

Agreement for Construction Material Testing Services

75th STREET, SWITZER ROAD TO EAST FRONTAGE ROAD (BR-1551)

This Agreement is made and entered into this _____ day of _____, 20_____, by and between the City of Overland Park, Kansas, hereinafter "City", and Kaw Valley Engineering, Inc., hereinafter "Consultant."

I. Scope of Services and Cost Therefore

The Consultant shall perform construction material testing services (the "Services") to the City's full satisfaction and in accordance with the Proposal Instructions, Proposal, Specifications, and Sampling and Testing Frequency Chart, which are attached hereto and incorporated by reference herein as follows:

EXHIBIT A:	Proposal Instructions
EXHIBIT B:	Proposal
EXHIBIT C:	Specifications
EXHIBIT D:	Sampling and Testing Frequency Chart

The Consultant shall be paid for this work an amount not to exceed Twenty Thousand Eight Hundred Thirteen and 00/100 dollars (\$20,813.00).

II. Term

All work shall be completed by May 15, 2015.

III. Changes to Scope of Services

This Agreement may be amended to provide for additions, deletions, and revisions in the Scope of Services outlined in the Proposal. Prior to commencing any additional services, Consultant must submit a proposal outlining the additional services to be provided. Consultant shall be compensated based upon the submitted unit prices for the additional services which shall be approved through a written Supplemental Agreement.

IV. Completion of Project

To meet the City's specific needs, certain defined deliverables, activities, and dependencies have been included in the Proposal. Execution of this Agreement constitutes agreement of the parties on the deliverables and activities in the Proposal. Once these pre-agreed deliverables and metrics have been satisfied, City and Consultant agree that the project is complete. Provisions of Insurance and Indemnification will survive completion of the project and termination of the Agreement.

V. Payment Terms

City will make payment to Consultant on a unit price basis as shown in the Proposal. It is understood and agreed that estimated quantities of items for unit price work are not guaranteed and payment will be based on actual quantities used for the period. City will make payment to Consultant within thirty (30) days after receipt of each undisputed invoice.

VI. Termination

Nothing in this Agreement shall prevent, limit, or otherwise interfere with the right of the City to terminate this Agreement, in whole or in part, with or without cause, subject to

written notice to Consultant. If the City terminates the Agreement prior to completion of Services, City shall compensate Consultant for all Services satisfactorily completed to date of its receipt of the termination notice. Compensation shall not include anticipatory profit or consequential damages, neither of which will be allowed.

VII. Dispute Resolution

City and Consultant agree that disputes relative to the Services performed should first be addressed by good faith negotiations between the parties. If direct negotiations fail to resolve the dispute, the party initiating the claim that is the basis for the dispute shall be free to take such steps as it deems necessary to protect its interests; provided, however, that notwithstanding any such dispute Consultant shall proceed with the Services as per this Agreement as if no dispute existed; and provided further that no dispute will be submitted to arbitration without the parties' express written consent.

VIII. Independent Contractor

Consultant is an independent contractor and as such neither Consultant nor its personnel are agents or employees of the City.

IX. Subcontractors

Consultant shall not subcontract out any work under this Agreement without written approval of the City. If Consultant subcontracts services under this Agreement, they shall not be relieved of their liability hereunder thereby. Services performed by any subcontractor hired by Consultant will not result in any additional cost to City. Consultant must notify the City of any proposed subcontractors and the City shall have the right of approval thereof. Consultant agrees to the insurance requirements concerning the use of subcontractors as specified herein

X. Indemnification

Consultant agrees to defend, indemnify and hold harmless the City and its agents and/or employees from any and all claims, settlements, and judgments including but not limited to those for bodily injury, physical property damage and/or death arising out of Consultant or any of its agents, servants, employees' or subcontractors performance or failure to perform under this Agreement. Neither acceptance of the completed Services, payment, nor termination of this Agreement shall release Consultant of its obligation under this paragraph.

XI. Insurance Requirements

- A. General: Consultant shall secure and maintain, throughout the duration of this contract, insurance (on an occurrence basis unless otherwise agreed to) of such types and in at least such amounts as required herein. Consultant shall provide certificates of insurance and renewals thereof on forms provided by the City. The City shall be notified by receipt of written notice from the insurer at least thirty (30) days prior to material modification or cancellation of any policy listed on the Certificate.
- B. Notice of Claim Reduction of Policy Limits: Consultant, upon receipt of notice of any claim in connection with the contract, shall promptly notify the City, providing full details thereof, including an estimate of the amount of loss or liability.

Consultant shall monitor and promptly notify the City of any reduction in limits of protection afforded under any policy listed in the Certificate (or otherwise required by the contract) if the Consultant's limits of protection shall have been impaired or reduced to such extent that the limits fall below the minimum amounts required herein. Consultant shall promptly reinstate the original limits of liability required hereunder and shall furnish evidence thereof to the City.

C. Commercial General Liability: The Commercial General Liability insurance coverage that is to be provided by Consultant shall comply with appropriate section. Such insurance shall specifically insure the contractual liability assumed by Consultant under SECTION IX of this CONTRACT.

Limits –

General Aggregate:	\$2,000,000
Products / Completed Operations Aggregate:	\$2,000,000
Personal & Advertising Injury:	\$1,000,000
Each Occurrence:	\$1,000,000

Policy MUST include the following conditions:
NAME CITY OF OVERLAND PARK AS “ADDITIONAL INSURED”

D. Automobile Liability: Policy shall protect the Consultant against claims for bodily injury and/or property damage arising from the ownership or use of any owned, hired and/or non-owned vehicle.

Limits (Same as Commercial General Liability) -
 Combined Single Limits, Bodily Injury and Property Damage - Each Accident:

Policy MUST include the following condition:
NAME CITY OF OVERLAND PARK AS “ADDITIONAL INSURED”

E. Workers' Compensation: This insurance shall protect the Consultant against all claims under applicable state workers' compensation laws. Consultant shall also be protected against claims for injury, disease or death of employees which, for any reason, may not fall within the provisions of workers' compensation law. The policy limits shall not be less than the following:

Workers' Compensation:	Statutory
Employer's Liability:	
Bodily Injury by Accident	\$100,000 each accident
Bodily Injury by Disease	\$500,000 policy limit
Bodily Injury by Disease	\$100,000 each employee

F. Industry Ratings: The City will only accept coverage from an insurance carrier who offers proof that it:

1. Is authorized to do business in the State of Kansas;
2. Carries a Best's policy holder rating of A- or better; and
3. Carries at least a Class VIII financial rating, or
4. Is a company mutually agreed upon by the City and Consultant.

G. Professional Liability: Consultant shall maintain throughout the duration of this Agreement Professional Liability Insurance in an amount of not less than One

Million Dollars (\$ 1,000,000.00), and shall provide the City with certification thereof.

H. Subcontractors' Insurance: If part of the Agreement is to be sublet, Consultant shall either:

1. Cover all subcontractors in its insurance policies, or
2. Require each subcontractor not so covered to secure insurance which will protect subcontractor against all applicable hazards or risks of loss as and in the minimum amounts designated.

Whichever option is chosen, Consultant shall indemnify and hold harmless the City as to any and all damages, claims or losses, including attorney's fees, arising out of the acts or omissions of its subcontractors.

XII. Non-Discrimination And Other Laws

A. During the performance of this Agreement, the Consultant agrees that:

1. Consultant shall observe the provisions of the Kansas Act Against Discrimination and shall not discriminate against any person in the performance of Services under the present contract because of race, religion, color, sex, disability, national origin ancestry or age;
2. in all solicitations or advertisements for employees, Consultant shall include the phrase, "equal opportunity employer," or a similar phrase to be approved by the Kansas Human Rights Commission ("Commission");
3. if Consultant fail to comply with the manner in which Consultant report to the Commission in accordance with the provisions of K.S.A. 44-031 and amendments thereto, Consultant shall be deemed to have breached the present contract and it may be canceled, terminated or suspended, in whole or in part, by the City;
4. if Consultant is found guilty of a violation of the Kansas Act Against Discrimination under a decision or order of the Commission which has become final, Consultant shall be deemed to have breached the present contract and it may be canceled, terminated or suspended, in whole or in part, by the City; and
5. Consultant shall include the provisions of subsections (A)(1) through (4) in every subcontract or purchase order so that such provisions will be binding upon such subcontractor or Consultant.

B. Consultant further agrees that Consultant shall abide by the Kansas Age Discrimination In Employment Act (K.S.A. 44-1111 et seq.) and the applicable provision in the Americans With Disabilities Act (42 U.S.C. 12101 et seq.) as well as all federal, state and local laws, ordinances and regulations applicable to this project and to furnish any certification required by any federal, state or local governmental agency in connection therewith.

XIII. Prohibition Against Contingent Fees

Consultant warrants that it has not employed or retained any person, firm, or corporation, other than a bona fide employee working solely for Consultant, to solicit or

secure the awarding of this Agreement based upon an arrangement that the person, firm or corporation would receive any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award of this Agreement. For the breach or violation of the foregoing provision, the City shall have the right to terminate the Agreement without liability and, at its discretion to deduct from the contract price, or otherwise recover the full amount of such fee, commission, percentage, gift or consideration.

XIV. Miscellaneous Provisions

- A. Parties hereto agree that neither shall assign or transfer their interest in this Agreement without the written consent of the other and further agree that this Agreement binds the parties, their successors, trustees, assignees and legal representatives.
- B. Any modification of this Agreement or additional obligation assumed by either party in connection herewith shall be binding only if evidenced in writing signed by each party or an authorized representative of each party.
- C. It is understood and agreed that the written terms and provisions of this Agreement shall supersede all prior verbal and written statements of any and every official and/or other representative of the City and Consultant and such statements shall not be effective or be construed as entering into, or forming a part of, or altering in any way whatsoever, the written Agreement. In the event that the City issues a purchase order, work order, invoice or similar document relating to Services performed, such purchase order or similar document shall be for the City's administrative purposes only and will not supplement, supersede, modify or affect any of the terms and conditions set forth herein.
- D. This Agreement is entered into under and pursuant to, and is to be construed and enforceable in accordance with, the laws of the State of Kansas. The waiver of or failure to enforce any term or condition of this Agreement shall not be construed as a waiver of any other term or condition. If any provision is held to be unenforceable by a court or other tribunal, the enforceability of the other provisions shall not be affected.
- E. Should any provision of this Agreement be determined to be void, invalid, unenforceable or illegal for whatever reason, such provision shall be null and void; provided, however, that the remaining provisions of this Agreement shall be unaffected thereby and shall continue to be valid and enforceable.

XV. Execution of Agreement

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their authorized officials on the day and year first above written.

City of Overland Park, Kansas

Carl Gerlach
Mayor

ATTEST:

Marian Cook
City Clerk

APPROVED AS TO FORM:

Tammy M. Owens
Deputy City Attorney

Kaw Valley Engineering, Inc.

Gary A. Leeds, P.E.
Principal

EXHIBIT A

PROPOSAL INSTRUCTIONS FOR CONSTRUCTION MATERIAL TESTING SERVICES

75th Street Reconstruction Switzer Road to E. Frontage Road

The City of Overland Park is accepting proposals for professional testing services for the above project. Written proposals will be accepted until 3:00 p.m. March 25, 2014. Proposals should be delivered or mailed to the address below:

Alan Daniels
City of Overland Park
Public Works Department
8500 Santa Fe
Overland Park, KS 66212

This proposal includes general testing requirements and approximate quantities of the various procedures anticipated to be required for this project. Room is provided at the bottom of the proposal to indicate additional charges or alternatives not specifically indicated elsewhere.

The following conditions shall apply:

1. All personnel that work on this job need to be KDOT L.P.A. certified. Testing shall be performed according to KDOT standards as outlined in Part V of the Construction Manual. The following documentation should be submitted with the proposal:
 - Qualifications of the project engineer.
 - Firms experience working on projects under KDOT administration.
 - Number of personnel that are KDOT certified and their experience and qualifications.
2. The proposal shall indicate that the testing personnel will be available for field-testing with 1/2- day notice (4 hours).
3. All sample acquisition and testing shall be conducted with staff personnel employed by the testing laboratory. No subcontracting of work shall be permitted without written approval of the City.
4. Additional types of tests may be required with the cost to be negotiated at that time.
5. The material-testing firm shall be responsible for all field sampling and delivery to the laboratory for testing as required.
6. All construction materials testing requirements and methods shall be in conformance with the City of Overland Park Sampling and Testing Frequency Chart.
7. The testing laboratory shall be responsible for filling asphaltic concrete core holes with non-shrinking grout as directed by the Project Engineer or his authorized representative if no further asphalt operations are planned.

EXHIBIT A

8. Test reporting requirements are as follows:
 - a. Results of asphaltic concrete samples shall be provided to the Project Engineer or his authorized representative within 24 hours.
 - b. In place density results of tests shall be provided to the Project Engineer or his authorized representative verbally at the time that the assigned tests are completed in the field or more often as directed.
9. Written test results shall be provided within 2 weeks of the test completion.
10. Summary sheets shall be submitted with invoices indicating date of services, tests performed, date test reported, and test report number.
11. Test report numbers on individual test reports shall correspond to those on the summary sheets. In addition to standard information such as test type and location, each test report shall clearly indicate the applicable project number and name as shown on the proposal. Locations shall be indicated as project Station and offset from baseline, and the report shall clearly show the type of construction being tested.
12. The following information shall be included on concrete cylinder compression test reports: concrete supplier, concrete mix number, slump range, unit weight range, air range, and design compressive strength.
13. Engineering review, transportation mileage, clerical and administrative costs including report preparation, facsimile or e-mail copies, and billing shall be subsidiary to the proposal.
14. The City will test in accordance with a Sampling and Testing Frequency Chart included in the proposal package.

EXHIBIT B

PROPOSAL

**75th Street Reconstruction
Switzer Road to East Frontage Road**

TO: CITY OF OVERLAND PARK
JOHNSON COUNTY, KANSAS

The undersigned proposes to provide Construction Material Testing Services as indicated below and in accordance with the Proposal Instructions, Specifications, and Agreement.

Description	Unit	Approx. Quantity	Unit Price	Total Price
Material Source Testing				
Moisture/Density-ASTM D698 with Atterberg Limits D4318	Each	12	\$175.00	\$2,100.00
Compaction of Earthwork				
Field Density Test KT-13 or KT-51	Each	15	\$10.00	\$150.00
Moisture Test KT-11 or KT-51	Each	15	\$15.00	\$225.00
Aggregates - Aggregate Base Course (AB-3 OP Modified) - reference Material and Testing Specifications				
Plasticity Test ASTM D4318	Each	10	\$60.00	\$600.00
Sieve Analysis ASTM C117 and C136	Each	10	\$60.00	\$600.00
Portland Cement Concrete				
Slump KT-12	Each	60	\$20.00	\$1,200.00
Unit Weight KT-20	Each	60	\$30.00	\$1,800.00
Air Content KT-18, KT-19, or KT-20	Each	60	\$35.00	\$2,100.00
Temperature ASTM C1064	Each	60	\$0.00	\$0.00
Cylinder Preparation (6/Set) KT-22 (includes round trip transportation, 1 hour on-site tech. time, sample pickup, and lab curing)	Set	60	\$30.00	\$1,800.00
Field Cured Cylinders KT-22	Each	20	\$0.00	\$0.00
Cylinder Test (6/Set) ASTM C39	Set	60	\$60.00	\$3,600.00
Field Cured Cylinders ASTM C39	Each	20	\$10.00	\$200.00
Asphaltic Concrete Quality Assurance Testing - mix verification of bituminous mixture during construction - reference Overland Park Superpave Asphaltic Concrete Surface and Intermediate Course Specification				
Asphalt plant belt sample gradation & KT-8	Each	6	\$60.00	\$360.00
Test from sample obtained behind the paver. The procedure is specified in the project technical specifications, subparagraph "Superpave Asphaltic Concrete Mix Design Method", S.1.8. Test properties to be determined and other information to be recorded are shown at the end of the specification entitled "Superpave Asphaltic Concrete Test" (Verified Mix Design). The bulk specific gravity of the total aggregate (Gsb) will be furnished by the City. Note - volumetric results due within 4 hours of sampling. Testing start times coordinated with Contractor's lab.				
	Each	6	\$275.00	\$1,650.00

EXHIBIT B

Determination of Asphalt Content and Gradation of Combined RAP or FRAP by Ignition Method ASTM D-6307-05 & ASTM D-5444-05	Each	6	\$75.00	\$450.00
Description	Unit	Approx. Quantity	Unit Price	Total Price
AASHTO T-283 (procedures as per the spec)	Each	1	\$50.00	\$50.00
Coring - 4" I.D. cores & patching holes (with specified material)	Each	10	\$50.00	\$500.00
Core Density ASTM D2726	Each	10	\$10.00	\$100.00
Sample Pick Up for Asphalt Testing (includes 3 hours tech. time and round trip transportation)	Each	15	\$60.00	\$900.00
Standby Time for sample pickup	Hour	10	\$5.00	\$50.00
Aggregates for Concrete KCMMB Test #1 - reference Material and Testing Specifications				
Part A Test	Each	2	\$5.00	\$10.00
Part B Test	Each	2	\$5.00	\$10.00
Sieve Analysis KT-2	Each	15	\$10.00	\$150.00
Material Passing the (No. 200 Sieve) by the Wash Method KT-3	Each	15	\$2.00	\$30.00
Soft or Friable Particles in Aggregate	Each	15	\$2.00	\$30.00
Sticks in Aggregate KT-35	Each	15	\$2.00	\$30.00
Clay Lumps in Aggregate KT-7	Each	15	\$2.00	\$30.00
Shale like Material in Aggregate KT-8	Each	15	\$2.00	\$30.00
Unit Weight Section 1102	Each	15	\$2.00	\$30.00
Underdrain Aggregate				
Sieve Analysis KT-2	Each	2	\$60.00	\$120.00
Sticks in Aggregate KT-35	Each	2	\$2.00	\$4.00
Clay Lumps in Aggregate KT-7	Each	2	\$2.00	\$4.00
Other				
Standby Time (excludes standby time for asphalt testing)	Hour	40	\$40.00	\$1,600.00
Project Meeting Attendance	Hour	4	\$75.00	\$300.00

TOTAL PROPOSAL \$ 20,813.00

EXHIBIT B

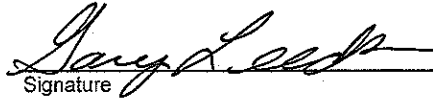
1. Sampling for tests are included in the unit price for the test.
2. It is understood that the above services are to be purchased by the City on an "as needed" basis and no guarantee of quantity is intended. Also, the undersigned understands the quantities shown in this proposal are estimates only and the City reserves the right to add or subtract from these amounts.
3. In submitting this quote, the undersigned declares he/she is the only person interested in said quote; that it is made without any connection with any person or persons making another quote for the same service; and that the quote is in all respects fair and without collusion, fraud, or misrepresentation.
4. The undersigned further declares that it has carefully examined the Proposal Instruction, Specification, Sampling and Testing Frequency Chart, and the Agreement, and has satisfied himself/herself as to the method of payment and specification requirements and understands that in signing this Proposal he/she waives all right to plead any misunderstandings regarding the same.
5. The undersigned further agrees that they shall abide by the Non-Discrimination And Other Laws in Section XI. of the Agreement.

DATED in Lenexa, Kansas this 25th of March 2014

(SEAL)

Kaw Valley Engineering, Inc.

Name of Consultant



Signature

Gary A. Leeds, P.E.

Printed Name

Principal

Title

14700 W. 114th Terrace, Lenexa, KS 66215

Complete Address

(913) 894-5150

Telephone Number

(913) 894-5977

Fax Number

EXHIBIT C

MATERIAL AND TESTING SPECIFICATIONS FOR CONSTRUCTION MATERIAL TESTING SERVICES

75th Street Switzer Road to East Frontage Road

S-1 OVERLAND PARK SUPERPAVE ASPHALTIC CONCRETE SURFACE AND INTERMEDIATE COURSE

Rev. Date: 1-30-09

S-1.1 General

The **2007 Standard Specifications for State Road and Bridge Construction**, Sections 109, 601, 611 (Class A), 1201, 1203, and 1203 shall govern the asphaltic concrete work except as otherwise modified herein. All testing required by this specification including mix design and field verification of the mix shall be the responsibility of the Contractor. The mix design shall be modified or redesigned whenever a material source changes or a quarry starts producing from a different geological unit or a major change is made to the asphalt plant. This work shall be subsidiary to other bid items.

S-1.2 Asphalt Cement

Asphalt cement shall conform to the requirements of AASHTO-MP 1a-04^{1, 2} Performance Graded Asphalt Binder PG 64-22. The grade of the asphaltic binder shall not be changed without a laboratory remix design. It shall also comply with Sections 1201 and 1202. **Each shipment of asphalt to the asphalt plant shall have a bill of lading stating the asphalt cement meets the specifications referenced above. Copies of the bill of lading shall be submitted to the City Engineer.** Asphalt cement shall not be paid for directly but shall be considered a subsidiary bid item.

S-1.2.1 Anti-Stripping Agent

All bituminous mixtures shall contain an anti-stripping agent. AD-here[®] LOF 65-00 LS as manufactured by ARR-MAZ Products, L.P. shall be added to the asphalt cement at the rate of 0.75% by weight of the total added asphalt cement. Other asphalt anti-stripping additives and their application rate may be used when proven equal after testing as specified in Paragraph "Resistance of Compacted Bituminous Mixture to Moisture Induced Damage AASHTO T 283-03" and approved by the City Engineer.

S-1.3 Aggregates General

The total aggregate (coarse aggregate, fine aggregate, and the material passing the No. 200 sieve) shall contain not less than 85 percent crushed material for intermediate course and surface course. The Coarse Aggregate Angularity for all coarse aggregates including RAP or FRAP shall be 85% or higher. The job mix formula (JMF) shall be within the control points shown below. It shall be noted that when the gradation of extracted plant produced mix varies appreciably from JMF, the test properties of the mix will be out of specifications.

The contractor may use Reclaimed Asphalt Pavement (RAP) or Fractionated Reclaimed Asphalt Pavement (FRAP) as an aggregate source. FRAP is defined as having two or more stockpiles, where Reclaimed Asphalt Pavement (RAP) is processed into coarse and fine fractions. The fine FRAP stockpile will contain only material passing the ¼ inch screen. The coarse FRAP stockpile will contain milled material retained on the ¼ inch screen and passing the ¾ inch screen. The maximum percentage of RAP is 25% and the maximum combined percentage of FRAP is 40%.

EXHIBIT C

FRAP may be comprised of coarse or fine FRAP or a combination thereof. Utilize a separate cold feed bin for each stockpile of FRAP used. Do not blend coarse and fine FRAP either in the stockpile or in a cold feed bin. Add RAP or FRAP to the mix through the RAP collar. RAP may not be used in surface courses regardless of mix designation.

Sources and types of RAP or FRAP must be recorded and submitted to the City Engineer upon request.

The RAP or FRAP used in production shall be similar in composition (extracted gradation and asphalt content) to the source used for design.

The contractor shall submit a copy of current aggregate quality and consensus tests for aggregates used in the mix. The quality test must have been run within 6 months of the date of a mix design submission or a volumetric test report.

S-1.3.1 Aggregate for Asphaltic Concrete Surface Course

The exact gradation shall be determined by the contractor's laboratory.

Sieve Size	Percent Passing 12.5 mm Nominal Size Control Points	
19mm (3/4 inch)	_____	100%
12.5 mm (1/2 inch)	90	100%
9.5 mm (3/8 inch)	80	95%
4.75 mm (No. 4)	_____	_____
2.36 mm (No. 8)	36	48%
1.18 mm (No. 16)	_____	_____
600 µm (No. 30)	_____	_____
300 µm (No. 50)	_____	_____
150 µm (No. 100)	_____	_____
75 µm (No. 200)	2	8%

Surface mixtures for streets designated thoroughfares by the city shall contain the following:

Fifteen percent of the minus No. 4 sieve material and 15 percent of the total aggregate shall be chat, crushed sandstone, crushed gravel, crushed steel slag, or crushed porphyry (rhyolite, basalt, granite, and Iron Mountain Trap Rock are examples of crushed porphyry).

S-1.3.2 Aggregate for Asphalt Concrete Intermediate or Leveling Course

The exact gradation shall be determined by the contractor's laboratory.

Sieve Size	Percent Passing 12.5 mm Nominal Size Control Points	
19 mm (3/4 inch)	_____	100%
12.5 mm (1/2 inch)	85	100%
9.5 mm (3/8 inch)	75	90%
4.75 mm (No. 4)	_____	_____
2.36 mm (No. 8)	34	44%
1.18 mm (No. 16)	_____	_____
600 µm (No. 30)	_____	_____
300 µm (No. 50)	_____	_____
150 µm (No. 100)	_____	_____
75 µm (No. 200)	2	8%

EXHIBIT C

Superpave Asphaltic Concrete Mix Design Method

The finished mixture shall meet the requirements described below when prepared in accordance with AASHTO T 312-04 (using 6 inch nominal size molds) and the volumetric properties of compacted paving mixtures as calculated using Chapter 4 of Superpave Mix Design, Superpave Series No. 2 (SP-2), Third Edition 2001 Printing, Published by the Asphalt Institute referred hereafter as "SP-2", unless otherwise specified. The procedure shall be as specified in Chapter 5 and 6 of the SP-2. The Theoretical Specific Gravity (Gmm) shall be determined following AASHTO T 209-99 (2004) and the Bulk Specific Gravity of the Compacted Asphalt Mixture (Gmb) shall be determined following AASHTO T166-00. The material for the theoretical specific gravity (Gmm) and the material for the Gyratory Compactor specimens (pucks) shall be cured at 140+/-3° C (285+/-5° F) for four hours in a closed oven after the mix is produced in the laboratory. Also, the plant-produced mixture shall be tested when the mix is four hours old. The mixture shall be transported to the laboratory in an insulated container and then stored in a laboratory oven at 140 +/-3° C (285 +/-5° F) minimum temperature for the remainder of the curing period. The curing oven shall be the forced air type and may be operated at a temperature not to exceed the maximum temperature at which the mixture may be discharged from the plant as specified in paragraph "Mixing Plants". This procedure shall be used when the water-absorption as determined by ASTM C 127-04 and ASTM C 128-04a of any aggregate in the mixture exceeds 1.25 percent. The mixture shall be compacted at 140 +/-3° C (285 +/-5° F). The theoretical specific gravity (Gmm) shall be performed using the Type E-A 4500ml metal vacuum pycnometer with a clear polymethyl methacrylate PMMA lid. The vacuum shall be applied for 15 minutes to gradually reduce the residual pressure in the vacuum vessel to 28 mm Hg. The bulk specific gravity of the Fine Sand Chat shall be determined using the standard Cone Test for Surface Moisture as stated in ASTM C-128-04a unless otherwise directed by the City Engineer. The G_{se} of the RAP or FRAP material shall be used as aggregate G_{sb} in volumetric calculations provided that the asphaltic cement content of the RAP or FRAP fraction is determined through the use of ASTM D-6307-05 Standard Test Methods for Asphalt Content of Hot Mix Asphalt by the Ignition Method. **The AASHTO Specification shall be used when this specification references the AASHTO number.**

S-1.4 Superpave Design and Testing Properties

Required Density (% of Theoretical
Maximum Specific Gravity (Gmm)
Number of Gyration (Average of 2-6 inch specimens)

$N_{initial}$ 6		85 - 91%
N_{design} 60	(Mix Design Only)	96%
N_{max} 90		≤ 98%
Percent Air Voids, in compacted mixture 0% RAP	Mix Design Only Field	4.0% 3.0-5.0%
Percent Air Voids, in compacted mixture 5-25% RAP or FRAP	Mix Design Only Field	3.7% 2.8-4.5%
Percent Air Voids, in compacted mixture 26-40% FRAP	Mix Design Only Field	3.4% 2.6-4.1%

EXHIBIT C

Percent VMA in compacted mixture	12.5mm Nominal Size (Mix Design Only)	14.0%
VEA% ¹	(0% RAP)	10.0%
	(5-25% RAP/FRAP)	10.3%
	(26-40% FRAP)	10.6%
The ratio of minus 75µm (No. 200) material to % effective asphalt control (Pbc) based on the weight of the aggregate from the extraction test	Mix Design	0.6-1.2
	Field (0-25% RAP/FRAP)	0.6-1.6
	Field (26-40% FRAP)	0.5-1.5

¹VEA% = Volume of Effective Asphalt (%) which is the numerical difference between VMA and Air Voids.

When the aggregate absorption is high, the produced mixture will be tender until the asphalt is absorbed into the aggregate. Therefore, it may be beneficial to silo the mixture at the plant for a time before delivering to the project site. This is more important when the truck haul is short.

S-1.5 Resistance of Compacted Bituminous Mixture to Moisture Induced Damage AASHTO T 283-03

The index of retained strength must be greater than 80 percent as determined by AASHTO T 283-03 (using a 4 inch nominal size mold). Specimens shall be conditioned by freezing and thawing. When the index of retained strength is less than 80 the amount of anti strip may have to be adjusted. No additional payment will be made to the Contractor for addition of anti-stripping agent required. The mix shall contain the anti-stripping agent specified in paragraph "Anti-Stripping Agent" and tested by AASHTO T 283.

S-1.5.1 Method of determining the retained strength of plant-produced mixtures. Sample the plant produced mixture at the plant site in accordance with ASTM D 979 or behind the paver using the procedure specified herein. Transport the mixture to the laboratory and determine the theoretical specific gravity as specified in paragraph "Asphaltic Concrete Mix Design Method". Prepare the specimens for the AASHTO T 283 test using the same four-hour cured material and compact to 7 ± 0.5 percent air voids. Allow the samples to cool and cure overnight at room temperature and proceed with testing by determining the thickness and bulk specific gravity, then separating the specimens into subsets and preconditioning as specified herein. Then proceed with the testing as specified in AASHTO T 283.

S-1.5.2 Test for AASHTO T 283

One set of tests for each mix design from each plant shall be made as the final verification of the plant produced mix design by the contractor's laboratory.

S-1.5.2.1 One set of tests for each mix produced for Public Works Department Contracts shall be taken during the initial production each year and one set of tests for each 10,000 tons produced that year. Sampling frequency shall be adjusted when the Contractor has multiple contracts with the Public Works Department so that tests are taken every 10,000 tons of production. The City Engineer may take an additional test at his expense. Any test that fails will require the contractor to adjust the JMF and take additional test at the contractor's expense.

S-1.5.2.2 One set of tests shall be made and approved by the City Engineer at contractor's expense when any of the material sources change or when requested by the City Engineer.

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S-1.6 Contractor's Laboratory

Asphaltic Concrete Mix Design shall be the responsibility of the Contractor's Laboratory. The laboratory shall be a commercial testing laboratory meeting the requirements of ASTM D 3666-05a. The manager of the laboratory shall submit a signed certificate stating that the laboratory has a current certificate stating that the laboratory meets the ASTM D 3666-05a requirements. The laboratory shall have past experience in testing materials and making Superpave Asphaltic Concrete mix designs. The laboratory shall be approved by the City Engineer. The laboratory shall establish the mix design using the criteria specified herein. Certified test results of the mix design and materials shall be submitted 30 days prior to commencing construction for review by the City Engineer. The test results shall include all detailed raw calculations for the composition of the mix design and shall include all specific gravity calculations. The calculations must be legible but not necessarily typed.

S-1.7 Verification of the Plant Produced Mix Design by the Contractor's Laboratory

All test properties of the mix shall be verified by sampling and testing the uncompacted mix placed behind the paver. The test shall be performed in accordance with paragraph "Superpave Asphaltic Concrete Mix Design Method" and shall indicate the test properties of the mix shown in paragraph "Superpave Design and Testing Properties". Also, an extraction and gradation test shall be made using the ignition oven. The contractor's laboratory shall adjust the mix design entering the plant to obtain the test properties behind the paver.

S-1.7.1 The properties of the plant produced mix shall be determined using uncompacted mix sampled behind the paver. The properties shall be determined at N_{design} from the average of two 6 inch nominal size samples gyrated to N_{max} .

S-1.7.2 Material for the sample shall be from the following locations

One from each side of the placed bituminous mat and one from the center of the mat. A square, pointed shovel shall be used for taking the sample and for evenly laying material back into the disturbed mat. Care shall be taken not to get foreign material or tack oil into the sample.

S-1.7.3 A test shall be taken at least daily, or as directed by the engineer when the plant has produced a **minimum** of 200 tons.

S-1.7.3.1 The test shall also consist of one gradation test ASTM C-136-96a of hot bin material for conventional plants, or total aggregate material from the final feed belt for dryer-drum plants.

S-1.7.3.2

NOTE: The result of the gradation test is very important in determining how to adjust the mix. After the gradation or the bitumen content has been adjusted to obtain the properties of the mix, this verified mix design becomes the Job Mix Formula (JMF). The plant settings may have to be adjusted again whenever the gradation of the materials change. When a change is made it shall be reported on the Superpave Asphaltic Concrete Test Report form.

S-1.7.3.3 Gradation and asphalt content of the mix shall be performed using ASTM D-6307-05 Standard Test Methods for Asphalt Content of Hot Mix Asphalt by the Ignition Method and ASTM D 5444-05. The initial temperature setting of the Ignition Oven shall not exceed 525° C (975° F). If RAP or FRAP is used, an additional gradation and asphalt content test shall be performed for the combined RAP or FRAP sampled from the RAP cold feed into the plant.

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S-1.7.3.4 Laboratory test results shall be shown on the test report form "Asphaltic Concrete Test" shown at the end of this specification section. Test results shall be received by the contractor and the City Engineer field representatives within approximately 7 hours after the samples are taken. The laboratory shall determine the Percent Voids, VMA and VEA as soon as possible and evaluate in accordance with paragraph below: **"Corrective action to be taken when Asphaltic Concrete Test indicates the mix is out of specification." Whenever the Percent Voids or VEA is out of specification the laboratory shall contact the Contractor and the City Engineer immediately.** The Contractors testing laboratory shall send the test results directly to the Contractor and the City immediately upon completion of the test. Signed checked copies may be sent later. The Contractors laboratory shall furnish the City's laboratory other items such as the JMF mix gradation, plant setting, the bulk specific gravity of the aggregate G_{sb} and the specific gravity of the asphalt G_b . Laboratories shall compare final test results when the mix is out of specification. The test results shall indicate whether the plant needs adjusting and recommendations shall be provided on correcting the problem.

S-1.7.3.5 The most recent Asphalt Concrete Test that indicates the mixture meets the specifications is the current mix design.

S-1.7.4 Corrective action to be taken when Asphaltic Concrete Test indicates the mix is out of specification.

S-1.7.4.1 Asphaltic Concrete Surface and Asphaltic Concrete Intermediate or Leveling Course
The mix should be adjusted when consecutive tests show the percent voids in the compacted mix are getting close to being the minimum or the maximum field values.

Paving shall stop and the mixture shall be redesigned whenever any of the following occurs: three consecutive sets of tests show the percent voids in the compacted mix are less than the minimum field value or more than the maximum field value; or two consecutive sets of tests show the percent voids in the compacted mix are less than 0.5 percent below the minimum field value or 0.5 percent greater than the maximum field value.

S-1.7.4.2 Also paving shall stop and the mix shall be redesigned whenever three consecutive sets of tests show the VMA of the specified mix is more than 1.0% greater or 1.5% less than the specified VMA, or the VEA is greater than 11.0% or less than 9.0%.

S-1.7.4.3 Asphaltic Concrete mixtures with a test indicating the VEA is 12.0 or more shall be removed unless directed otherwise by the City Engineer.

S-1.7.5 Pre-Construction test strips

Test strips shall be constructed by the Contractor off city property at the contractor's expense. However, the city shall observe the sampling and testing. The contractor may negotiate the construction of a test strip on the project with the engineer. In that event, asphalt not meeting specification shall be removed at contractor's expense. Asphalt meeting specifications will be paid for at unit prices.

S-1.7.5.1 The Contractor's laboratory shall test the final belt gradation if the plant is a dryer-drum plant or the hot bin material if the plant is a conventional plant, and adjust the feeds to insure the plant is producing the gradation of the mix design, before hot mix production begins for the tested strip.

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S-1.7.5.2 Test strips shall contain at least 85 tons of asphaltic concrete. A test sample shall be taken behind the paver at 80 tons. The paver shall be set 12 feet wide and at plan depth when the sample is taken. Care shall be taken not to get foreign material or tack oil into the sample.

S-1.7.5.3 If the laboratory test results indicate the mix can be adjusted to meet the properties stated in paragraph "Superpave Design and Testing Properties", project paving may begin. However, this has to be agreed upon by the Contractor's laboratory, the Contractor, and the City Engineer. Otherwise, another test strip shall be constructed. Test strips will not be required on other projects which use this mix design. However, all materials have to be from the same sources and geological units. Also, the mix has to be produced by the same plant.

S-1.8 Verification testing of the plant produced asphaltic concrete by the city. The City Engineer will take verification tests at random times, at the City's expense.

S-1.9 Mixing Plants

Mixing plants shall meet the requirements of KDOT's latest specification in effect when this project's bids are received by the City, except the mixture discharged from the plant shall not exceed 157.2°C (315°F).

S-1.10 Asphalt mixtures having temperatures less than 113°C (235°F), when dumped into the mechanical spreader will be rejected.

S-1.10.1 All bituminous mixtures shall be delivered to the paver at a temperature sufficient to allow the material to be placed and compacted to the specified density and surface tolerance.

S-1.10.2 All delivery trucks shall be totally covered with a water proof tarpaulin at the asphalt plant and shall not be uncovered until they are next in line to unload.

S-1.11 Placing

Asphaltic concrete intermediate and surface courses shall not be placed in compacted lifts greater than 3 inches deep except when otherwise indicated on maintenance project plans. Asphaltic concrete surface course shall not be placed thinner than 2 inches deep. Asphaltic concrete intermediate course used as surface shall not be placed thinner than 2 inches. Interim layers of intermediate course shall not be left uncovered by the subsequent course for more than 5 days, weather permitting. Material trucks hauling materials other than asphaltic concrete or tack coat shall not travel on previously constructed layers of asphaltic intermediate course until the final course of the intermediate is constructed.

S-1.11.1 The Contractor shall schedule and route his hauling operation to minimize hauling over a final course as much as feasible.

S-1.11.2 Bituminous-Materials Spreaders

Bituminous-materials spreaders shall be the self-propelled type equipped with hoppers, tamping, or vibrating devices, distributing screws (augers), adjustable screeds operated either manually or automatically, equipment for heating the screeds and equalizing devices. The spreader shall be capable of spreading hot bituminous mixtures without leaving indented areas, tearing, shoving, or gouging and capable of confining edge of strips to true lines without use of stationary side forms and capable of placing the course to the required thickness. It shall also be capable of producing a finished surface conforming to the smoothness requirements specified. Spreaders shall be designed to operate forward at variable speeds and in reverse at traveling speeds of not less than 100 feet per minute. If an automatic grade control device is

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used on the spreader for two-lane paving operations, it shall consist of sensing device for control of one end of the screed and a slope-control mechanism for control of the other end of the screed, or a sensing device on each side of the paving machine. Where the paver is used on multiple paving lanes (more than two paving lanes), sensing devices shall be used on each side of the spreader for control of the screed. The slope-control mechanism shall not be used for grade control in multiple paving lane operations.

S-1.11.2.1 When the contractor chooses to pave lanes through the project wider than 12 ft. the spreader (paver) shall be equipped with auger extensions.

S-1.11.2.2 Through lanes shall be paved before left turn lanes and side street intersections. Through lane pavers shall not stop for other areas to be paved.

S-1.11.3 Special Procedures to Prevent Segregation

The wings of the spreader hopper shall not be emptied (flipped) between truck loads. The depth of the material in the screed auger chamber shall be kept approximately three-fourths (3/4) full - all the way out to the end gate. The augers should be running automatically and the vibrating screed turned on. The hopper conveyor shall always have approximately 6 inches of material covering it and not be allowed to run out of material. Whenever the paver is run empty (conveyor exposed) the area behind the paver should be checked for a segregated spot. If a spot exists the paver should be stopped and the segregated spot repaired before it is rolled.

S-1.11.4 Joints General

Joints between old and new pavements or between successive day's work shall be cut back vertical with a saw. Other joints shall be sawed vertical as directed by the City Engineer. All joints shall be tacked and shall be made carefully to insure continuous bond between old and new sections of the course. All joints shall have the same texture, density, and smoothness as other sections of the course. The tack shall be overlapped onto the previous pavement 1 inch to 2 inches. Contact surfaces of previously constructed pavements, curbs, gutters, manholes, etc., shall be tacked. Surfaces that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with an approved power saw, as directed. The surface against which new material is to be placed shall be sprayed with a thin, uniform coat of bituminous material conforming to the requirements of paragraph TACK COAT stated hereinafter. The material shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

S-1.11.4.1 Edges of previously placed pavement that have cooled and are irregular, honeycombed, poorly compacted, damaged, or otherwise defective unsatisfactory sections shall be cut back to expose a clean, sound surface for the full thickness of the course as directed by the City Engineer.

S-1.11.4.2 Transverse Joints

The roller shall pass over the unprotected end of freshly placed mixture only when placing of the course is discontinued or when delivery of mixture is interrupted to the extent that unrolled material may become cold. In all cases, the edge of the previously placed course shall be cut back to expose an even, vertical surface the full thickness of the course. In continuing placement of the strip, the mechanical spreader shall be positioned on the transverse joint so that sufficient hot mixture will be spread to obtain a joint after rolling which conforms to the required density and smoothness specified herein.

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A string line shall be used to set pavement elevations twenty-five feet after a beginning at a transverse joint or twenty-five feet before an ending at a transverse joint.

S-1.11.4.3 Offsetting Joints in Intermediate and Surface Courses

The surface course shall be placed so that longitudinal joints of the surface course will not coincide with joints in the intermediate course by approximately 9 inches. Care shall be taken when possible to offset longitudinal joints in a manner that the final surface course joint is in the center of the pavement or at the location shown on the plans. Transverse joints in the surface course shall be offset by at least two feet from transverse joints in the intermediate course.

S-1.11.4.4 Special Requirements for Placing Paving Lanes Succeeding Initial Lanes

In placing each succeeding lane after the initial lane has been placed and compacted as specified hereafter, the screed endgate of the mechanical paver shall overlap the previously placed lane slightly and shall be approximately 1.25 times thicker than the existing compacted lane to allow for compaction roll down and produce a smooth compacted joint with the specified density. Mixture placed on the edge of the previously placed lane by the mechanical paver shall be pushed back (tucked) to the edge of the lane being placed by use of a lute (rake). The pushed back material shall form a ridge on the uncompacted lane along the edge of the previously placed lane. The height of the ridge above the uncompacted lane should be approximately equal to the thickness being allowed for roll down during compaction. These procedures shall be used to facilitate getting a smooth joint with density. Excess mixture shall be removed and wasted. Excess material shall not be spread over the uncompacted mat.

S-1.11.5 Steel-Drum Rollers

Steel-drum rollers shall be self-propelled, tandem (two-axle) with both drums the same size, powered by both drums, vibratory types, weighing not less than 20,000 pounds static weight and not less than 150 lb/in of drum. Drums shall be equipped with adjustable scrapers, water tanks, and sprinkling apparatus for keeping the drums wet, thereby preventing the bituminous mixture from sticking to the wheels. Rollers shall be capable of reversing without backlash and free from worn parts. Roller drums with flat and pitted areas or projections that leave marks in the pavement will not be permitted.

S-1.11.6 Heavy Pneumatic-Tired Rollers

Heavy pneumatic-tired rollers shall be self-propelled and shall consist of two axles on which are mounted an odd number of pneumatic-tired wheels. The roller shall have at least nine pneumatic-tired wheels in such manner that the rear group of wheels will not follow in the tracks of the forward group, but spaced to give essentially uniform coverage with each pass. Axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. Tires shall be smooth, inflated to 90 p.s.i.. Construction of the roller shall be such that each wheel can be loaded to a minimum of 2,300 pounds.

S-1.11.7 Blowers and Brooms

Blowers and brooms shall be power type and suitable for cleaning the surface to be paved. Open faced brooms may only be used when approved by the City Engineer.

S-1.12 Compaction of Mixture

The contractor is responsible for the development of a compaction procedure that will obtain the required density. The following paragraphs describe a procedure that generally obtains density. **The contractor shall determine the exact amount of rolling (coverages needed) to obtain a density meeting paragraph: "Density and Density Test". The ideal density is an average density between 92% and 94%.**

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S-1.12.1 General

The surface of the placed material shall be corrected if necessary before compaction begins. Compaction of the mixture shall be accomplished using a minimum of two steel-drum rollers and a pneumatic-tired roller as specified above. Breakdown rolling shall be as close behind the paver as possible. The break down roller shall be a steel-drum and operated in the vibratory mode on the first forward pass and may be operated in vibratory mode on subsequent passes either forward or back. Delays in rolling freshly spread mixture will not be permitted. The pneumatic-tired roller shall be used as an intermediate roller; however, it shall also roll closely behind the break down roller. The pneumatic-tired roller shall always be kept moving in order to keep its tires warm. The second steel-drum roller shall be used as a final finish roller. Rollers shall not travel faster than 3 mph. Steel-drum rollers shall not be used in the vibratory mode except for initial breakdown rolling. When steel-drum rollers are used in the vibratory mode they shall be operated at maximum frequency and minimum amplitude. Rolling shall be continued until density is obtained in all portions of each course.

The speed of rollers shall be slow enough at all times to avoid displacement of the hot mixture. Displacement of the mixture resulting from reversing the direction of the roller or from any other cause shall be corrected at once by raking or removing and replacing fresh mixture when necessary. Alternate passes of the roller shall be varied slightly in length. During rolling, the wheels of steel-drum rollers and plates of vibro plate compactors shall be moistened to prevent adhesion of the mixture to the drums or plates, but excess water will not be permitted. Tires of heavy pneumatic roller shall be moistened with soapy water when required to prevent mixture from sticking to tires during rolling. Rollers shall not be permitted to stand on finished courses until the courses have thoroughly cooled. The contractor shall supply ample rollers to obtain the specified density. Places inaccessible to rollers shall be thoroughly compacted with hot hand-tampers or vibro plate compactors.

S-1.12.2 Break Down Rolling

Rollers shall be operated as specified above. The unconfined edge or low side edge of the paving lane shall be broken down first. The other edge shall be broken down second and the middle broken down last. **This is considered one coverage.** Steel-drum break down rollers shall not hang over the free edge of the mat or stay back from it even though they are going to back up for the adjoining lane. The entire lane shall be broken down at the same temperature.

S-1.12.2.1 Intermediate Rolling

The rubber tired roller shall be close behind the break down roller after the mat has cooled a few degrees. The rubber tired roller shall roll the same pattern making the same coverage as the breakdown. The rubber tired roller should stay the thickness of the lift from the free edge.

The number of coverages shall be determined by the contractor. This will change with temperature, humidity and thickness of the lift.

S-1.12.2.2 Longitudinal Joint Break Down Rolling of Paving Lanes Succeeding Initial Lanes

The break down roller in the vibratory mode shall lap over the tucked joint approximately six inches (6") on to the previously placed compacted lane.

As part of the break-down rolling and immediately after the break-down roller completes its first passes, the longitudinal joint shall be pinched to ensure compaction with the pneumatic-tired roller. The rubber tired roller shall make at least one complete pass (forward and backward) operated on the hot lane with the outside tire pinching the joint.

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After the rubber tired roller rolls the joint, it shall make at least one pass over the rest of the mat and then drop back to its intermediate rolling. The steel drum roller in static mode shall immediately smooth out the rubber tired marks.

S-1.12.2.3 Finish Rolling

Finish rolling should start when the mat has cooled down 20°F to 40°F below the intermediate rolling (This could be approximately 225°F). The steel wheeled roller in static mode shall immediately smooth out the rubber tired marks using the same pattern making the same type coverages as the breakdown roller. Do not roll until cracks appear, let it cool. Finish rolling can continue until the temperature reaches 175°F to 150°F.

The finish rolling shall continue until the pavement is smooth and has the density specified above.

S-1.13 Sampling Pavements for Density

Samples of finished pavement shall be obtained by the contractor or the contractor's laboratory. A minimum of one test (three cores) shall be taken for each tonnage lot represented by a Superpave Asphaltic Concrete test. Lots larger than 1200 tons shall have one set of (three cores) for each 1000 tons placed or as directed by the Engineer. The cores samples shall be taken at locations throughout the tonnage lot. The locations shall not be previously marked. The core locations shall be marked by the City Engineer after each tonnage lot placement is completed. Cores shall be at least 4 inches in diameter. Sample holes shall be backfilled by the contractor using Quikrete, Rapid Road Repair manufactured by The Quikrete Companies, Atlanta Georgia, 30329, Crystex manufactured by L&M Construction Chemicals Inc., Omaha Nebraska, 68152 or approved equal. The top of the patch shall be sprayed black with paint. The samples shall be tested by the contractor's laboratory to determine conformance to density and thickness. The City Engineer may require the contractor to take more samples at the contractor's expense if the density is marginal.

S-1.14 Density and Density Test

Density of the compacted mixture of the surface or intermediate course shall be determined by tests made on specimens taken from the compacted course in accordance with the requirements of the previous paragraph: SAMPLING PAVEMENTS FOR DENSITY. The density shall be the average of the three cores 92% to 96% of max theoretical specific gravity of the Superpave Asphaltic Concrete test for the lot. No core shall be less than 90%.

S-1.15 Weather Limitations

Weather limitations in Section 611.3(b) of the Standard Specifications shall apply except that the following table shall be used.

Asphalt Placement Temperature Limitations			
Paving Course	Compacted Thickness (inches)	Air Temperature (°F)	Road Surface Temp. (°F)
Surface	All	55	60
Subsurface	< 1.5	50	55
Subsurface	≥ 1.5 and < 3	40	45
Subsurface	≥ 3	30	35

S-1.16 Road Surface Preparation

When the bituminous mixture is placed on an existing bituminous surface, the surface shall be cleaned of all foreign material and broomed as necessary to remove dust. Areas shown on the

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plans or designated by the City Engineer to be patched shall be excavated to a depth directed by the City Engineer, filled with bituminous mixture and compacted. When the contract does not provide for a patching item, an amount two and one-half times the unit price for the bituminous mixture shall be used. The excavation required will not be paid for directly but will be considered subsidiary. In addition to brooming, a high pressure type water truck, capable of washing all fines, dirt, and debris from the surface, may be required prior to overlaying as directed by the City Engineer. Equipment compliance with this specification shall be visual observation by the City Engineer at the commencement of washing operations. Unless specified, no direct payment shall be made for this item, as it shall be considered subsidiary to other bid items.

S-1.17 Tack Coat

Emulsified Asphalt CSS-1h meeting the requirements of Section 1202 of the Standard Specifications shall be used for tack coat. All existing and new asphaltic concrete surfaces shall receive a tack coat not more than six hours prior to placing an asphaltic concrete paving course. Surfaces previously tack coated and not covered with new asphaltic concrete for more than six hours shall be retacked. The rate of application shall be 0.05 gal./sy to 0.12 gal./sy, or as otherwise directed by the City Engineer. At locations where asphalt is being placed on top of existing concrete pavement, or for night work where temperatures warrant, the emulsified asphalt shall be diluted 10 percent with water versus the normal 50 percent dilution with water. Tack coat shall not be paid for directly but shall be considered subsidiary to other bid items.

S-1.18 Surface Smoothness

The surface course, upon completion of final rolling, shall be smooth and true to grade and cross-section. When a 12-foot straightedge is laid on the surface parallel with the centerline, the surface shall not vary more than 1/8 inch from the straightedge. When the 12-foot straightedge is laid on the surface transverse to the centerline between the crown and edge of pavement, the surface shall not vary more than 1/4 inch from the straightedge. Low or defective areas shall be immediately corrected by cutting out the faulty areas and replacing with fresh hot mixture and compacting the area to conform to the remainder of the pavement. Testing for plan grade conformance and surface smoothness shall be performed by the Contractor in the presence of a representative of the City Engineer. Tests shall be made at intervals as directed by the City Engineer. The City Engineer may direct the contractor to diamond grind areas that are out of tolerance in lieu of above replacement.

S-1.19 Measurement

Measurement shall be in accordance with Section 109.01 of the Standard Specifications and as modified herein after. The asphalt mixture shall be weighed on approved, certified scales at the contractor's expense. Scales shall be inspected and sealed at least annually by an approved calibration laboratory. The City Engineer will verify the weights at random times, at the City's expense.

S-1.20 Payment

Payment will be made at the contract unit price bid per ton for "Asphaltic Concrete Intermediate Course" and "Asphaltic Concrete Surface Course". This shall be considered payment for all items of work specified in this section. No separate payment will be made for tack coat and asphalt cement.

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SUPERPAVE ASPHALTIC CONCRETE TEST (Verified Mix Design)					
Description: _____					
LAB I.D.:			TIME		TONS
Sample Date:			Belt _____		
Sample I.D.:			Hot Mix		
Supplier:	_____				
GRAIN SIZE DATA – ASTM D5444, C136, C117					
Sieve Size	Belt Sample	RAP/FRAP Sample*	Hot-Mix Sample*	Master Grade Limits	Cal. Single Point
19mm (3/4")					
12.5mm (1/2")					
9.5mm (3/8")					
4.75mm (No. 4)					
2.36mm (No. 8)					
1.18mm (No. 16)					
600µm (No 30)					
300µm (No 50)					
15 µm (No 100)					
75µm (No 200)					
EXTRACTION DATA-ASTM D6307					
%AC, total mix basis	Sample	RAP/FRAP	Plant Setting	*from uncompacted mat	

Aggregate Type	%**	Aggregate Type	%**		
_____	_____	_____	_____		
_____	_____	_____	_____		
_____	_____	_____	_____		
**total aggregate basis					
VOLUMETRIC DATA 6" NOMINAL SIZE Gyratory Specimens					
Gyrations (average of 2 specimens) @ 280-290 deg F – AASHTO T312 - 01					
Nmax =	Ndes = 60	Nini = 6			
90					
	Sample*	Specifications			
Mix bulk specific gravity @ Ndes, Gmb		--			
%Voids @ Ndes		3.0-5.0/2.8-4.5/2.6-4.1	AASHTO T T-169 0%/5-25%/26-40% RAP		
%VMA @ Ndes, Gsb basis		12.5-15	14%+1%-1.5%		
%VEA @ Ndes		9.0-11	=%VMA-%Voids		
%Gmm @ Nmax		98 maximum	AASHTO T 166-00		
%Gmm @ Nini		85-91	AASHTO T 166-00		
Ratio (-) 75µm (No. 200) to % Eff Binder		0.6-1.6/0.5-1.5	0-25%/26-40% RAP		

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Tensile Strength Ratio, %		80 minimum	AASHTO T 283-03
Max Theoretical Specific Gravity Gmm		--	AASHTO T 209-99(04)
Max Theo. Density, pcf		--	
Effective specific gravity Agg. Gse		--	
Bulk Specific Gravity of Total Agg., Gsb		--	ASTM C128, C127
Specific Gravity of Asphalt, Gb		--	
Shale or shale-like (virgin aggregates only)		1.0% maximum	KT-8
COMMENTS:			

S-2 AGGREGATE BASE COURSE (OP SPECIAL)

Rev. Date: 4/19/07

S-2.1 General

This work shall consist of furnishing and placing aggregate base course in accordance with the following specifications and as shown on the plans.

S-2.2 Compaction

Compaction requirements shall be based on the results of a test section constructed by the Contractor, using the materials, methods, and equipment proposed for use in the work. The test section shall meet the requirements of paragraph "Test Section" and shall be observed by the City Engineer.

S-2.2.1 Compaction Equipment

A dual or single smooth drum roller with vibratory capability and static weight not less than 26.8 kg/cm (150 lbs/in) width of drum.

Sampling and Testing

S-2.3.1 Samples

Samples for material gradation, liquid limit, and plastic limit tests shall be taken in conformance with ASTM D 75.

S-2.3.2 Initial Test

One of each of the following tests shall be performed on the proposed material, prior to commencing construction for each source (geological unit) of material: Sieve analysis, wear test, soundness, absorption, specific gravity, liquid limit and plasticity index, and moisture-density relationships. Certified test results shall be submitted to the City Engineer prior to commencing construction.

S-2.3.3 Sieve Analyses

Sieve analyses shall be made in conformance with ASTM C 117 and C 136. Sieves shall conform to ASTM E 11.

S-2.3.4 Liquid Limit and Plasticity Index

Liquid Limit and plasticity index shall be determined in accordance with ASTM D 4318.

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S-2.3.5 Testing Frequency

Testing frequency for sieve analysis, liquid limit and plasticity index -- Results shall verify that the material complies with the specifications. After the initial test, a minimum of one analysis shall be performed for each 1,000 megagrams (835 tons) of material placed, with a minimum of one analysis for each day's placement until the base course is completed. When the source of materials is changed or deficiencies are found, the initial analysis shall be repeated and the material already placed shall be re-tested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced.

S-2.3.6 Density

Density will be determined by roller pattern. The City Engineer may perform check density test as specified herein at random times.

S-2.3.7 Soundness, Wear, Absorption, and Specific Gravity Test shall conform to the requirements of Section 1104 of the standard specifications. The above test shall be performed in accordance with test methods stated in Section 1115 of the standard specifications.

S-2.4 Approval of Material

S-2.4.1 Aggregates

Aggregates shall consist of clean, sound, durable particles of crushed limestone stone. The Contractor shall obtain materials that meet the specification and can be used to meet the grade and smoothness requirements specified herein, after all compaction operations have been completed. The aggregates shall be free of silt and clay as defined by ASTM D 2487, vegetable matter, and other objectionable materials or coatings. The portion retained on the 4.75 mm (No. 4) sieve shall be known as coarse aggregate; that portion passing the 4.75 mm (No. 4) sieve shall be known as fine aggregate.

S-2.4.2 Coarse Aggregates

Coarse aggregates shall be angular particles of uniform density. The percentage of flat and/or elongated particles shall not exceed 20 in the fraction retained on the 12.5 mm (1/2 inch) sieve and in the fraction passing the 12.5 mm (1/2 inch) sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the requirements set forth herein.

S-2.4.3 Fine Aggregate

Fine aggregate shall be natural sand or angular particles produced by crushing stone or gravel that meets the requirements for wear and soundness specified for coarse aggregate.

S-2.4.4 Gradation Requirements

Gradation requirements specified herein shall apply to the completed compacted base course. The aggregates shall have a maximum size of 50 mm (2 inch) and be graded continuously well within the limits specified in Table I. Sieves shall conform to ASTM E 11.

EXHIBIT C

TABLE I. GRADATION OF AGGREGATES
Percentage by Weight Passing Square-Mesh Sieve:

Sieve Designation	Percent Passing
50 mm (2 inches)	100
37.5 mm (1 ½ inches)	70-100
25 mm (1 inch)	45-80
12.5 mm (1/2 inch)	30-60
4.75 mm (No. 4)	10-35
2.36 mm (No. 8)	5-25
425 µm (No. 40)	4-18
75 µm (No. 200)	0-10

Liquid limit and plasticity index requirements stated herein shall apply to any aggregate component that is blended to meet the required gradation and also to the aggregate in the completed base course. The portion of the aggregate passing the 425 µm (No. 40) sieve shall be either non-plastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

S-2.4.5 Stockpiling Material

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. Aggregates shall be stockpiled on the cleared and leveled areas designated by the City Engineer so as to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

S-2.5 Preparation Of Surface

Immediately prior to placing aggregate base course, the previously constructed underlying surface course shall be cleaned of all foreign substances; if the surface of the underlying material has been damaged after placement or has inadequate compaction or other deviations from this contract specification requirements, such defects shall be repaired immediately prior to placement of this course.

S-2.6 Grade Control

During construction, the lines and grades including crown and cross slope indicated for the base course shall be maintained by means of line and grade stakes placed by the Contractor.

S-2.7 Weather Limitation

Base courses shall be placed when the atmospheric temperature is above 2 degrees C (36° F). Areas of completed base course that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirement.

S-2.8 Mixing of Materials

The coarse and fine aggregates shall be mixed in a stationary plant. **Water shall also be added to the aggregate prior to placement at a stationary mixing plant. The amount of water added shall be considerably above optimum moisture.** The Contractor shall make such adjustments in mixing procedures or in equipment as may be directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification.

EXHIBIT C

S-2.9 Placing

The mixed material shall be placed on the prepared sub-grade or sub-base in layers of uniform thickness with an approved spreader box when possible as directed by City Engineer. Tracked equipment operated on base course material shall have street tracks. When a compacted layer 150 mm (6 inches) or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 150 mm (6 inches) is required, the material shall be placed in layers of equal thickness. No layer shall exceed 150 mm (6 inches) or be less than 75 mm (3 inches) when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, content, and to insure an acceptable base course. Mixed material shall not be placed on or above frozen material.

S-10 Test Section

S-2.10.1 General

A test section shall be constructed to evaluate placement and compaction procedures. Test section data will be used by the City Engineer to determine the required number of passes and the field dry density requirements for full scale production. The test section shall be located within the limits of the base course construction area at a location approved by the City Engineer. The underlying courses shall be completed, inspected and approved in the test section prior to constructing the base course. The test section shall be 12 feet wide and contain approximately 100 tons of completed base course. Whenever the quarry starts producing the base course material from a different geological unit, a new test section shall be constructed.

S-2.10.2 Mixing, Placement, and Compaction

Mixing, placement, and compaction shall be accomplished using equipment meeting the requirements stated hereinbefore. Compaction equipment speed shall be no greater than 2.4 km/hour (1.5 miles/hour).

S-2.10.2.1 Procedure

The test section shall be constructed with aggregate in a moist state so as to establish a correlation between number of roller passes and dry density achievable during field production. Density and moisture content tests shall be conducted at the surface and at intervals of 2 inches of depth down for the total layer thickness, in accordance with ASTM D 2922 and ASTM D 3017. Sieve analysis tests shall be conducted on composite samples, taken adjacent to the density test locations, which represent the total layer thickness. One set of tests (i.e. density, moisture, and sieve analysis) shall be taken before compaction and after each subsequent compaction pass at three separate locations as directed by the City Engineer. Compaction passes and density readings shall continue until the difference between the average dry densities of any two consecutive passes is less than or equal to 0.5 pcf.

S-2.10.3 Evaluation

Within 5 working days of completion of the test section, the Contractor shall submit to the City Engineer a Test Section Construction Report complete with all required test data and correlations. The City Engineer will evaluate the data and provide to the Contractor the required number of passes of the roller, the dry density for field density control during construction, the depth at which to check the density, and the need for a final static pass of the roller.

EXHIBIT C

S-2.11 Compaction

Compaction shall be accomplished using rollers meeting the requirements of paragraph "Compaction Equipment" and operating at a rolling speed of no greater than 1.5 miles per hour. Each lift of material, including shoulders, shall be compacted with the number of passes of the roller as specified by the City Engineer. In addition, a minimum field dry density, as specified by the City Engineer, shall be maintained. If the required field dry density is not obtained, the number of roller passes shall be adjusted. Excessive rolling resulting in crushing of aggregate particles shall be avoided. In all places not accessible to the rollers, the material shall be compacted with mechanical hand operated tampers.

S-2.12 Finishing

The surface of top layer of base course shall be finished after final compaction, by cutting any overbuild to grade and rolling with a steel-wheeled roller. In no case will thin layers of material be added to the top layer of base course to meet grade. If the elevation of top layer of base course is 12.5-mm (1/2 inch) or more below the grade, the top layer of base shall be scarified to a depth of at least 75-mm, new material shall be added, and the layer shall be blended and recompacted to bring to grade. Adjustments in rolling and finishing procedures shall be made as may be directed to obtain grades, to minimize segregation and degradation of base course material, to adjust the water content, and to insure an acceptable base course. Material found unacceptable shall be removed and replaced, as directed, with acceptable material. As stated here in before the gradation applies to the completed compacted base.

S-2.13 Edges of Base Course

Acceptable material shall be placed along the edges of the base course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 0.30-m (1 foot) width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the base course, as directed.

S-2.14 Smoothness Test

The surface of the top layer shall not deviate more than 12.5 mm (1/2 inch) when tested with a 3.05 m (10 feet) straightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding 12.5 mm (1/2 inch) shall be corrected as directed. Measurements taken at right angles to the centerline shall be taken at a minimum of 15.24 m (50 feet) intervals.

S-2.15 Thickness Control

The completed thickness of the base course shall be within 12.5 mm (1/2 inch) of the thickness indicated. The thickness of the base course shall be measured at intervals providing at least one measurement for at least each 418 square meters (500 sq. yd) of base course. The depth measurement shall be made by test holes at least 75 mm (3 inches) in diameter. Where the measured thickness of the base course is more than 12.5 mm (1/2 inch) deficient, such areas shall be corrected by excavating to the required depth and replacing with new material. Where the measured thickness of the base course is 12.5 mm (1/2 inch) more than indicated, it will be considered as conforming with the requirements plus 12.5 mm (1/2 inch), provided the surface of the base course is within 12.5 mm (1/2 inch) below established grade and not above the established grade. The average job thickness shall be the average of the job measurements as specified above but within 6.25 mm (1/4 inch) of the thickness indicated.

S-25.16 Maintenance

The base course shall be maintained in a condition that will meet all specification requirements until accepted.

EXHIBIT C

Within 15 days after completion of the aggregate base course it shall be covered with asphaltic concrete intermediate course. The aggregate base course shall not be used as a haul road except for curb construction.

S-2.17 Measurement and Payment

Payment for aggregate base course shall be at the contract unit price bid per square yard for "Aggregate Base Course (OP Special)" which includes all tools, materials, labor, equipment and incidentals necessary to complete the work specified above.

S-3 K.C.M.M.B. TEST NO. 1 - PROCEDURE FOR ANALYSIS OF NON-SPECIFIED AGGREGATE WITHIN FRESHLY MIXED CONCRETE

S-3.1 Part A

1. Obtain 25-30 lb. sample of freshly mixed concrete in accordance with ASTM C172.
2. Wash obtained sample of freshly mixed concrete over combination of 12" diameter $\frac{1}{2}$ - inch and $\frac{3}{8}$ - inch sieves in general accordance with ASTM C117.
3. Weigh wet aggregate.
4. Remove non-specified aggregate and other deleterious materials in general accordance with ASTM C142.
5. Weigh remaining specified aggregate.
6. Percentage of non-specified aggregate is:
 - 1 minus Specified aggregate weight
 - Total aggregate weight

If percentage of non-specified aggregate in concrete mixes delivered from centrally batched concrete plants exceeds 3% by weight of the coarse aggregate fraction, or if percentage of non-specified aggregate in all other concrete mixes exceeds 2% by weight, place specified and non-specified aggregate in separate sample bays and return to the laboratory and complete Part B of the test.

S-3.2 Part B

1. Place specified and non-specified aggregate in separate sample bays.
2. Dry both aggregates in general accordance with ASTM C566.
3. Determine dry weight of specified and non-specified aggregates.
4. Final percentage of non-specified aggregate is:
 - 1 minus Dry Weight of Specified Aggregate
 - Dry Weight of Total Aggregate

EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART

ITEM	CONSTRUCTION OR MATERIAL TYPE	TESTS REQUIRED	TEST METHOD	ACCEPTANCE SAMPLES AND TESTS
1. COMPACTION OF EARTHWORK				
		Field Density Tests	KT-13, KT-51	a 600 sy ² of prepared subgrade. Not less than 4 per day per equipment spread.
	Structure Backfill	Field Density Tests Moisture Tests	KT-13, KT-51 KT-11, KT-51, or g	a 1 per structure minimum (each side) 600 sy ² of prepared subgrade. Not less than 4 per day per equipment spread.
	Structure Backfill	Moisture Tests	KT-11, KT-51, or g	1 per structure minimum (each side)
2. SUBGRADE MODIFICATION				
	Aggregates	Plasticity Tests	KT-10	b,c 500 TONS or yd ³
		Sieve Analysis of Aggregate	KT-2	a 500 TONS or yd ³
		Material Passing the No.200 Sieve by the Wash Method	KT-3	a 500 TONS or yd ³
		Sticks in Aggregate	KT-35	e
		Clay Lumps in Aggregate	KT-7	e
		Shale or Shale-like Materials in Aggregate	KT-8	e
		Field Density Tests	KT-13 or KT-41	a,b 1 000 ft
		Moisture Tests	KT-11 or g	e
3. AGGREGATE BASE COURSE				
	Combined Aggregate	Sieve Analysis of Aggregate	KT-2	a 1 000 ft each lift or if total aggregate each 500 TONS
		Plasticity Tests	KT-10	a,c 1 000 ft each lift or if total aggregate each 500 TONS
	Completed Base	Moisture Tests	KT-11 or g	e
		Field Density Tests	KT-13 or KT-41	a 200 ft
		Moisture Tests	KT-11, KT-41 or g	e
ITEM	CONSTRUCTION OR MATERIAL TYPE	TESTS REQUIRED	TEST METHOD	ACCEPTANCE SAMPLES AND TESTS
3A. AGGREGATE BASE COURSE (OP SPECIAL)				
	Combined Aggregate	Sieve Analysis of Aggregate	ASTM C 117-04 ASTM C 136-06	a Preconstruction and when source of material changes
		Soundness, Wear, Absorption and Specific Gravity	Methods stated in the Standard Specifications, Subsection 1117 ASTM D 4318-05	
		Liquid Limit and Plasticity		

EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART

Completed Work	Index	ASTM C 117-04 ASTM C 136-06	h	835 TONS with a minimum of one for each days placement
	Sieve Analysis of Aggregate	ASTM D 4318-05		
	Liquid Limit and Plasticity Index	Test strip roller pattern	h	Verification of roller pattern
	Field Density Tests			
4. STABILIZED SHOULDERS (Aggregate, Non-Bituminous)				
Completed Shoulder	Sieve Analysis of Aggregate	KT-2	a	500 TONS
	Plasticity Tests	KT-10	a,c	500 TONS
	Moisture Tests	KT-11 or g	e	
	Field Density Tests	KT-13 or KT-41	b	200 ft or 150 TONS
	Moisture Tests	KT-11, KT-41 or g	b	200 ft or 150 TONS
5. GRANULAR SUBBASE				
Completed Work	Sieve Analysis of Aggregate	KT-2	a	1 000 ft, 500 TONS, or 500 yd ³
	Plasticity Tests	KT-10	a	1 000 ft, 500 TONS, or 500 yd ³
	Moisture Tests	KT-11 or g	e	
	Field Density Tests	KT-13 or KT-41	a	200 ft
	Moisture Tests	KT-11, KT-41 or g	a	200 ft
6. SURFACE OR RESURFACING AGGREGATE				
	Sieve Analysis of Aggregate	KT-2	a	500 TONS
	Material Passing the No. 200 Sieve by Wash Method	KT-3	a	500 TONS
	Sticks in Aggregate	KT-35	e	
	Soft or Friable Particles in Aggregate	KT-7	e	
	Moisture Tests	KT-11 or g	e	

EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART

ITEM	CONSTRUCTION OR MATERIAL TYPE	TESTS REQUIRED	TEST METHOD	ACCEPTANCE SAMPLES AND TESTS
7. PORTLAND CEMENT CONCRETE STRUCTURES AND MISCELLANEOUS CONSTRUCTION				
		Slump Unit Weight Air Content	KT-21 KT-20 KT-18, KT-19, or KT-20 ASTM C 1064-05	h As needed to control product, minimum 1 set of tests every 50 yd ³ . Select initial sample from first 2 or 3 loads and then on a random basis or as conditions indicate. Perform tests with every set of test cylinders.
		Temperature Cylinders	KT-22	
				<u>Bridge Decks</u> Minimum 1 set of seven 6"x12" cylinders and one 4"x8" cylinder per 100 yd ³ or major mix design change <u>Structures</u> Minimum 1 set of 7 per 100 yd ³ <u>Sidewalk and Flatwork</u> Minimum 1 set of 7 per 500 yd ² <u>Curb and Gutter</u> Minimum 1set of 7 per 500 lf
		Permeability of Concrete	ASTM C 1202-97	All cylinders shall be tested for compressive strength in accordance with ASTM C 39-05 at the following intervals: Two cylinders each at 7 days, 14 days, and 28 days. One cylinder shall be reserved for additional testing, if required.
		Density of Fresh Concrete	KT-36	<u>Bridge Decks</u> One 4"x8" cylinder shall be tested at 28 days using standard moist curing (2 tests per cylinder). 150 yd ³ for Bridge Decks, Thin Overlays, and Bridge Deck Surfacing
		KCMMB Test #1	As specified in "Procedure for Analysis of Non-Specified Aggregate within Freshly Mixed Concrete" on file with the City Engineer.	a,b a As needed to control product, beginning of every project and every 150 cubic yards.

**EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART**

ITEM	CONSTRUCTION OR MATERIAL TYPE	TESTS REQUIRED	TEST METHOD	ACCEPTANCE SAMPLES AND TESTS
8.	CONCRETE PAVEMENT			
		Slump Unit Weight Air Content	KT-21 KT-20 KT-18, KT-19, or KT-20 ASTM C 1064-05	h As needed to control product, minimum 1 set of tests per each half day and/or per 4 000 yd ² . Perform tests with every set of test beams.
		Temperature Beams	KT-22 & KT-23	a 1 set of 3 on initial pour. 1 set per week and/or major mix design change.
		Profilograph	KT-46 or KT-54	b Testing by Contractor, results reviewed by City of Overland Park See Std. Spec. Sec. 502.03(k).
		Thickness Cores Density of Fresh Concrete	KT-38	a,b Initially, 1 complete transverse profile, thereafter 5 tests per day.
		KCMMB Test #1	As specified in "Procedure for Analysis of Non-Specified Aggregate within Freshly Mixed Concrete" on file with the City Engineer.	a As needed to control product, beginning of every project and every 150 cubic yards.
9.	ASPHALTIC CONCRETE QUALITY ASSURANCE TESTING			
	Bituminous Mixtures	Test showing the information required on table "Superpave Asphaltic Concrete Test (Verified Mix Design)" Mix Cured 4 hours before testing. City Engineer shall receive test results in approximately 7 hours.	Note: Procedure is specified in "Overland Park Technical Specification for Overland Park Superpave Asphaltic Concrete, subparagraph Superpave Asphaltic Concrete Mix Design Method", available in the office of the City Engineer. AASHTO T283-03	a One for two of the contractor test or as directed by the City Engineer.
	Completed Road Work	Resistance to moisture damage <u>Field Density Tests</u> Cores	KT-15 Procedure 3 or AASHTO T166	a 1 per year and every 10,000 tons as directed by the City Engineer. a <u>Surface & Base Courses</u> 1 set of 3-4" cores per 1000 tons placed as directed by the City Engineer.

**EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART**

ITEM	CONSTRUCTION OR MATERIAL TYPE	TESTS REQUIRED	TEST METHOD	ACCEPTANCE SAMPLES AND TESTS
10.	SLURRY SEAL			
		Sieve Analysis of Aggregate	KT-2	a 250 TONS
11.	AGGREGATE FOR CONCRETE			
		Sieve Analysis of Aggregate	KT-2	a 250 TONS
		Material Passing the No. 200 Sieve by the Wash Method	KT-3	a 250 TONS
		Sticks in Aggregate	KT-35	e
		Clay Lumps in Aggregate	KT-7	e
		Shale or Shale-like Materials in Aggregate	KT-8	e
		Unit Weight (light weight aggregate only)	Section 1102(d)(3)	e
12.	PORTLAND CEMENT TREATED BASE			
		Sieve Analysis of Aggregate	KT-2	a 1 in A.M. and 1 in P.M. or each 500 TONS
		Plasticity Tests	KT-10	a,b 1 in A.M. and 1 in P.M. or each 500 TONS
		Moisture Tests	KT-11 or g	,c e Minimum of 1 per day
		Density Standard	KT-12	e Minimum of 1 per day
		Field Density Tests	KT-13 or KT-41	a 1 000 ft/width laid or 2 000 ft/lane
		Field Moisture Tests	KT-13 or KT-41	a 1 000 ft/width laid or 2 000 ft/lane
13.	UNDERDRAIN AGGREGATE			
		Sieve Analysis of Aggregate	KT-2	a 250 TONS
		Sticks in Aggregate	KT-35	e
		Clay Lumps in Aggregate	KT-7	e
14.	CRUSHED STONE FOR BACKFILL			
		Sieve Analysis of Aggregate	KT-2	a 500 TONS
		Clay Lumps in Aggregate	KT-7	e
15.	STONE FOR RIPRAP, WASH CHECKS & OTHER MISC. USES			
		Sieve Analysis of Aggregate	KT-2	a 500 TONS or yd ³ Note: Tests to be conducted at production site.

EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART

ITEM	CONSTRUCTION OR MATERIAL TYPE	TESTS REQUIRED	TEST METHOD	ACCEPTANCE SAMPLES AND TESTS
16.	FLY ASH	Moisture/Density and Compressive Strength Tests	D4609	e 4 series of Standard Proctors Moisture/Density relationships for each earth fill material. Two series incorporating 16% fly ash by dry weight, at delays of 0 and 2 hours. Two series incorporating 13% fly ash by dry weight at compaction delays of 0 to 2 hours. Find compressive strength for both series after 7 days at 100.4 degrees Fahrenheit. Min. 5 test specimens per series.
		Inplace Moisture	AASHTO 217	Perform in place moisture tests using the gas pressure ("Speedy") method, at a rate of 1 per 718 sq. yard as during initial subgrade preparation and thereafter as directed by the engineer.

EXHIBIT D
SAMPLING AND TESTING FREQUENCY CHART
CITY OF OVERLAND PARK

Code Instruction

- a Normal operation. Minimum frequency for exceptional conditions may be reduced by the Project Engineer on a project basis, written justification shall be made to the City Engineer and placed in the project documents
- b Applicable only when specifications contain those requirements.
- c If, for a given project, no Plastic Index results of ten (10) consecutive tests are closer than 1 Plastic Index to the specifications limit, the specified testing frequency may be reduced by fifty percent (50%). When operating at a reduced testing frequency, should any two (2) consecutive Plastic Index results exceed the test limit results required for reduced testing frequency, testing shall be resumed at the original specified frequency. The original specified testing frequency shall be resumed should any one test result exceed the specification limits. Following a return to the original specified testing frequency, the reduced frequency may be resumed providing the original criteria for reduced frequency are met.
- e Engineer's discretion. Frequency of tests shall be agreed upon by the Field Engineer and the Project Engineer. Frequency will be governed by field conditions. Written documentation of the agreed upon testing frequency shall be included in the project records.
- g For determining moisture content of a material, KT-43, Moisture Content of Asphalt Mixtures or Mineral Aggregates - Microwave Oven Method, can be used in conjunction with KT-2, KT-3, KT-4, KT-8, KT-9, KT-12, KT-13, KT-34, and KT-48.
- h Initial frequency. Frequency may be reduced on a project basis, by authority of the Project Engineer, upon continued satisfactory and uniform production. Authorization for reductions in testing frequency shall be documented in the project records.

GENERAL NOTES

Note 1: All sampling and testing frequencies listed are minimum. Additional or other tests will be conducted, as required, to control the work.

Note 2: Frequencies are based on two lane roadways. For four or more lane roadway construction, double the frequencies shown per unit length.

Note 3: All aggregate acceptance tests are to be conducted at the point of usage except for Item 15, Stone for Riprap, Wash Checks, and Other Miscellaneous Uses.

Note 4: For a better explanation of metric (SI) units, see section 5.9 of the KDOT Construction Manual SAMPLING AND TEST METHODS FORWARD.

Note 5: All test methods listed as "KT" are Kansas Test methods and may be found in the KDOT Construction Manual Part V.