Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensic
Civil/Planning

ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

Job No. 171800

Approved
By: Elizabeth Nijkamp
Date:09/01/2020
El Paso County Planning & Community Development

August 31, 2020

Grace Covington
Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Re: Addendum to Pavement Design Report – SF- 195
The Gardens at North Carefree
El Paso County, Colorado

Dear Ms, Covington,

As requested, RMG – Rocky Mountain Group completed a Pavement Design Report for the referenced project entitled

Pavement Design Report
The Gardens at North Carefree SF-195
RMG Job No. 171800
Dated May 12, 2020

This report was approved by El Paso County on May 19, 2020. The approved pavement section is as follows:

Streets	HMA (in)	CTS (in)
Vineyard Circle, Fallow Lane, Running Deer Way	3.75	9.0

We understand the entirety of Vineyard Circle was developed with the approved pavement section. The purpose of this addendum to the Approved Report is to allow for an alternate pavement section for Fallow Lane and Running Deer Way. In lieu of installing the approved HMA/CTS section, the following HMA/ABC pavement section is proposed:

Streets	HMA (in)	ABC (in)	Prepared Subgrade (in)
Fallow Lane, Running Deer Way	3.75	9.0	12.0

Pavement Design

The following pavement design performed in accordance with El Paso County Engineer Criteria supports the proposed pavement section. Soil parameters from the referenced Pavement Report are utilized.

Street Classification – Urban Local Residential

1) Fallow Lane, Running Deer Way
   ESAL = 292,000 (Table D-2)
   Serviceability Index = 2.0 (Table D-1)
   Reliability = 80% (Table D-1)

2) Strength coefficients (Table D-3)
   Asphalt (HMA): $a_1 = 0.44$
   Aggregate Base Course (ABC): $a_2 = 0.11$

3) Subgrade
   M_r = CBR x 1500 = 5.1 x 1500 = 7,650 psi

4) Structural number (SN) = 2.60 (1993 AASHTO Empirical Equation, Appendix A)

5) Composite asphalt/cement treated subgrade section
   Minimum HMA thickness = D_1 = 3 inches (Table D-2)
   ABC thickness = $D_2 = \{SN - (D_1 \times a_1)\} / a_2 = \{2.60 - (3 \times 0.44)\} / 0.11 = 11.6$ inches

6) In accordance with El Paso County ECM, Section D.4, Paragraph F, *The base course thickness selected cannot exceed 2.5 times the HMA thickness selected.*
   Therefore, try Asphalt thickness = 3.75 inches
   ABC thickness = $D_2 = \{SN - (D_1 \times a_1)\} / a_2 = \{2.60 - (3.75 \times 0.44)\} / 0.11 = 8.6$ inches
   Use HMA = 3.75 inches and ABC = 9 inches

   Check SN = (3.75 x 0.44) + (9 x 0.11) = 2.64 > 2.60 (Min. SN required) => OK

Subgrade Preparation

A composite section of HMA over ABC may be placed atop a 12-inch layer of prepared subgrade. Pavement areas should have topsoil, organic material, and debris removed to bottom of subgrade elevation. The upper 6 inches of exposed soil should be scarified and moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to firm and unyielding condition. Subgrade should then be brought to grade by installing clean soil in 8-inch loose lifts and compacted to 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). The subgrade should then be proof-rolled with a heavy, pneumatic tired vehicle, and any areas that deform under wheel loads should be removed and replaced with clean material and recompacted. Subgrade construction should continue until 12-inches of prepared subgrade has been placed.

Aggregate Base Course

Aggregate base course material shall meet the criteria of the El Paso County Engineering Criteria Manual, Appendix D, Section D.5, Paragraph I. Aggregate Base Course gradation shall meet the criteria for CDOT base course, Class 5 or Class 6. Aggregate base course shall be supplied from an approved source.

All findings, conclusions and recommendations presented in the report referenced above and not specifically addressed in this letter remain valid for the currently proposed project.

Should you have questions, please do not hesitate to call.

Cordially,

RMG – Rocky Mountain Group

Geoff Webster, P.E.
Sr. Geotechnical Project Engineer

Compression Test Report

Report No: 171800-2020-08-21-17-7C

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/14/20

Job No: 171800.17C

Project: Gardens at N. Carefree
Akers Dr

Physical Properties of Concrete Cylinder

Concrete Supplier:	Transit Mix	Slump (in.):	3.00
Truck No.	78	Ambient Air Temp. (F):	75
Ticket No.	86671061	Mix Temp. (F):	75
Mix Design No.:	14582110	Air Content (%):	5.6
Sampled By:	Aubrey Russell	Unit Weight (pcf):	142.2
Batch Time:	8:05 am	Water added (gal):	0.00
Time of Test:	8:40 am	Specified Strength (psi):	4,500
Time in Truck:	35 min		

Compressive Strengths

Project Set No.: 17

Specimen No.	Cylinder Weight (lbs.)	Date Cast	Date Tested	Age (Days)	Diameter (in.)	Height (in.)	H/D Factor	Area (Sq. in.)	Fracture Type	Ultimate Load (lbs.)	Compressive Strength (psi)	Factored Compressive Strength (psi)	Average PSI
A	8.29	08/14/20	08/17/20	3	4.00	8.00	1.00	12.57	2	56,500	4,490	4,490	4,490
B	8.33	08/14/20	08/21/20	7	4.00	8.00	1.00	12.57	5	66,690	5,310	5,310	5,310

Specimen C, Cast on 08/14/20 has not been processed

Specimen D, Cast on 08/14/20 has not been processed

Specimen E, Cast on 08/14/20 has not been processed

Specimen F, Cast on 08/14/20 has not been processed

Test Location: C&G, West C&G at Fallow and Vinyard Cr intersection

Respectfully submitted,

Christopher Beasley
ACI Concrete Strength Testing Technician
RMG - Rocky Mountain Group

2910 Austin Bluffs Parkway, Suite 100, Colorado Springs, CO 80918 Phone: (719) 548-0600

Compression Test Report

Report No: 171800-2020-08-23-18-3C

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/20/20

Job No: 171800.18C

Project: Gardens at N. Carefree
Akers Dr

Physical Properties of Concrete Cylinder

Concrete Supplier:	Transit Mix	Slump (in.):	3.50
Truck No.	81	Ambient Air Temp. (F):	82
Ticket No.	86671361	Mix Temp. (F):	79
Mix Design No.:	14582110	Air Content (%):	5.4
Sampled By:	Aubrey Russell	Unit Weight (pcf):	141.1
Batch Time:	9:08 am	Water added (gal):	0.00
Time of Test:	9:42 am	Specified Strength (psi):	4,500
Time in Truck:	34 min		

Compressive Strengths

Project Set No.: 18

Specimen No.	Cylinder Weight (lbs.)	Date Cast	Date Tested	Age (Days)	Diameter (in.)	Height (in.)	H/D Factor	Area (Sq. in.)	Fracture Type	Ultimate Load (lbs.)	Compressive Strength (psi)	Factored Compressive Strength (psi)	Average PSI
A	8.37	08/20/20	08/23/20	3	4.00	8.00	1.00	12.57	5	61,230	4,870	4,870	4,870

Specimen B, Cast on 08/20/20 has not been processed

Specimen C, Cast on 08/20/20 has not been processed

Specimen D, Cast on 08/20/20 has not been processed

Specimen E, Cast on 08/20/20 has not been processed

Specimen F, Cast on 08/20/20 has not been processed

Test Location: C&G, W Intersection of Vineyard Cr & Running Deer Wy

Respectfully submitted,

Christopher Beasley
ACI Concrete Strength Testing Technician
RMG - Rocky Mountain Group

2910 Austin Bluffs Parkway, Suite 100, Colorado Springs, CO 80918 Phone: (719) 548-0600

FIELD ACTIVITY REPORT

Report No: 20200820-A-APR

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/20/20

Job No: 171800

Project: Gardens at N. Carefree

Site Visit Summary

Date: 08/20/20 Arrived: 9:15 am Temperature: 82°

Work Requested By: Barry/Covington

Weather: Sunny

Equipment working on reported Activity at time of visit:
Concrete Truck

Activity	Observed	In the Vicinity of	Test	Pass	Fail	ReTest	Informed	Contractor
Subgrade (SG)	Y	Vineyard Cr, Running Deer Way	1	1	0	0	Foreman	Liberty
Concrete Compressive Strength (CT)	Y	Vineyard Cr, Running Deer Way	0	0	0	0	Foreman	Liberty

Other Observations: During the requested site visit, RMG performed Compaction testing on Subgrade in the vicinity of Vineyard Cr, Running Deer Way. Compaction test results are attached. Technician also performed Concrete testing on concrete placed for curb and gitter in the vicinity of Vineyard Cr, Running Deer Way. Concrete test results are presented separatly. Contractor or notified.

Aubrey Russell
Field Representative

Reviewed By:
Cory Ramsey, P.E.

FIELD DENSITY REPORT

Report No: 20200820-A-APR

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/20/20

Job No: 171800

Project: Gardens at N. Carefree

Moisture-Density Test Information		Laboratory Test Data			Project Specifications		
Sample No.	Classification and Description	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)	Water Content Range (%)		Minimum Percent Compaction (%)
1	SM	ASTM D-1557	117.5	13.0	-2	2	95

Field Test Results

Test No	Location	Test Type	Test Depth (ft)	Elevation Datum (1)	Dry Density (pcf)	Water Content (%)	Moisture Density Sample No.	Percent Compaction (%)	Meets Project Specs? Compaction	Water Content	Test Pass
1	W intersection of Vineyard Cr & Running Deer, 105' N of SW	SG	0.0	C	112.1	11.0	1	95	Y	Y	Y

(1) Elevation Datum Key
C - Pavement/Slab Elevation

Aubrey Russell

Field Representative

COLORADO LICENSED
CORY E. RAMSEY
08/26/20
54783
PROFESSIONAL ENGINEER

Reviewed By: Cory Ramsey, P.E.

The tests were performed in general accordance with applicable ASTM and AASHTO test methods. Test results indicate the density at the specific depths and locations tested. We have relied on the contractor to apply the necessary compactive effort and moisture to achieve specified compaction during times when our observer is not present and at locations other than those tested. The test results may not be representative of all the fill placed.

FIELD ACTIVITY REPORT

Report No: 20200824-A-RCW

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/24/20

Job No: 171800

Project: Gardens at N. Carefree

Site Visit Summary

Date: 08/24/20 Arrived: 8:30 am Temperature: 80°

Work Requested By: Barry/Covington

Weather: Sunny

Equipment working on reported Activity at time of visit:
Concrete Truck

Activity	Observed	In the Vicinity of	Test	Pass	Fail	ReTest	Informed	Contractor
Subgrade (SG)	Y	Akers Dr	4	4	0	0	Gilbert	Trax
Concrete Compressive Strength (CT)	Y	Akers Dr	0	0	0	0	Gilbert	Trax

Other Observations: During the requested site visit, RMG performed Compaction testing on curb and gutter subgrade in the vicinity of Akers Dr. Compaction test results are attached. Technician also performed Concrete testing on concrete placed for curb and gutter in the vicinity of Akers Dr. Concrete test results are presented separately. Technician cast 1 set of 5 CT cylinders. Contractor was notified.

Cameron Wright
Field Representative

Reviewed By:
Cory Ramsey, P.E.

FIELD DENSITY REPORT

Report No: 20200824-A-RCW

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/24/20

Job No: 171800

Project: Gardens at N. Carefree

Moisture-Density Test Information

Sample No.	Classification and Description	Laboratory Test Data			Project Specifications		
		Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)	Water Content Range (%)		Minimum Percent Compaction (%)
1	SM	ASTM D-1557	117.5	13.0	-2	2	95

Field Test Results

Test No	Location	Test Type	Test Depth (ft)	Elevation Datum (1)	Dry Density (pcf)	Water Content (%)	Moisture Density Sample No.	Percent Compaction (%)	Meets Project Specs? Compaction	Water Content	Test Pass
1	5' S of start of curb and gutter at NE end	SG	0.0	C	111.8	12.4	1	95	Y	Y	Y
2	25' S of start of curb and gutter at NE end	SG	0.0	C	112.4	13.1	1	96	Y	Y	Y
3	10' East into turn in off Akers Dr (N)	SG	0.0	C	112.1	12.1	1	95	Y	Y	Y
4	10' East into turn in off Akers Dr, (S)	SG	0.0	C	112.3	11.4	1	96	Y	Y	Y

(1) Elevation Datum Key
C - Pavement/Slab Elevation

Cameron Wright

Field Representative

COLORADO LICENSED
CORY E. RAMSEY
08/25/20
54783
PROFESSIONAL ENGINEER

Reviewed By: Cory Ramsey, P.E.

The tests were performed in general accordance with applicable ASTM and AASHTO test methods. Test results indicate the density at the specific depths and locations tested. We have relied on the contractor to apply the necessary compactive effort and moisture to achieve specified compaction during times when our observer is not present and at locations other than those tested. The test results may not be representative of all the fill placed.

Job No. 171800

August 25, 2020

Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Re: Cement Treated Subgrade Test Results (Set 1)
Gardens at N. Carefree
El Paso County, Colorado

Dear Covington Properties, LLC:

RMG – Rocky Mountain Group sampled cement treated subgrade (CTS) soils during placement and compaction during construction of the streets in the above referenced subdivision. Our sampling and testing consisted of preparation of four (4) CTS "pucks" for each sample location. Pucks were prepared by compacting sampled CTS materials in the Standard Proctor mold utilizing Standard Proctor compactive effort (ASTM D-698). The pucks were extruded from the mold and moist-cured in the laboratory seven (7) days prior to testing for compressive strength.

The compressive strength for each puck was determined at seven (7) days after placement to verify that the minimum required compressive strength of 125 psi was obtained prior to placement of hot-mix bituminous pavements. The results of our testing are presented in the table below:

Sample Location	Date Prepared	Puck #	7-Day Compressive Strength	
			Tested Strength, psi	Average 7-Day Compressive Strength, psi
Vineyard Cr, STA 9+00	8-17-20	1A	170	170
		1B	180	
		1C	170	
		1D	150	

Based upon our test results, the cement treated subgrade that was placed and compacted at the locations tested on 8-17-20 met the minimum design strength requirements as recommended in RMG's Pavement Design Report, The Gardens at North Carefree, El Paso County, Colorado, Job No. 171800, dated May 12, 2020.

Should you have questions, please feel free to contact our office.

Cordially,

RMG – Rocky Mountain Group

Cory Ramsey, P.E.
Geotechnical Project Engineer

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensic
Civil/Planning

ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

Job No. 171800

August 25, 2020

Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Re: Cement Treated Subgrade Test Results (Set 2)
Gardens at N. Carefree
El Paso County, Colorado

Dear Covington Properties, LLC:

RMG – Rocky Mountain Group sampled cement treated subgrade (CTS) soils during placement and compaction during construction of the streets in the above referenced subdivision. Our sampling and testing consisted of preparation of four (4) CTS "pucks" for each sample location. Pucks were prepared by compacting sampled CTS materials in the Standard Proctor mold utilizing Standard Proctor compactive effort (ASTM D-698). The pucks were extruded from the mold and moist-cured in the laboratory seven (7) days prior to testing for compressive strength.

The compressive strength for each puck was determined at seven (7) days after placement to verify that the minimum required compressive strength of 125 psi was obtained prior to placement of hot-mix bituminous pavements. The results of our testing are presented in the table below:

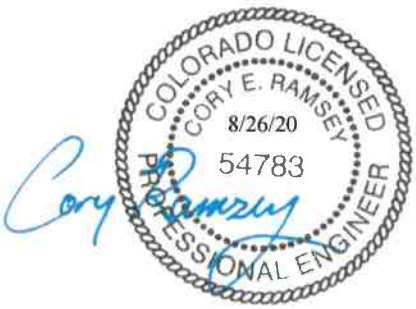
Sample Location	Date Prepared	Puck #	7-Day Compressive Strength	
			Tested Strength, psi	Average 7-Day Compressive Strength, psi
Vineyard Cr, STA 8+75	8-18-20	2A	200	210
		2B	220	
		2C	200	
		2D	220	

Based upon our test results, the cement treated subgrade that was placed and compacted at the locations tested on 8-18-20 met the minimum design strength requirements as recommended in RMG's Pavement Design Report, The Gardens at North Carefree, El Paso County, Colorado, Job No. 171800, dated May 12, 2020.

Should you have questions, please feel free to contact our office.

Cordially,

RMG – Rocky Mountain Group



Cory Ramsey, P.E.
Geotechnical Project Engineer

FIELD ACTIVITY REPORT

Report No: 20200820-A-APR

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/20/20

Job No: 171800

Project: Gardens at N. Carefree

Site Visit Summary

Date: 08/20/20 Arrived: 9:15 am Temperature: 82°

Work Requested By: Barry/Covington

Weather: Sunny

Equipment working on reported Activity at time of visit:
Concrete Truck

Activity	Observed	In the Vicinity of	Test	Pass	Fail	ReTest	Informed	Contractor
Subgrade (SG)	Y	Vineyard Cr, Running Deer Way	1	1	0	0	Foreman	Liberty
Concrete Compressive Strength (CT)	Y	Vineyard Cr, Running Deer Way	0	0	0	0	Foreman	Liberty

Other Observations: During the requested site visit, RMG performed Compaction testing on Subgrade in the vicinity of Vineyard Cr, Running Deer Way. Compaction test results are attached. Technician also performed Concrete testing on concrete placed for curb and gitter in the vicinity of Vineyard Cr, Running Deer Way. Concrete test results are presented separatly. Contractor or notified.

Aubrey Russell
Field Representative

Reviewed By:
Cory Ramsey, P.E.

FIELD DENSITY REPORT

Report No: 20200820-A-APR

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/20/20

Job No: 171800

Project: Gardens at N. Carefree

Moisture-Density Test Information

Sample No.	Classification and Description	Laboratory Test Data: Test Method	Laboratory Test Data: Maximum Dry Density (pcf)	Laboratory Test Data: Optimum Water Content (%)	Project Specifications: Water Content Range (%)		Project Specifications: Minimum Percent Compaction (%)
1	SM	ASTM D-1557	117.5	13.0	-2	2	95

Field Test Results

Test No	Location	Test Type	Test Depth (ft)	Elevation Datum (1)	Dry Density (pcf)	Water Content (%)	Moisture Density Sample No.	Percent Compaction (%)	Meets Project Specs? Compaction	Water Content	Test Pass
1	W intersection of Vineyard Cr & Running Deer, 105' N of SW	SG	0.0	C	112.1	11.0	1	95	Y	Y	Y

(1) Elevation Datum Key
C - Pavement/Slab Elevation

Aubrey Russell

Field Representative

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Reviewed By: Cory Ramsey, P.E.

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FIELD ACTIVITY REPORT

Report No: 20200824-A-RCW

Client: Covington Properties, LLC
13725 Struthers Road, Suite 201
Colorado Springs, CO 80921

Date: 08/24/20

Job No: 171800

Project: Gardens at N. Carefree

Site Visit Summary

Date: 08/24/20 Arrived: 8:30 am Temperature: 80°

Work Requested By: Barry/Covington

Weather: Sunny

Equipment working on reported Activity at time of visit:
Concrete Truck

Activity	Observed	In the Vicinity of	Test	Pass	Fail	ReTest	Informed	Contractor
Subgrade (SG)	Y	Akers Dr	4	4	0	0	Gilbert	Trax
Concrete Compressive Strength (CT)	Y	Akers Dr	0	0	0	0	Gilbert	Trax

Other Observations: During the requested site visit, RMG performed Compaction testing on curb and gutter subgrade in the vicinity of Akers Dr. Compaction test results are attached. Technician also performed Concrete testing on concrete placed for curb and gutter in the vicinity of Akers Dr. Concrete test results are presented separately. Technician cast 1 set of 5 CT cylinders. Contractor was notified.

Cameron Wright
Field Representative

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