



Cook, Flatt & Strobel Engineers
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September 12, 2024

David N. Olson
SWP XIII, LLC
P.O. Box 24302
Overland Park, KS 66283

Re: The Streets of West Pryor
Lot 13 Pavement Section
Lee's Summit, Missouri
CFS # 23-1128

Mr. Olson,

Cook, Flatt & Strobel (CFS) Engineers, P.A. has reviewed the pavement section for the reference project. The contractor used crushed concrete granular base in lieu of crushed limestone granular base. We have evaluated the crushed concrete base material and in our professional opinion the crushed concrete material submitted by the contractor as indicated in the attached KTI test report number 418162C.025 is an equivalent base aggregate product to MODOT type 5 for substitution as base aggregate for the Project's specified pavement section.

The Florida Department of Transportation recommends the same structural coefficient for crushed concrete base as for crushed limestone base. Pavement design evaluation was performed using the Tensor Plus flexible pavement design software. Below is a breakdown of the current Lee's Summit requirements compared with the proposed pavement sections.

Material	Lee's Summit Light Duty Pavement (in)	Lee's Summit Heavy Duty Pavement (in)	Proposed Pavement Light Duty (in)	Proposed Pavement Heavy Duty (in)
Surface Asphalt APWA Type III	1.5	1.5	1.5	1.5
Base Asphalt APWA Type I	4.0	5.0	4.0	5.0
MoDOT Type 5 Base Rock	6.0	6.0	NA	NA
Crushed Concrete Type 5	NA	NA	6.0	6.0
Geogrid	Yes	Yes	Yes	Yes
Sub-Grade Material	Compacted Soil	Compacted Soil	Soil Rock Fill	Soil Rock Fill
Structural Number	3.160	3.560	3.160	3.560




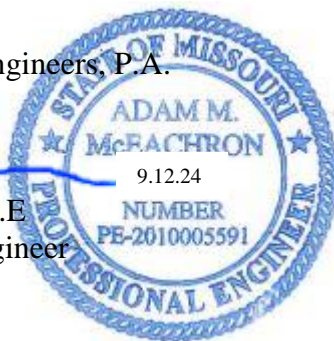
A CBR value of 3.3 was utilized for the pavement sub-grade. Based on the input data, the pavement sections are equivalent. This information has been reviewed and approved by the civil engineer of record for the project.

It should be noted that CFS tested the fill material for the site and observed and passed a proof-roll on the sub-grade prior to placement of the geo-grid and base rock. A proof-roll was performed and passed on the base rock prior to asphalt placement as well.

Please contact CFS with further questions. 913-627-4090

Respectfully,
Cook, Flatt & Strobel Engineers, P.A.


Adam M. McEachron, P.E.
Senior Geotechnical Engineer




Sam Malinowski, P.E.
Project Civil Engineer

Attachments: FDOT Flexible Pavement Design Coefficients
MDOT Section 1007 Aggregate Base
Laboratory Testing of Crushed Concrete Utilized

TABLE 5.4
STRUCTURAL COEFFICIENTS FOR DIFFERENT PAVEMENT LAYERS
(New Construction or Reconstruction)

<u>Layer Type</u>	<u>Layer Coeff. per inch</u>	<u>Spec. Sec.</u>
FC-5	0.00	337
FC-12.5, FC-9.5	0.44	337
Superpave Type SP (SP-9.5, SP-12.5, SP-19.0)	0.44	334
Limerock (LBR 100)	0.18	200
Cemented Coquina (LBR 100)	0.18	200
Shell Rock (LBR 100)	0.18	200
Bank Run Shell (LBR 100)	0.18	200
Graded Aggregate (LBR 100)	0.15	204
Recycled Concrete Aggregate (LBR 120)	0.15	204
Type B-12.5	0.30	234
Limerock Stab. (LBR 70)	0.12	230
Shell Stab. (LBR 70)	0.10	
Sand Clay (LBR 75)	0.12	
Soil Cement (500 psi)	0.20	
Soil Cement (300 psi)	0.15	
Type B Stab. (LBR 40)	0.08	
Type B Stab. (LBR 30)	0.06	
Type C Stab.	0.06	
Cement Treated (300 psi)	0.12	
Lime Treated	0.08	

SECTION 1007

AGGREGATE FOR BASE

1007.1 Scope. This specification covers aggregate to be used for base.

1007.2 Type 1 Aggregate.

1007.2.1 Type 1 aggregate for base shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing No. 40 sieve shall have a maximum plasticity index of six. Any sand, silt and clay and any deleterious rock and shale shall be uniformly distributed throughout the material.

1007.2.2 The aggregate shall be in accordance with the following gradation requirements:

Sieve	Percent by Weight
Passing 1-inch	100
Passing 1/2-inch	60-90
Passing No. 4	35-60
Passing No. 30	10-35

1007.3. Type 5 Aggregate.

1007.3.1 Type 5 aggregate for base shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing the No. 40 sieve shall have a plasticity index not to exceed six. Any sand, silt and clay, and any deleterious rock and shale shall be uniformly distributed throughout the material.

1007.3.2 Type 5 aggregate shall be in accordance with the following gradation requirements:

Sieve	Percent by Weight
Passing 1-inch	100
Passing 1/2-inch	60-90
Passing No. 4	35-60
Passing No. 30	10-35
Passing No. 200	0-15

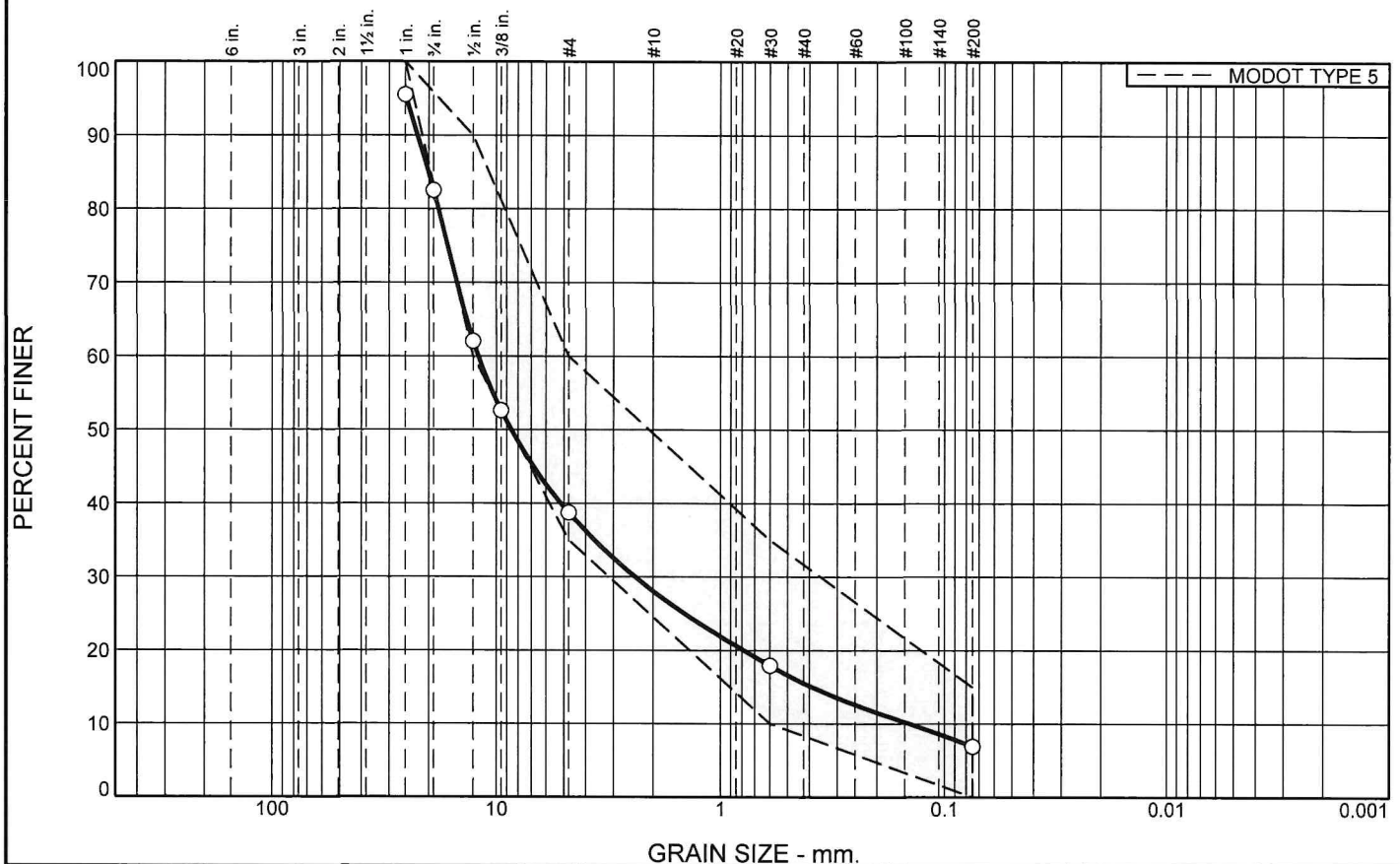
1007.4. Type 7 Aggregate.

1007.4.1 Type 7 aggregate for base shall consist of crushed stone, sand and gravel, or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing the No. 40 sieve shall have a plasticity index not to exceed six. Any sand, silt and clay, and any deleterious rock and shale shall be uniformly distributed throughout the material.

1007.4.2 Type 7 aggregate shall be in accordance with the following gradation requirements:

Sieve	Percent by Weight
Passing 1 1/2-inch	100
Passing 1-inch	70-100
Passing No. 8	15-50
Passing No. 200	0-12

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
		12.6	8.6	6.9	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	95.5	100	X
3/4"	82.6		
1/2"	62.0	60-90	
3/8"	52.6		
#4	38.7	35-60	
#30	17.9	10-35	
#200	6.9	0-15	

* MODOT TYPE 5

Source of Sample: .025 Bulk Sample

Soil Description
Client Drop 1" minus Recycled Concrete

Atterberg Limits
PL= 23 LL= 28 PI= 5

Coefficients
D₉₀= 22.4263 D₈₅= 20.0697 D₆₀= 12.0633
D₅₀= 8.5750 D₃₀= 2.4053 D₁₅= 0.3905
D₁₀= 0.1428 C_u= 84.49 C_c= 3.36

Classification
USCS= GP-GM AASHTO= A-1-a

Remarks
KTI Report No.418162C.025

Date: 3/19/24



Client: Metropolitan Concrete Recycle
Project: Metropolitan Concrete Recycle-Testing

Project No: 418162C

Figure

Tested By: DD

Checked By: Otto J. Kruger, Jr., PE