number to signs at all major entrances to the project site. The wording shall read "AZCON - _____". Wording or diagrams showing the location of the job trailer shall also be provided. If there is no sign which this information can be added to, the contractor shall furnish a sign for this purpose.

SECTION 1005 - BITUMINOUS MATERIALS FOR SURFACING

1005-3 BITUMINOUS MATERIAL REQUIREMENTS

1005-3.01 Asphalt Cement of the Standard Specifications is modified to read:

TABLE 1005-1 of the Standard Specifications is modified to read:

| TABLE 1005-1 PG 76-22 TR+ ASPHALT BINDER | | | | |
|---|--------------------|--------------------|-------------------------|---|
| Test Property | Test Method | Requirement | Test Result | Percent of Contract Unit Price Allowed |
| Solubility in Trichloroethylene, %, minimum | ASTM D 2042 | 97.5 | ----- | ----- |
| Softening Point, °C, minimum | AASHTO T 53 | 60 | ≥ 60 57 - 59 < 57 | 100 85 70 (1) |
| Elastic Recovery, @ 10 °C, %, minimum | AASHTO T 301 | 55 | ≥ 55 50 - 54 < 50 | 100 85 70 (1) |
| Phase Angle (δ), @ 70 °C @ 10 rad/sec, degrees, maximum | AASHTO T 315 | 75 | ≤ 75 76 - 83 > 83 | 100 85 65 (1) |
| (1) Reject Status: The pay adjustment applies if allowed to remain in place. | | | | |
| Notes: | | | | |
| <ul style="list-style-type: none"> • PG 76-22 TR+ asphalt binder shall contain a minimum of 8 percent crumb rubber and a minimum of two percent SBS (styrene-butadiene-styrene) polymer. • PG 76-22 TR+ asphalt binder shall conform to the requirements of AASHTO M 320 and, in addition, shall meet the requirements specified above. • Should the bituminous material be deficient on more than one of the properties listed in Tables 1005-1, the pay adjustment will be the greatest reduction to the contract unit price specified considering individual test results. • The pressure aging temperature for PG 76-22 TR+ asphalt binder shall be 110 °C. • The crumb rubber shall be derived from processing whole scrap tires or shredded tire materials. The tires from which the crumb rubber is produced shall be taken from automobiles, trucks, or other equipment owned and operated in the United States. The processing shall not produce, as a waste product, casings or other round tire material that can hold water when stored or disposed of above ground. | | | | |