



**Iron Woman**  
Construction and  
Environmental Services LLC

# IRON WOMAN CONSTRUCTION & ENVI

Compark Village South F1  
E-470 & Chambers  
Parker, CO 80134

**To:**  
Greg McIlvain  
Belford North Metro District  
8390 E Crescent Parkway  
Suite 300  
Greenwood Village, CO 80111

**From:**  
Liz Resetar  
Iron Woman Construction  
12503 E. Euclid Dr  
Suite 220  
Centennial, CO 80111

## SUBMITTAL INFORMATION

Submittal No: 5  
Submittal Description: Aggregates  
Date Submitted: 01/05/2021  
**Response Requested By: 01/12/2021**  
Date Response Received:

## PRODUCT DATA

| ITEM # | DESCRIPTION | DWG / SPEC # | SECTION # | ITEM STATUS |
|--------|-------------|--------------|-----------|-------------|
|        | Aggregates  | MULTIPLE     | MULTIPLE  | New         |

### Remarks:

Please see attached for review and approval. Submittal package includes all aggregates for this project.

***I certify that the above submitted item(s) have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise noted.***

## SUBMITTAL REVIEW & APPROVAL

|                  |                                |   |                              |
|------------------|--------------------------------|---|------------------------------|
| Reviewed By:     | Engineer's Approval S          |   |                              |
| Date:            |                                |   |                              |
| <b>Status:</b>   | <input type="radio"/> Approved | <input type="radio"/> Approved as Noted | <input type="radio"/> Revise |
| <b>Comments:</b> |                                |   |                              |

- No Exception Taken
- Approved as Noted
- Rejected
- Revise and Resubmit

This review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the submittal during this review do not relieve contractor from compliance with the requirements of the plans and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite, information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of his or her Work with that of all other trades; and for performing all work in a safe and satisfactory manner.

**Manhard Consulting, Ltd.**

Date: 02/10/2021 By: Gary Iwata



# GORDON - 1.5" AREMA

Trench Stabilization all Utility Trenching when required

## Basic Quality Statistical Summary Report

**Plant** 16999-Gordon Recycle  
**Product** 3562-ASTM No. 4 Rock  
**Specification** ASTM C33 No. 4  
**Period** 01/01/2020 - 12/02/2020

| Sieve/Test      | Tests | Average | St Dev | Target | Specification |
|-----------------|-------|---------|--------|--------|---------------|
| 2" (50mm)       | 10    | 100     | 1.0    |        | 100-100       |
| 1 1/2" (37.5mm) | 10    | 93      | 2.8    |        | 90-100        |
| 1" (25mm)       | 10    | 44      | 10.1   |        | 20-55         |
| 3/4" (19mm)     | 10    | 12      | 4.3    |        | 0-15          |
| 1/2" (12.5mm)   | 10    | 3       | 1.4    |        |               |
| 3/8" (9.5mm)    | 9     | 2       | 1.2    |        | 0-5           |
| Pan             | 10    | 0.0     | 0.00   |        |               |

**Query**

Query Selections  
Date Created 12/02/2020  
Date Range 01/01/2020 - 12/02/2020  
Plant Gordon Recycle  
Sample Type Shipping



08/15/2018

# GORDON - 3-6" VTC

## 4575-2662 3"- 6" Ballast Stone

| Procedure | Sieve/Test       | Average | Unit |
|-----------|------------------|---------|------|
|           | 6" (150mm)       | 100     | %    |
|           | 5" (125mm)       | 96      | %    |
|           | 4 1/2" (112.5mm) | 78      | %    |
|           | 4" (100mm)       | 72      | %    |
|           | 3" (75mm)        | 56      | %    |
|           | 2 1/2" (63mm)    | 40      | %    |
|           | 2" (50mm)        | 22      | %    |
|           | 1 1/2" (37.5mm)  | 11      | %    |
|           | 1" (25mm)        | 6       | %    |
|           | 3/4" (19mm)      | 5       | %    |
|           | 1/2" (12.5mm)    | 2       | %    |
|           | 3/8" (9.5mm)     | 1       | %    |



## Basic Quality Statistical Summary Report

**Plant** 16426-Platte Sand and Gravel  
**Product** 4515-3/8 Squeegee  
**Specification** 3/8 Squeegee  
**Period** 01/01/2020 - 12/23/2020

| Sieve/Test    | Tests | Average | St Dev | Target | Specification |
|---------------|-------|---------|--------|--------|---------------|
| 1/2" (12.5mm) | 189   | 100     | 0.0    |        | 100-100       |
| 3/8" (9.5mm)  | 189   | 100     | 0.0    |        | 100-100       |
| #4 (4.75mm)   | 189   | 84      | 11.4   |        | 50-100        |
| #8 (2.36mm)   | 189   | 24      | 14.8   |        | 0-45          |
| #16 (1.18mm)  | 189   | 10      | 8.5    |        | 0-30          |
| #30 (.6mm)    | 189   | 5       | 4.8    |        |               |
| #50 (.3mm)    | 189   | 2       | 1.7    |        | 0-6           |
| #100 (.15mm)  | 189   | 0       | 0.5    |        |               |
| #200 (75µm)   | 189   | 0.2     | 0.19   |        | 0-3           |
| Pan           | 189   | 0.0     | 0.00   |        |               |

**Query**

Query Selections  
Date Created 12/23/2020  
Date Range 01/01/2020 - 12/23/2020  
Plant Platte Sand and Gravel

## Basic Quality Statistical Summary Report

**Plant** 16306-Specifications Aggregate Quarry  
**Product** 4576-ASTM #57/67 Rock  
**Specification** 57/67 Crushed Rock  
**Period** 01/01/2020 - 12/01/2020

| Sieve/Test    | Tests | Average | St Dev | Target | Specification |
|---------------|-------|---------|--------|--------|---------------|
| 1" (25mm)     | 471   | 100     | 0.1    |        | 95-100        |
| 3/4" (19mm)   | 473   | 91      | 2.8    |        | 90-100        |
| 1/2" (12.5mm) | 473   | 38      | 7.6    |        | 25-60         |
| 3/8" (9.5mm)  | 473   | 20      | 5.7    |        | 20-55         |
| #4 (4.75mm)   | 473   | 3       | 1.4    |        | 0-10          |
| #8 (2.36mm)   | 473   | 2       | 1.1    |        | 0-5           |
| #200 (75µm)   | 1     | 1.4     |        |        | 0-1.5         |
| Pan           | 473   | 0.0     | 0.00   |        |               |

**Query**

Query Selections  
Date Created 12/01/2020  
Date Range 01/01/2020 - 12/01/2020  
Plant Specifications Aggregate Quarry  
Sample Type Shipping  
Sample Location Stockpile



# CLASS 1 - STRUCTURAL FILL

West Division  
Metro Area Aggregate District  
1627 Cole Blvd, Suite 200  
Lakewood, CO 80401

Attention: Mr. Randy Peterson

December 7, 2020

Re: Laboratory Test Results  
Class I Structural Fill  
Specification Aggregates Quarry  
Golden, CO

Mr. Peterson:

Enclosed are the results of the laboratory tests performed on the Class I Structural Fill sampled from the Specification Aggregates Quarry in October 2020. Testing was performed in accordance with the procedures and specifications contained herein.

This report includes results for the following tests: gradation, unit weight, L.A. Abrasion, Atterberg Limits, Standard and Modified Proctors, and R-Value Determination. Additional tests can be performed per your request.

Please contact us if you have any questions regarding the attached information.

Respectfully submitted,  
Martin Marietta Materials, Inc.  
Central Laboratory



Erik Biggers  
Testing Lab Manager

Todd Genovese, P.E.  
Division QA/QC Manager



Specification Aggregates Quarry

Class I Structural Fill

Sieve Analysis of Fine and Coarse Aggregate

ASTM C 136 & C 117

| Sieve Size |         | Percent Passing (%) | Specification<br>CDOT 703.08 |
|------------|---------|---------------------|------------------------------|
| 2"         | 50 mm   | 100                 | 100                          |
| 3/8"       | 9.5 mm  | 100                 |                              |
| No. 4      | 4.75 mm | 88                  | 30 to 100                    |
| No. 8      | 2.36 mm | 75                  |                              |
| No. 16     | 1.18 mm | 60                  |                              |
| No. 30     | 600 µm  | 48                  |                              |
| No. 50     | 300 µm  | 36                  | 10 to 60                     |
| No. 100    | 150 µm  | 26                  |                              |
| No. 200    | 75 µm   | 18.2                | 5 to 20                      |

Bulk Density (Unit Weight) by Rodding

ASTM C 29

| Sample Weight (lbs) | Measure Volume (ft <sup>3</sup> ) | Unit Weight (lbs/ft <sup>3</sup> ) | Unit Weight (tons/cy) |
|---------------------|-----------------------------------|------------------------------------|-----------------------|
| 10.24               | 0.1000                            | 102.4                              | 1.38                  |
| 10.22               | 0.1000                            | 102.2                              | 1.38                  |
| 10.35               | 0.1000                            | 103.5                              | 1.40                  |
| Average             |                                   | 103                                | 1.39                  |

Degradation of Coarse Aggregate in the LA Abrasion Machine

ASTM C 131

| Grading | Sample Mass Before Test (grams) | Sample Mass After Test (grams) | Percent Loss (%) | Specification<br>AASHTO M 147 |
|---------|---------------------------------|--------------------------------|------------------|-------------------------------|
| C       | 5000.2                          | 3393.8                         | 32               | 50% max.                      |

Atterberg Limits

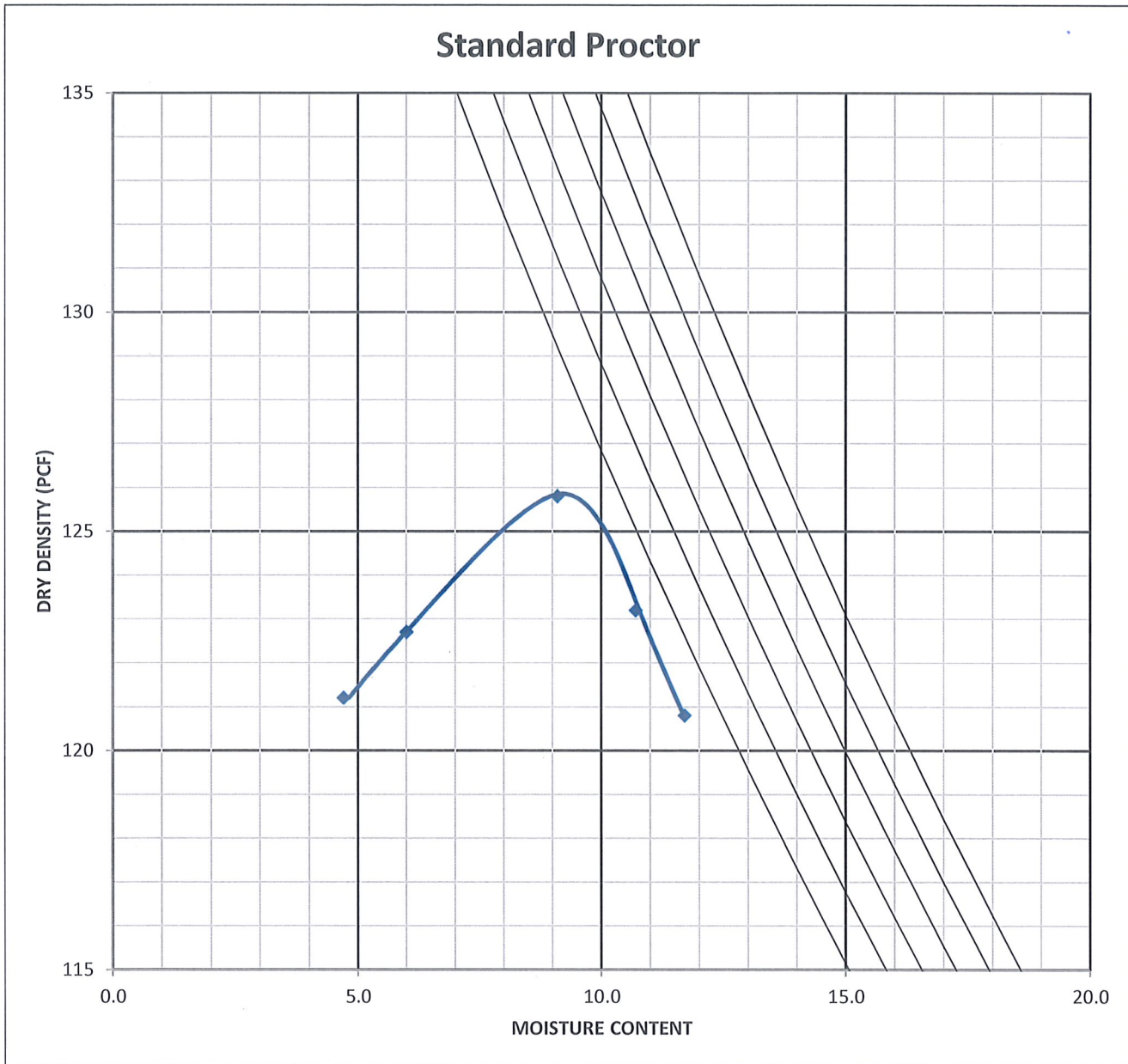
AASHTO T 89 & T 90

|                        | Result | Specification<br>CDOT 703.08 |
|------------------------|--------|------------------------------|
| Liquid Limit (LL) - %  | 20     | 35 max.                      |
| Plastic Limit (PL) - % | 18     |                              |
| Plasticity Index (PI)  | 2      | 6 max.                       |

NL = No Limit, NV = No Value, NP = Non-plastic

Standard Proctor

ASTM D 698

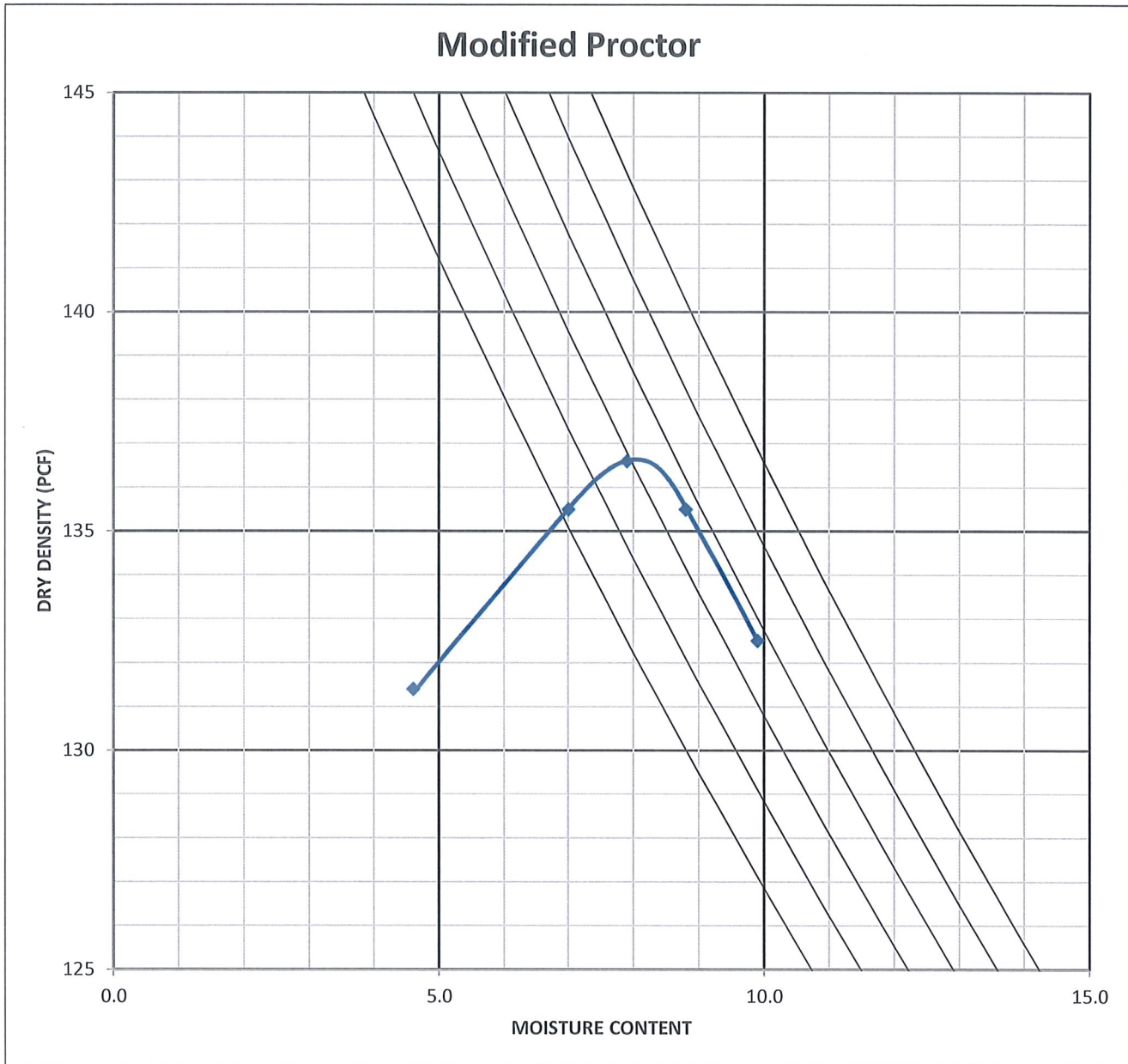


Maximum Dry Density (pcf): 125.8

Optimum Moisture Content (%): 9.2

Modified Proctor

ASTM D 1557

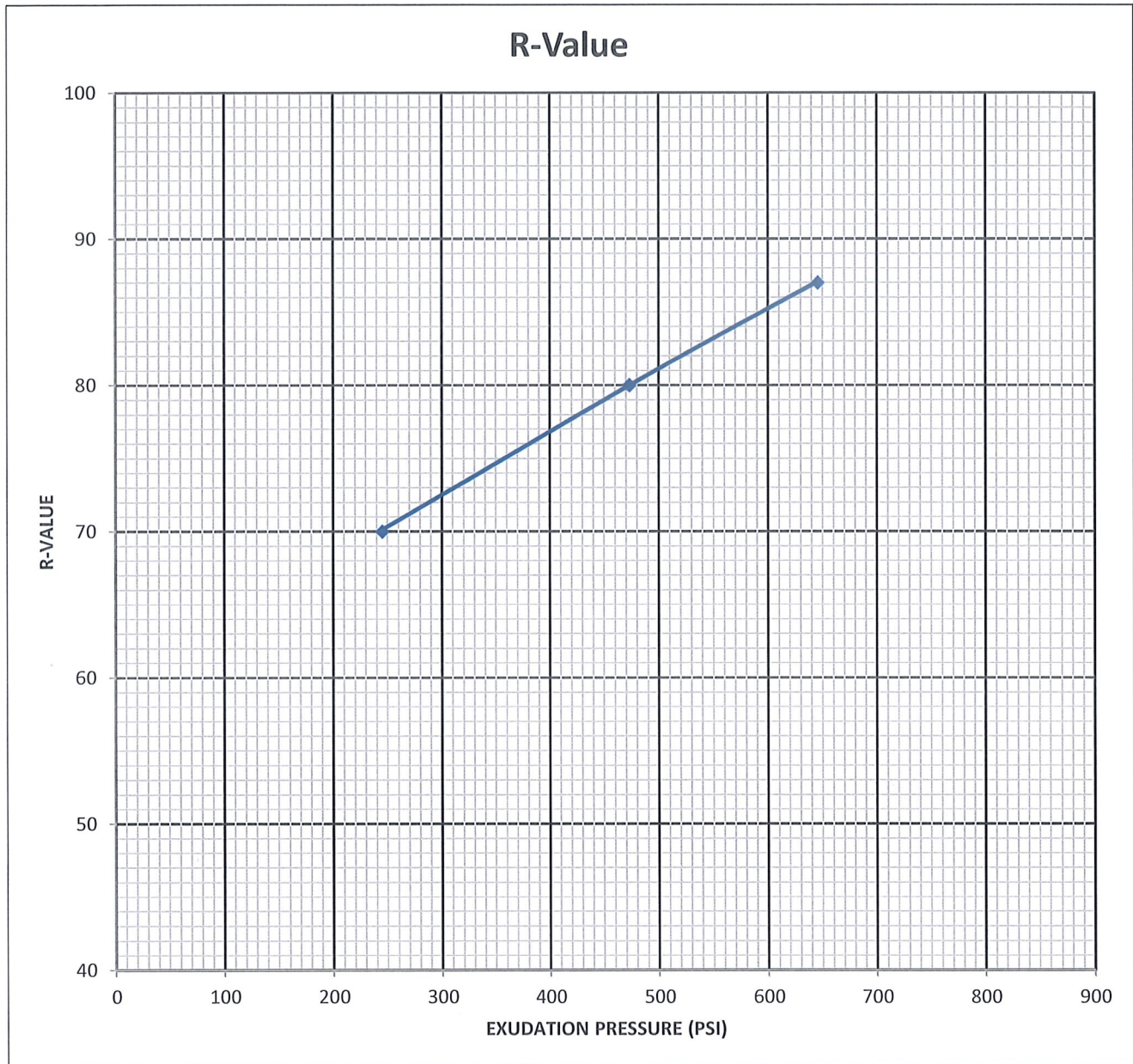


Maximum Dry Density (pcf): 136.6

Optimum Moisture Content (%): 8.0

Resistance R-Value and Expansion Pressure

ASTM D 2844



| Point                    | 1    | 2    | 3    |
|--------------------------|------|------|------|
| Moisture (%)             | 8.3  | 8.5  | 9.0  |
| Specimen Height (inches) | 2.50 | 2.61 | 2.57 |
| Exudation Pressure (psi) | 646  | 473  | 245  |
| R-Value*                 | 87   | 80   | 70   |

\* Corrected based on height if necessary

R-Value at 300 psi Exudation Pressure

72

# CLASS 6 - PATHS & TRAILS

Attention: Mr. Randy Peterson

December 7, 2020

Re: Laboratory Test Results  
CDOT Class 6 ABC  
Specification Aggregates Quarry  
Golden, CO

Mr. Peterson:

Enclosed are the results of the laboratory tests performed on the CDOT Class 6 ABC sampled from the Specification Aggregates Quarry in October 2020. Testing was performed in accordance with the procedures and specifications contained herein.

This report includes results for the following tests: gradation, unit weight, LA Abrasion, Atterberg Limits, Standard and Modified Proctors and R-value determination. Additional tests can be performed per your request.

Please contact us if you have any questions regarding the attached information.

Respectfully submitted,  
**Martin Marietta Materials, Inc.**  
Central Laboratory



*Erik Biggers*  
Testing Lab Manager



*Todd Genovese, P.E.*  
Division QA/QC Manager



Specification Aggregates Quarry

CDOT Class 6 ABC

Sieve Analysis of Fine and Coarse Aggregate

ASTM C 136 & C 117

| Sieve Size |         | Percent Passing (%) | Specification CDOT Class 6 |
|------------|---------|---------------------|----------------------------|
| 1"         | 25.0 mm | 100                 | 100                        |
| 3/4"       | 19.0 mm | 96                  | 95 to 100                  |
| 1/2"       | 12.5 mm | 77                  |                            |
| 3/8"       | 9.5 mm  | 64                  |                            |
| No. 4      | 4.75 mm | 47                  | 30 to 65                   |
| No. 8      | 2.36 mm | 40                  | 25 to 55                   |
| No. 16     | 1.18 mm | 33                  |                            |
| No. 30     | 600 µm  | 28                  |                            |
| No. 50     | 300 µm  | 22                  |                            |
| No. 100    | 150 µm  | 16                  |                            |
| No. 200    | 75 µm   | 11.1                | 3 to 12                    |

Bulk Density (Unit Weight) by Rodding

ASTM C 29

| Sample Weight (lbs) | Measure Volume (ft <sup>3</sup> ) | Unit Weight (lbs/ft <sup>3</sup> ) | Unit Weight (tons/cy) |
|---------------------|-----------------------------------|------------------------------------|-----------------------|
| 38.61               | 0.3340                            | 115.6                              | 1.56                  |
| 38.48               | 0.3340                            | 115.2                              | 1.56                  |
| 38.55               | 0.3340                            | 115.4                              | 1.56                  |
| Average             |                                   | 115                                | 1.56                  |

Degradation of Coarse Aggregate in the LA Abrasion Machine

ASTM C 131

| Grading | Sample Mass Before Test (grams) | Sample Mass After Test (grams) | Percent Loss (%) | Specification CDOT Class 6 |
|---------|---------------------------------|--------------------------------|------------------|----------------------------|
| B       | 4998.9                          | 3200.6                         | 36               | 50% max.                   |

Atterberg Limits

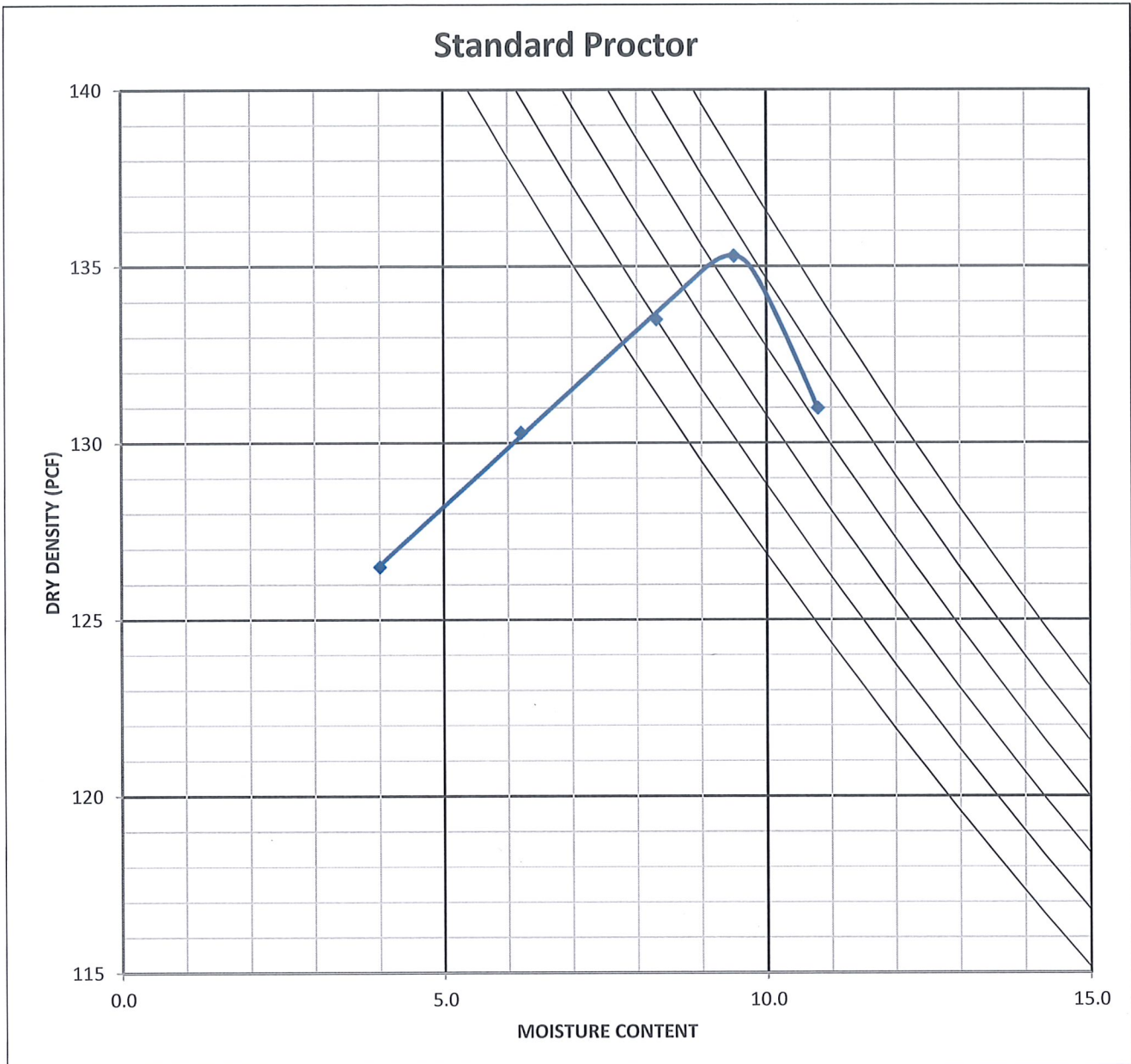
AASHTO T 89 & T 90

|                        | Result | Specification CDOT Class 6 |
|------------------------|--------|----------------------------|
| Liquid Limit (LL) - %  | 21     | 30 max.                    |
| Plastic Limit (PL) - % | 18     |                            |
| Plasticity Index (PI)  | 3      | 6 max.                     |

NL = No Limit, NV = No Value, NP = Non-plastic

Standard Proctor

ASTM D 698

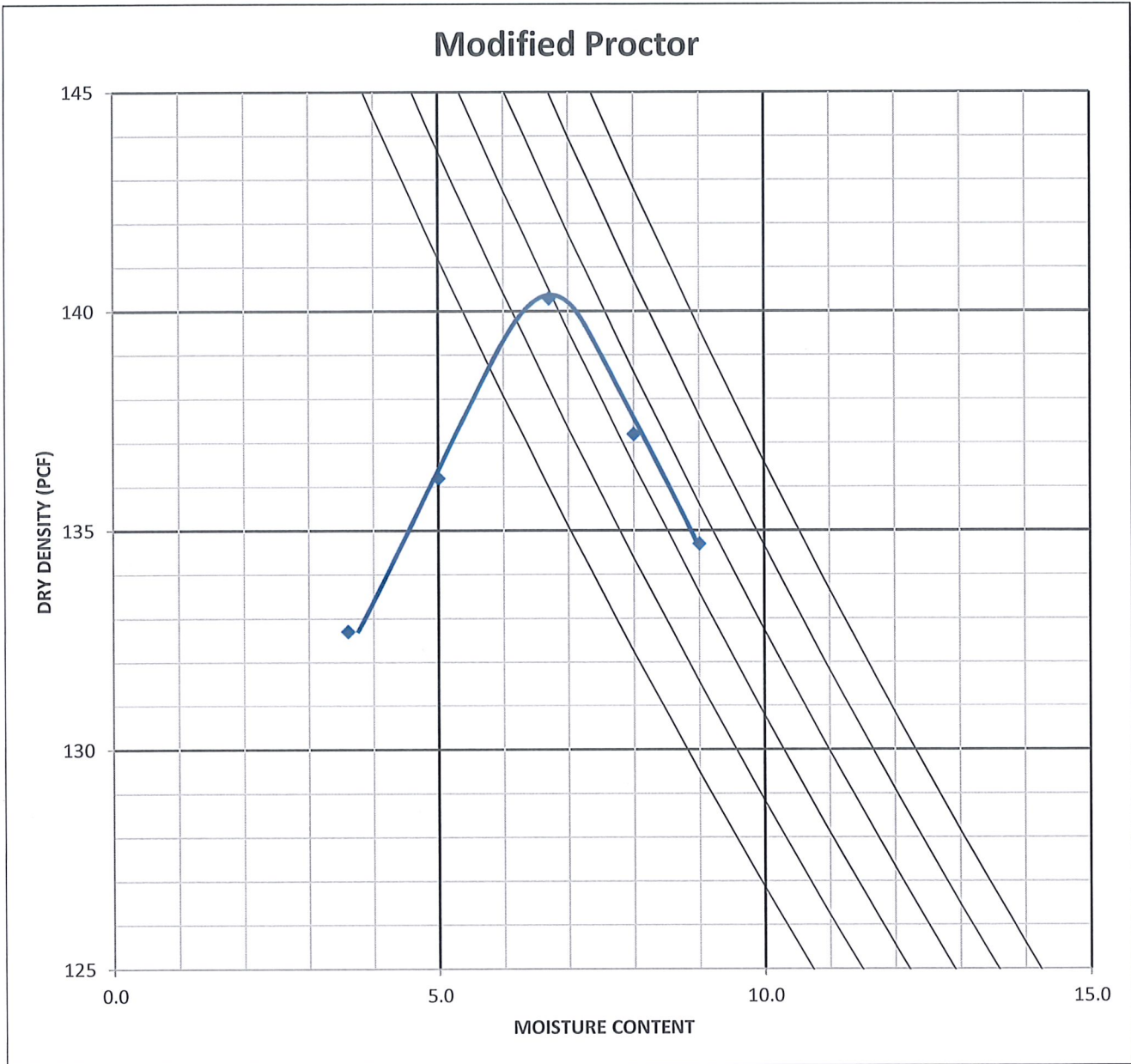


Maximum Dry Density (pcf): 135.3

Optimum Moisture Content (%): 9.5

Modified Proctor

ASTM D 1557

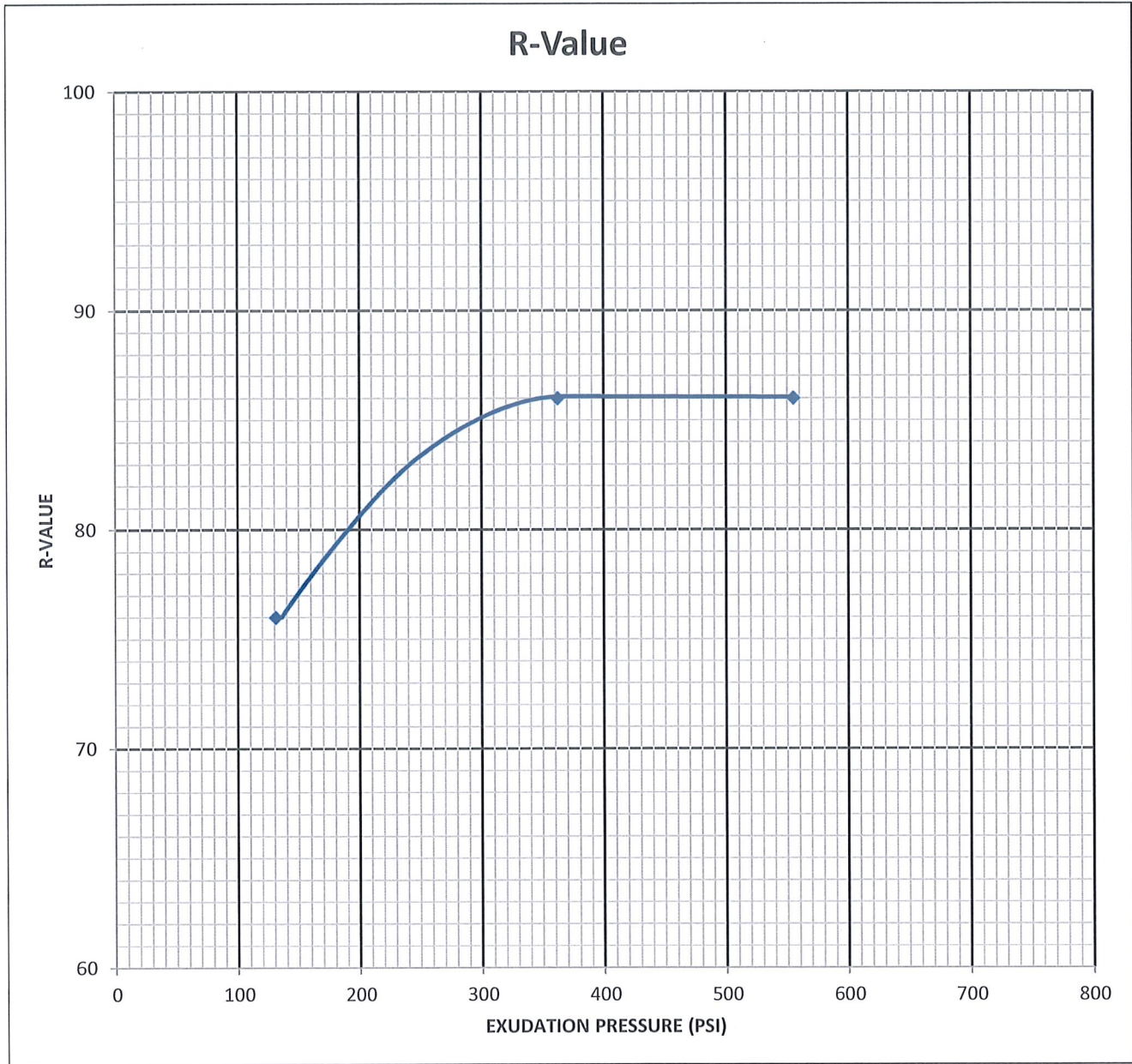


Maximum Dry Density (pcf): **140.3**

Optimum Moisture Content (%): **6.7**

Resistance R-Value and Expansion Pressure

ASTM D 2844



| Point                    | 1    | 2    | 3    |
|--------------------------|------|------|------|
| Moisture (%)             | 7.5  | 8.0  | 8.8  |
| Specimen Height (inches) | 2.45 | 2.40 | 2.55 |
| Exudation Pressure (psi) | 555  | 362  | 131  |
| R-Value*                 | 86   | 86   | 76   |

\* Corrected based on height if necessary

R-Value at 300 psi Exudation Pressure

84

**CLASS 1 CRUSHER FINES PATH AND ALTERNATE FOR STORM BEDDING**

Attention: Mr. Randy Peterson

December 7, 2020

Re: Laboratory Test Results  
Class I Crusher Fines  
Specification Aggregates Quarry  
Golden, CO

Mr. Peterson:

Enclosed are the results of the laboratory tests performed on the Class I Crusher Fines sampled from the Specification Aggregates Quarry in October 2020. Testing was performed in accordance with the procedures and specifications contained herein.

This report includes results for the following tests: gradation, unit weight, L.A. Abrasion, Atterberg Limits, Standard and Modified Proctors, and R-Value Determination. Additional tests can be performed per your request.

Please contact us if you have any questions regarding the attached information.

Respectfully submitted,  
**Martin Marietta Materials, Inc.**  
Central Laboratory



*Erik Biggers*  
Testing Lab Manager



*Todd Genovese, P.E.*  
Division QA/QC Manager



Specification Aggregates Quarry

Class I Crusher Fines

Sieve Analysis of Fine and Coarse Aggregate

ASTM C 136 & C 117

| Sieve Size |         | Percent Passing (%) | Specification<br>CDOT 703.08 |
|------------|---------|---------------------|------------------------------|
| 2"         | 50 mm   | 100                 | 100                          |
| 3/8"       | 9.5 mm  | 99                  |                              |
| No. 4      | 4.75 mm | 75                  | 30 to 100                    |
| No. 8      | 2.36 mm | 48                  |                              |
| No. 16     | 1.18 mm | 35                  |                              |
| No. 30     | 600 µm  | 27                  |                              |
| No. 50     | 300 µm  | 21                  | 10 to 60                     |
| No. 100    | 150 µm  | 15                  |                              |
| No. 200    | 75 µm   | 10.2                | 5 to 20                      |

Bulk Density (Unit Weight) by Rodding

ASTM C 29

| Sample Weight (lbs) | Measure Volume (ft <sup>3</sup> ) | Unit Weight (lbs/ft <sup>3</sup> ) | Unit Weight (tons/cy) |
|---------------------|-----------------------------------|------------------------------------|-----------------------|
| 11.72               | 0.1000                            | 117.2                              | 1.58                  |
| 11.83               | 0.1000                            | 118.3                              | 1.60                  |
| 11.73               | 0.1000                            | 117.3                              | 1.58                  |
| <b>Average</b>      |                                   | <b>118</b>                         | <b>1.59</b>           |

Degradation of Coarse Aggregate in the LA Abrasion Machine

ASTM C 131

| Grading | Sample Mass Before Test (grams) | Sample Mass After Test (grams) | Percent Loss (%) | Specification<br>AASHTO M 147 |
|---------|---------------------------------|--------------------------------|------------------|-------------------------------|
| C       | 5000.2                          | 3741.3                         | 25               | 50% max.                      |

Atterberg Limits

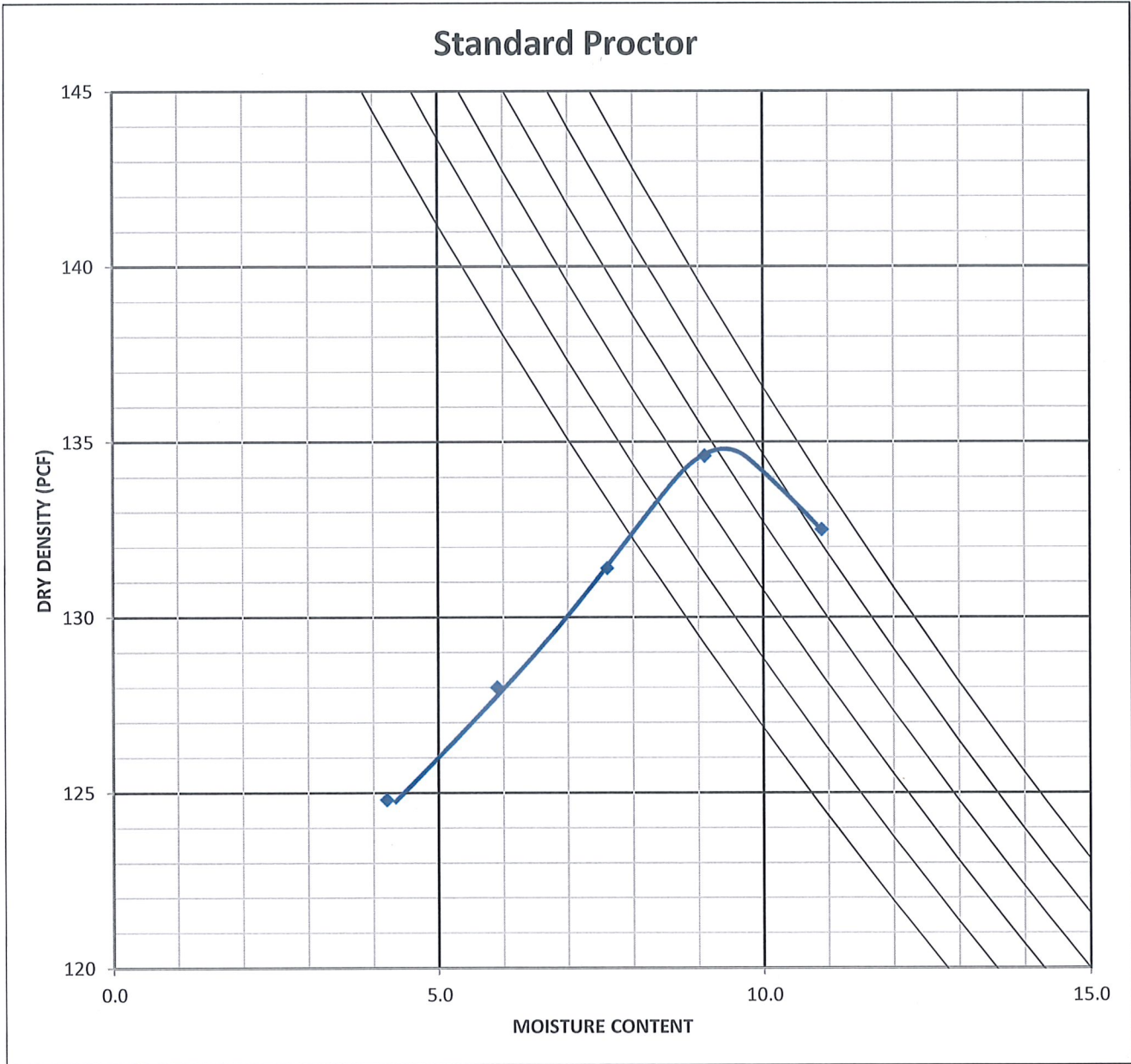
AASHTO T 89 & T 90

|                        | Result | Specification<br>CDOT 703.08 |
|------------------------|--------|------------------------------|
| Liquid Limit (LL) - %  | NL     | 35 max.                      |
| Plastic Limit (PL) - % | NP     |                              |
| Plasticity Index (PI)  | NV     | 6 max.                       |

NL = No Limit, NV = No Value, NP = Non-plastic

Standard Proctor

ASTM D 698

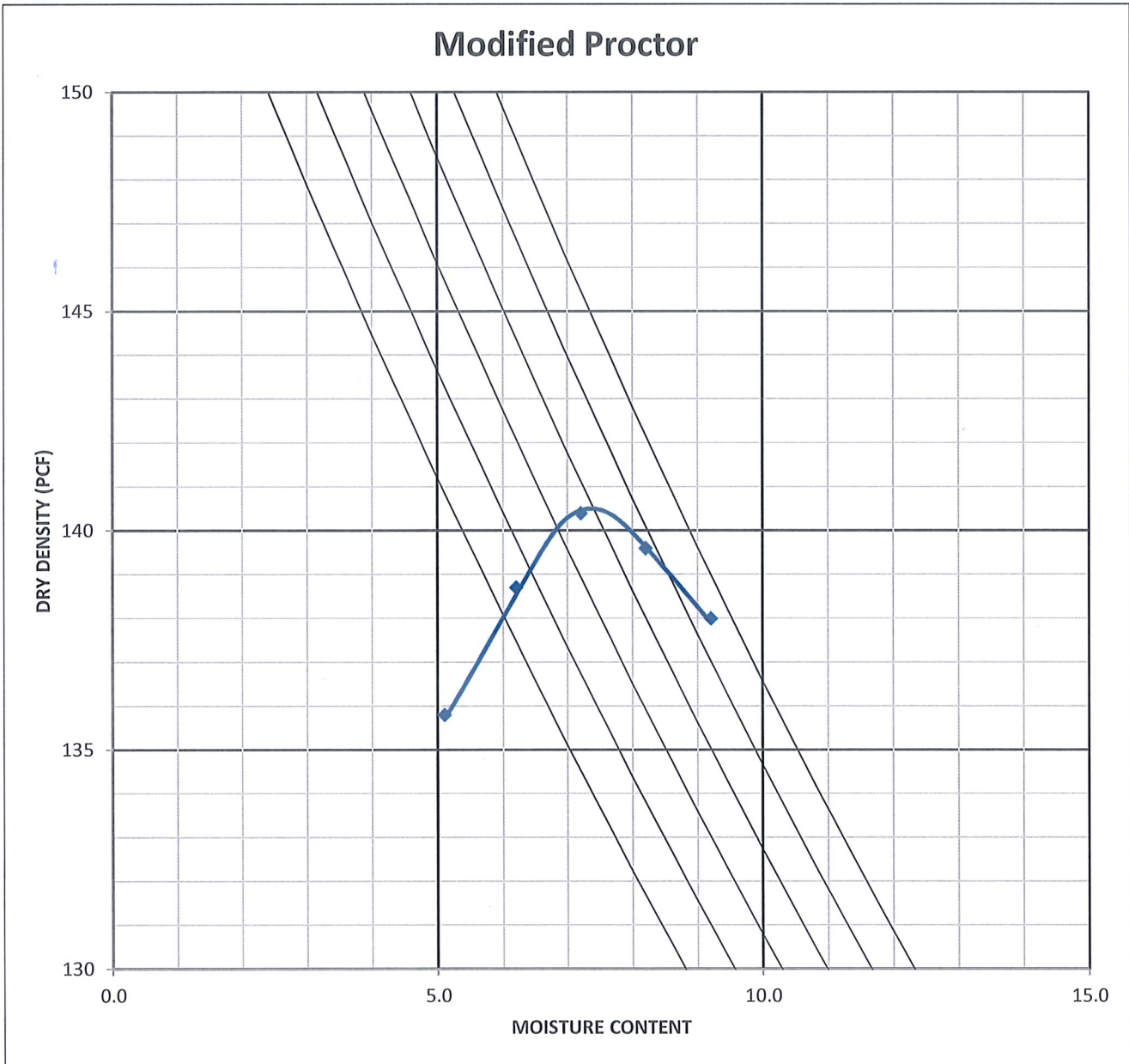


Maximum Dry Density (pcf): 134.8

Optimum Moisture Content (%): 9.4

Modified Proctor

ASTM D 1557

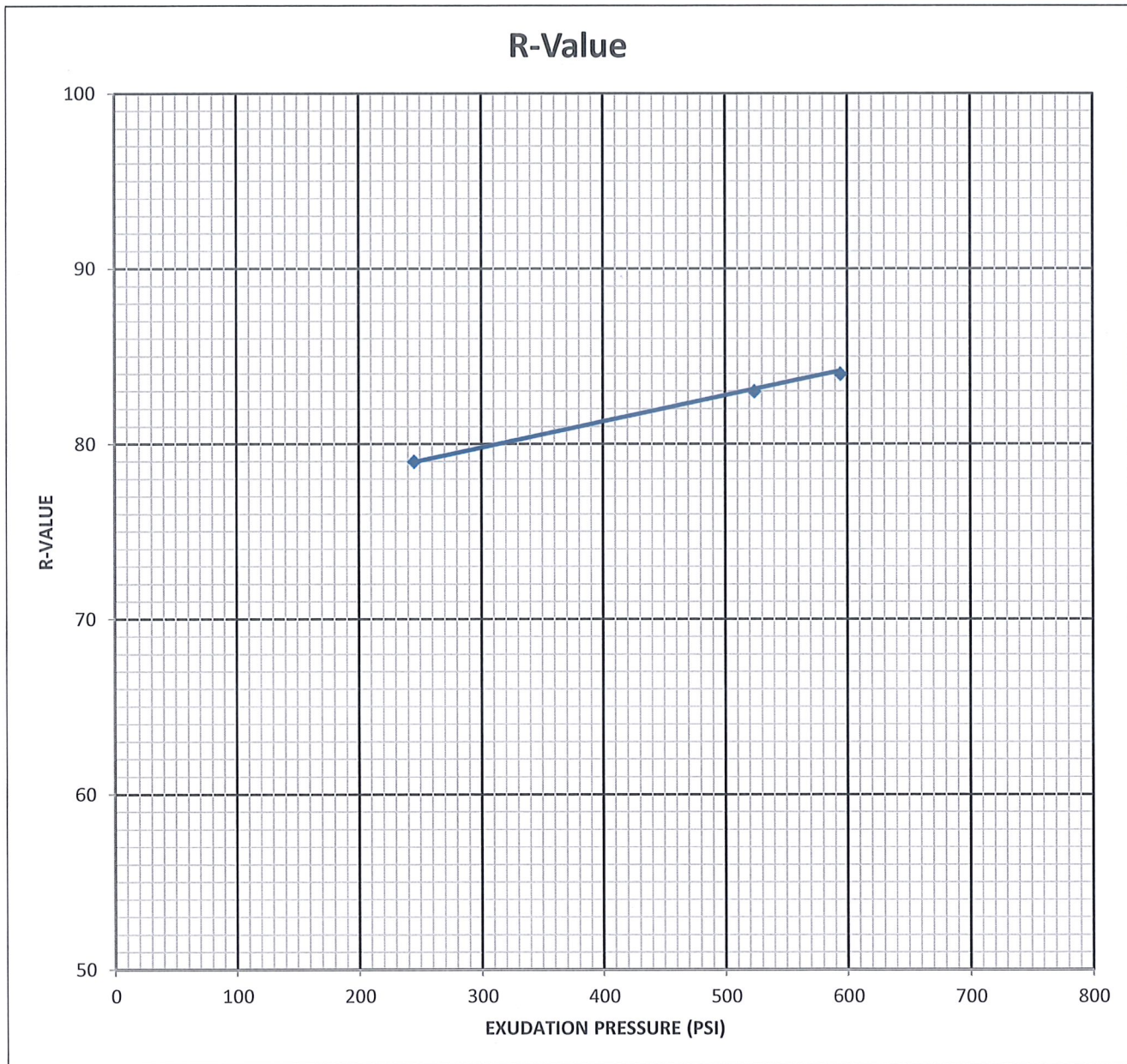


Maximum Dry Density (pcf): 140.5

Optimum Moisture Content (%): 7.3

Resistance R-Value and Expansion Pressure

ASTM D 2844



| Point                    | 1    | 2    | 3    |
|--------------------------|------|------|------|
| Moisture (%)             | 7.5  | 7.7  | 8.0  |
| Specimen Height (inches) | 2.40 | 2.47 | 2.48 |
| Exudation Pressure (psi) | 594  | 524  | 245  |
| R-Value*                 | 84   | 83   | 79   |

\* Corrected based on height if necessary

R-Value at 300 psi Exudation Pressure

80



# TYPE II BEDDING UNDER RIP RAP

## Basic Quality Statistical Summary Report

**Plant** 16306-Specifications Aggregate Quarry  
**Product** 4577-1 1/2 G Rock  
**Specification** 5624-Type II Bedding  
**Period** 01/01/2020 - 12/23/2020

| Sieve/Test    | Tests | Average | St Dev | Target | Specification |
|---------------|-------|---------|--------|--------|---------------|
| 3" (75mm)     | 188   | 100     | 0.0    |        | 100-100       |
| 1" (25mm)     | 189   | 74      | 8.2    |        |               |
| 3/4" (19mm)   | 189   | 22      | 7.6    |        | 20-90         |
| 1/2" (12.5mm) | 189   | 4       | 3.9    |        |               |
| 3/8" (9.5mm)  | 189   | 3       | 2.2    |        |               |
| #4 (4.75mm)   | 188   | 2       | 1.6    |        | 0-20          |
| #200 (75µm)   | 37    | 1.4     | 0.68   |        | 0-3           |
| Pan           | 153   | 0.0     | 0.00   |        |               |

**Query**

Query Selections  
Date Created 12/23/2020  
Date Range 01/01/2020 - 12/23/2020  
Plant Specifications Aggregate Quarry

# TYPE M RIP RAP



Rocky Mountain Division  
Aggregate District  
1627 Cole Blvd, Suite 200  
Lakewood, CO 80401

February 25, 2020

COMPANY: MARTIN MARIETTA  
DENVER METRO AGGREGATE DIVISION

PIT SOURCE: SPECIFICATION AGGREGATE QUARRY  
18401 W. Colfax Avenue  
Golden, Colorado

**TYPE "M" RIP RAP**  
(D/50 = 12")  
(CDOT Specification)  
(UDFCD Specification)

| <u>Size</u> | <u>%Passing</u> | <u>Specification</u> |
|-------------|-----------------|----------------------|
| 23"         | 100             | 100                  |
| 21"         | 92              | 70-100               |
| 18"         | 55              | 50-70                |
| 12"         | 40              | 35-50                |
| 4"          | 3               | 2-10                 |

| <u>ASTM DESIGNATIONS</u> | <u>2019 RESULTS</u> | <u>AASHTO EQUIVALENTS</u> |
|--------------------------|---------------------|---------------------------|
| ASTM C 127               | 2.76                | AASHTO T 85               |
| ASTM C 131               | 21 % Loss           | AASHTO T 96               |
| ASTM C 88                | 2 % Loss            | AASHTO T104               |

- Gradations may change due to handling and loading of material.
- Testing results are obtained from annual testing at our regional laboratory.

# TYPE L RIP RAP



Rocky Mountain Division  
Aggregate District  
1627 Cole Blvd, Suite 200  
Lakewood, CO 80401

February 25, 2020

COMPANY: MARTIN MARIETTA  
DENVER METRO AGGREGATE DIVISION

PIT SOURCE: SPECIFICATION AGGREGATE QUARRY  
18401 W. Colfax Avenue  
Golden, Colorado

**TYPE "L" RIP RAP**  
(D/50 = 9")  
(CDOT Specification)  
(UDFCD Specification)

| <b><u>Size</u></b> | <b><u>%Passing</u></b> | <b><u>Specification</u></b> |
|--------------------|------------------------|-----------------------------|
| 17"                | 100                    | 100                         |
| 15"                | 90                     | 70-100                      |
| 12"                | 58                     | 50-70                       |
| 9"                 | 37                     | 35-50                       |
| 3"                 | 4                      | 2-10                        |

**ASTM DESIGNATIONS**

ASTM C 127  
ASTM C 131  
ASTM C 88

**2019 RESULTS**

2.76  
21 % Loss  
2 % Loss

**AASHTO EQUIVALENTS**

AASHTO T 85  
AASHTO T 96  
AASHTO T104

- Gradations may change due to handling and loading of material.
- Testing results are obtained from annual testing at our regional laboratory.