# R&M Laboratory Test Results Lab # 550

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

AASHTO R18 AMRL Lab #793

## Client & Sample Information

**Field #: PND -1**

Client: PND Engineers, Inc.
Client Address: Juneau, Alaska

Project: PND - 1
Material/Use: n/a
Test Location: n/a

Sampled From: n/a
Source: n/a

Sampled By: PND
Depth: n/a

Date Sampled: n/a
Quantity Rep: n/a
PO Number:

## Laboratory Sample Data

Received By: RJM
R&M Project No: 1446.01

Date Received: 3/26/2007
Lab No: 550

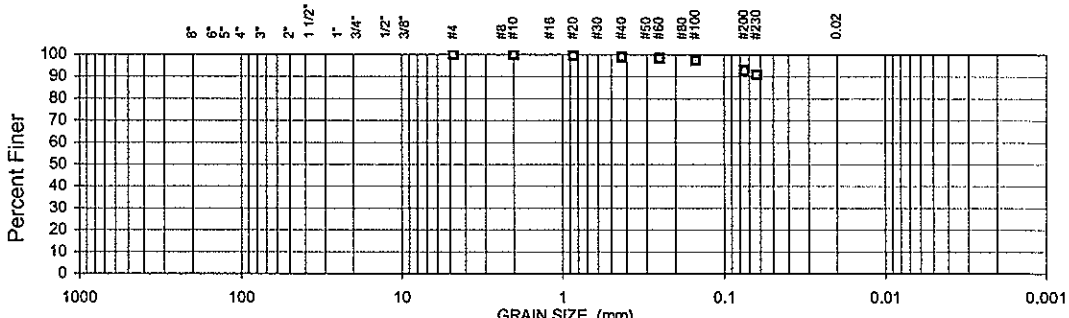
Tech Assigned: RJM
Date Completed: 3/28/2007

## Aggregate & Soils Classification, Atterberg, SpG, etc.

| Grain Size Distribution | | | |
|---|---|---|---|
| Sieve | % Ret. | % Pass | Spec. |
| 6" | | | |
| 5" | | | |
| 4" | | | |
| 3" | | | |
| 2 1/2" | | | |
| 2" | | | |
| 1 1/2" | | | |
| 1 1/4" | | | |
| 1" | | | |
| 3/4" | | | |
| 5/8" | | | |
| 1/2" | | | |
| 3/8" | | | |
| 5/16" | | | |
| 1/4" | | | |
| #4 | 0.0 | 100 | |
| #5 | | | |
| #6 | | | |
| #8 | | | |
| #10 | 0.2 | 100 | |
| #12 | | | |
| #16 | | | |
| #20 | 0.3 | 100 | |
| #30 | | | |
| #40 | 0.5 | 99 | |
| #50 | | | |
| #60 | 0.6 | 98 | |
| #70 | | | |
| #80 | | | |
| #100 | 1.1 | 97 | |
| #140 | | | |
| #200 | 4.3 | 93.0 | |
| #230 | 2.0 | 91.0 | |
| .02mm | | | |
| .005mm | | | |
| .002mm | | | |
| .001mm | | | |
| Fineness Modulus: | | | |

R&M performs sieve analyses using one or more of the following test methods (whichever apply): **P200 Wash**: ASTM-C117 or D1140 or AASHTO-T11; **Standard Gradation Only**: ASTM-C136 or AASHTO-T27 or T88; **Gradation w/ Hydrometer**: ASTM-D422 or ATM T-1; **Sieve Analysis of Mineral filler for Asphalt**: ASTM-D546 or AASHTO-T37; **Sieve Analysis of Extracted Aggregate**: ASTM-D5444 or AASHTO-T30

### GRAIN SIZE DISTRIBUTION CHART




**ASTM-USCS Classification**

| Boulders | Cobbles | Gravel | | Sand | | | Silt Clay | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt Clay | Silt Size[1] | C.S.[2] |

[1]ASTM D653 defines "Silt Size" as soil finer than .02mm and coarser than .002mm; [2]ASTM D653 defines "Clay Size" as soil finer than .002mm

| USCS % Boulders & Cobbles | USCS % Gravel | USCS % Sand | USCS % Silt Clay | USCS Classification | AASHTO % Boulders & Cobbles | AASHTO % Gravel | AASHTO % Sand | AASHTO % Silt Clay | AASHTO Classification |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 6.6 | 93.4 | | | 0.2 | 6.5 | 93.4 | |

Note: The USCS (ASTM) and AASHTO classifications were determined using the following test methods, respectively: ASTM-D2487 and AASHTO-M145.
For both USCS and AASHTO: % boulders & cobbles is based on the original field sample; % gravel, sand and silt clay are based on only minus 3 inch material.

Test Methods used are as follows:
**$D_{100}$, $D_{60}$, $D_{30}$, $D_{10}$, $C_C$, $C_U$**- ASTM D2487
**Atterberg Limits**- ASTM D421, D2217, D4318 or AASHTO T87, T89, T90, T146;
**Specific Gravity**- ASTM C127, C128, D854 or AASHTO T84, T85, or T100;
**Fineness Modulus**- ASTM C136 or AASHTO T27

| Chart for Coefficients of Curvature and Uniformity | | | | | |
|---|---|---|---|---|---|
| $D_{100}$ | $D_{60}$ | $D_{30}$ | $D_{10}$ | $C_C$ | $C_U$ |
| 4.75 | | | | | |

Note: D100 = particle diameter (mm) corresponding to 100% finer on the particle-size distribution curve. Similarly, D60, D30 and D10 = particle diameter (mm) corresponding to 60, 30 or 10% finer on the particle-size distribution curve, respectively. These values may have been obtained through interpolation or extrapolation. These values are based on only the minus 3-inch material.

| Atterberg Limits | | | |
|---|---|---|---|
| Prep: | Wet | Dry | Spec. |
| LL | | | |
| PL | | | |
| PI | | | |

| Specific Gravity | | | | | |
|---|---|---|---|---|---|
| Coarse | | | Fine | | |
| | Actual | Spec. | | Actual | Spec. |
| Bulk: | | | Bulk: | | |
| Bulk SSD: | | | Bulk SSD: | | |
| Apparent: | | | Apparent: | | |
| Absorption: | | | Absorption: | | |

More Test Results on the Following Page →

R&M Laboratory Test Results Lab # 550
R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

# Density, Moisture, Unit Weight, etc.

**Field #: PND -1**

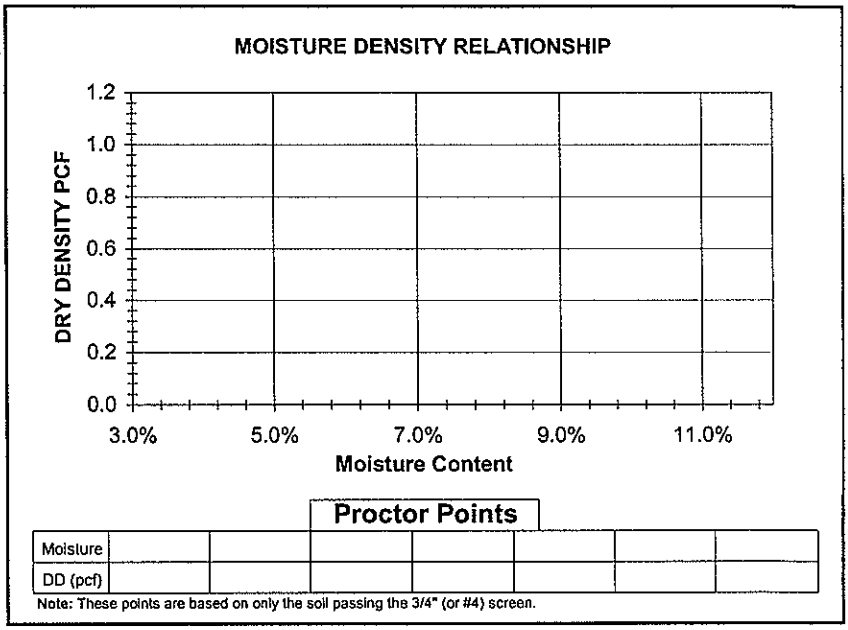
R&M uses the following methods for these tests: **Proctor:** ASTM-D698 or D1557 or D4718 or AASHTO-T99 or T180 or T224 or T272; **Moisture:** ASTM-C566 or D2216 or AASHTO-T217 or T255 or T265; **Unit Weight of Aggregate:** ASTM-C29 or AASHTO-T19; **Brass Liner Dry Density:** ASTM-D2937

| Density (BLDD/Proctor) |
|---|
| Natural Density(BLDD) |
| |
| Max Dry Density |
| |
| Corr. Max Density |
| |

| Moisture |
|---|
| Natural Moisture |
| |
| Optimum Moisture |
| |
| Corr. Opt. Moisture |
| |

| Density - Vibratory Table (D4253) | |
|---|---|
| Maximum Index Density: | |

| Unit Weight | | | |
|---|---|---|---|
| Weight Loose: | | Weight Rodded: | |




| Proctor Points | | | | | | | |
|---|---|---|---|---|---|---|---|
| Moisture | | | | | | | |
| DD (pcf) | | | | | | | |

Note: These points are based on only the soil passing the 3/4" (or #4) screen.

# Aggregate Quality (Degradation, LA Abrasion, Sodium Sulfate)

R&M performs aggregate quality tests using the following methods (whichever apply): **Degradation:** ATM-T13; **LA Abrasion:** ASTM-C131 or C535 or AASHTO-T96; **Sodium Sulfate:** ASTM-C88 or AASHTO-T104

| | Reading | D-Value | Spec. |
|---|---|---|---|
| ATM Deg. | | | |

| | Grading | % Loss | Spec. |
|---|---|---|---|
| LA Abrasion | | | |

| | Fine | Spec. | Coarse | Spec. |
|---|---|---|---|---|
| Sodium Sulfate | | | | |

# Fracture, SE, Organic, pH, Friable Particles, etc.

Test Methods Used are as follows: **Sand Equivalent:** ASTM-D2419 or AASHTO T176; **Organic Content:** ASTM-D2974 or AASHTO-T267; **pH Level:** ASTM-D4972 or AASHTO T-289 or ATM-T29; **Friable Particles:** ASTM-C142 or AASHTO-T112; **Uncompacted Voids:** ASTM-C1252 or AASHTO-T304; **Permeability:** ASTM-D2434 or AASHTO-T215

| | Actual | Spec. |
|---|---|---|
| Sand Equivalent Value: | | |
| Organic Content: | | |
| pH in $H_2O$: | | |
| pH in $CaCl_2$: | | |
| Friable Particles: | | |
| Uncompacted Voids: | | |
| Permeability: | | |

| Fracture Count | | | | |
|---|---|---|---|---|
| Size | 1 Face | Spec. | 2 Face | Spec. |
| + 1" | | | | |
| 1" - 3/4" | | | | |
| 3/4" - 3/8" | | | | |
| 3/8" - #4 | | | | |
| #4 - #10 | | | | |
| Combined | | | | |

ASTM DESCRIPTION: _____

REMARKS: _____

Checked By: Ryan McCormick

Signed By: _____

More Test Results on the Previous Page

# R&M Laboratory Test Results Lab # 550

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

AASHTO R18 AMRL Lab #793

## Client & Sample Information

**Field #: PND -3**

Client: PND Engineers, Inc.
Client Address: Juneau, Alaska

Project: PND - 3
Material/Use: n/a
Test Location: n/a

Sampled From: n/a
Source: n/a

Sampled By: PND
Depth: n/a

Date Sampled: n/a
Quantity Rep: n/a
PO Number:

## Laboratory Sample Data

Received By: RJM
R&M Project No: 1446.01

Date Received: 3/26/2007
Lab No: 550

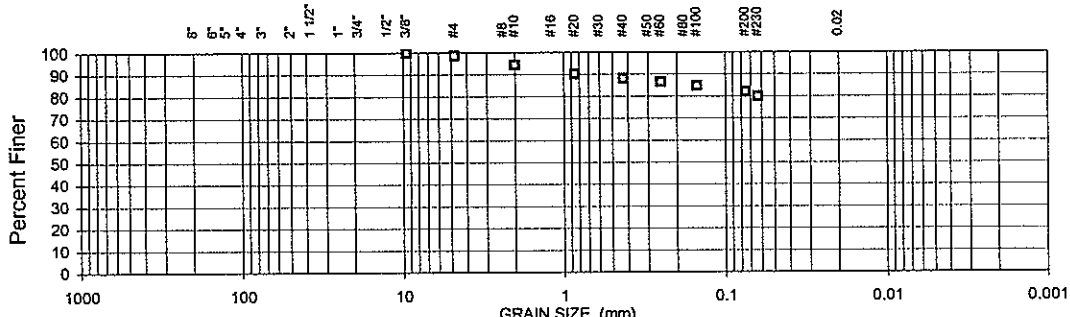
Tech Assigned: RJM
Date Completed: 3/28/2007

## Aggregate & Soils Classification, Atterberg, SpG, etc.

| Grain Size Distribution | | | |
|---|---|---|---|
| Sieve | % Ret. | % Pass | Spec. |
| 6" | | | |
| 5" | | | |
| 4" | | | |
| 3" | | | |
| 2 1/2" | | | |
| 2" | | | |
| 1 1/2" | | | |
| 1 1/4" | | | |
| 1" | | | |
| 3/4" | | | |
| 5/8" | | | |
| 1/2" | | | |
| 3/8" | 0.0 | 100 | |
| 5/16" | | | |
| 1/4" | | | |
| #4 | 1.3 | 99 | |
| #5 | | | |
| #6 | | | |
| #8 | | | |
| #10 | 4.2 | 94 | |
| #12 | | | |
| #16 | | | |
| #20 | 4.2 | 90 | |
| #30 | | | |
| #40 | 2.1 | 88 | |
| #50 | | | |
| #60 | 1.6 | 87 | |
| #70 | | | |
| #80 | | | |
| #100 | 1.7 | 85 | |
| #140 | | | |
| #200 | 2.8 | 82.0 | |
| #230 | 2.0 | 80.0 | |
| .02mm | | | |
| .005mm | | | |
| .002mm | | | |
| .001mm | | | |
| Fineness Modulus: | | | |

R&M performs sieve analyses using one or more of the following test methods (whichever apply): **P200 Wash**: ASTM-C117 or D1140 or AASHTO-T11; **Standard Gradation Only**: ASTM-C136 or AASHTO-T27 or T88; **Gradation w/ Hydrometer**: ASTM-D422 or ATM T-1; **Sieve Analysis of Mineral filler for Asphalt**: ASTM-D546 or AASHTO-T37; **Sieve Analysis of Extracted Aggregate**: ASTM-D5444 or AASHTO-T30

### GRAIN SIZE DISTRIBUTION CHART




**ASTM-USCS Classification**

| Boulders | Cobbles | Gravel | | Sand | | | Silt Clay | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt Clay | Silt Size[1] | C.S.[2] |

[1]ASTM D653 defines "Silt Size" as soil finer than .02mm and coarser than .002mm; [2]ASTM D853 defines "Clay Size" as soil finer than .002mm

| USCS % Boulders & Cobbles | USCS % Gravel | USCS % Sand | USCS % Silt Clay | USCS Classification | AASHTO % Boulders & Cobbles | AASHTO % Gravel | AASHTO % Sand | AASHTO % Silt Clay | AASHTO Classification |
|---|---|---|---|---|---|---|---|---|---|
| | 1.3 | 17.1 | 81.6 | | | 5.5 | 12.9 | 81.6 | |

Note: The USCS (ASTM) and AASHTO classifications were determined using the following test methods, respectively: ASTM-D2487 and AASHTO-M145.
For both USCS and AASHTO: % boulders & cobbles is based on the original field sample; % gravel, sand and silt clay are based on only minus 3 inch material.

Test Methods used are as follows:
$D_{100}$, $D_{60}$, $D_{30}$, $D_{10}$, $C_C$, $C_U$- ASTM D2487
**Atterberg Limits**- ASTM D421, D2217, D4318 or AASHTO T87, T89, T90, T146;
**Specific Gravity**- ASTM C127, C128, D854 or AASHTO T84, T85, or T100;
**Fineness Modulus**- ASTM C136 or AASHTO T27

| Atterberg Limits | | | |
|---|---|---|---|
| Prep: | Wet | Dry | Spec. |
| LL | | | |
| PL | | | |
| PI | | | |

| Chart for Coefficients of Curvature and Uniformity | | | | | |
|---|---|---|---|---|---|
| $D_{100}$ | $D_{60}$ | $D_{30}$ | $D_{10}$ | $C_C$ | $C_U$ |
| 9.5 | | | | | |

Note: D100 = particle diameter (mm) corresponding to 100% finer on the particle-size distribution curve. Similarly, D60, D30 and D10 = particle diameter (mm) corresponding to 60, 30 or 10% finer on the particle-size distribution curve, respectively. These values may have been obtained through interpolation or extrapolation. These values are based on only the minus 3-inch material.

| Specific Gravity | | | | | |
|---|---|---|---|---|---|
| Coarse | | | Fine | | |
| | Actual | Spec. | | Actual | Spec. |
| Bulk: | | | Bulk: | | |
| Bulk SSD: | | | Bulk SSD: | | |
| Apparent: | | | Apparent: | | |
| Absorption: | | | Absorption: | | |

More Test Results on the Following Page →

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

# R&M Laboratory Test Results Lab # 550

## Density, Moisture, Unit Weight, etc.

**Field #: PND -3**

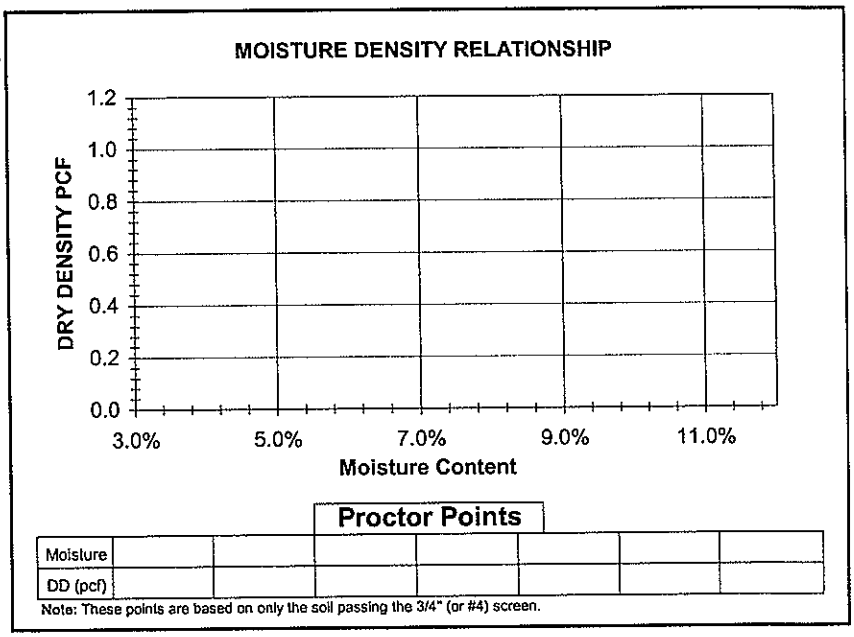
R&M uses the following methods for these tests: **Proctor:** ASTM-D698 or D1557 or D4718 or AASHTO-T99 or T180 or T224 or T272; **Moisture:** ASTM-C566 or D2216 or AASHTO-T217 or T255 or T265; **Unit Weight of Aggregate:** ASTM-C29 or AASHTO-T19; **Brass Liner Dry Density:** ASTM-D2937

| Density (BLDD/Proctor) |
|---|
| Natural Density(BLDD) |
| |
| Max Dry Density |
| |
| Corr. Max Density |
| |

| Moisture |
|---|
| Natural Moisture |
| |
| Optimum Moisture |
| |
| Corr. Opt. Moisture |
| |

| Density - Vibratory Table (D4253) | |
|---|---|
| Maximum Index Density: | |

| Unit Weight | | | |
|---|---|---|---|
| Weight Loose: | | Weight Rodded: | |




| Proctor Points | | | | | | | |
|---|---|---|---|---|---|---|---|
| Moisture | | | | | | | |
| DD (pcf) | | | | | | | |

Note: These points are based on only the soil passing the 3/4" (or #4) screen.

## Aggregate Quality (Degradation, LA Abrasion, Sodium Sulfate)

R&M performs aggregate quality tests using the following methods (whichever apply): **Degradation:** ATM-T13; **LA Abrasion:** ASTM-C131 or C535 or AASHTO-T96; **Sodium Sulfate:** ASTM-C88 or AASHTO-T104

| | Reading | D-Value | Spec. |
|---|---|---|---|
| ATM Deg: | | | |

| | Grading | % Loss | Spec. |
|---|---|---|---|
| LA Abrasion | | | |

| | Fine | Spec. | Coarse | Spec. |
|---|---|---|---|---|
| Sodium Sulfate | | | | |

## Fracture, SE, Organic, pH, Friable Particles, etc.

Test Methods Used are as follows: **Sand Equivalent:** ASTM-D2419 or AASHTO T176; **Organic Content:** ASTM-D2974 or AASHTO-T267; **pH Level:** ASTM-D4972 or AASHTO T-289 or ATM-T29; **Friable Particles:** ASTM-C142 or AASHTO-T112; **Uncompacted Voids:** ASTM-C1252 or AASHTO-T304; **Permeability:** ASTM-D2434 or AASHTO-T215

| | Actual | Spec. |
|---|---|---|
| Sand Equivalent Value: | | |
| Organic Content: | | |
| pH in $H_2O$: | | |
| pH in $CaCl_2$: | | |
| Friable Particles: | | |
| Uncompacted Voids: | | |
| Permeability: | | |

| Fracture Count | | | | |
|---|---|---|---|---|
| Size | 1 Face | Spec. | 2 Face | Spec. |
| + 1" | | | | |
| 1" - 3/4" | | | | |
| 3/4" - 3/8" | | | | |
| 3/8" - #4 | | | | |
| #4 - #10 | | | | |
| Combined | | | | |

ASTM DESCRIPTION: _____

REMARKS: _____

Checked By: Ryan McCormick

Signed By: _____

More Test Results on the Previous Page

# R&M Laboratory Test Results Lab # 550

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

AASHTO R18 AMRL Lab #793

## Client & Sample Information

**Field #: PND 5,6,7**

Client: PND Engineers, Inc.
Client Address: Juneau, Alaska
Project: PND - 5,6,7, combind
Material/Use: n/a
Test Location: n/a
Sampled From: n/a
Sampled By: PND
Date Sampled: n/a
Source: n/a
Depth: n/a
Quantity Rep: n/a
PO Number:

## Laboratory Sample Data

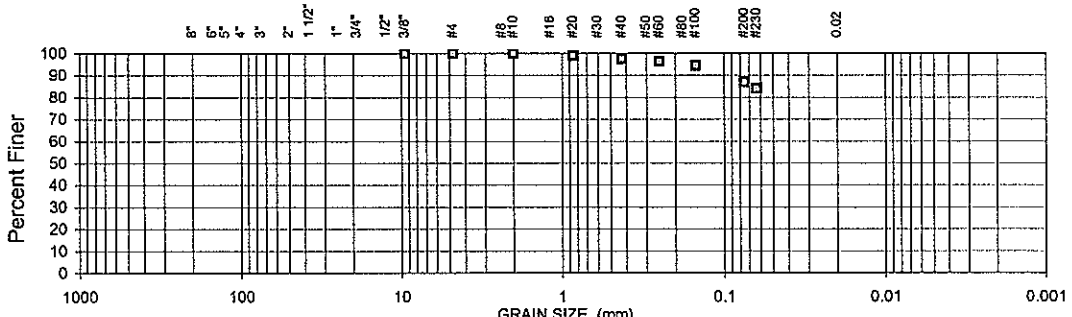
Received By: RJM
Date Received: 3/26/2007
Tech Assigned: RJM
R&M Project No: 1446.01
Lab No: 550
Date Completed: 3/28/2007

## Aggregate & Soils Classification, Atterberg, SpG, etc.

| Grain Size Distribution | | | |
|---|---|---|---|
| Sieve | % Ret. | % Pass | Spec. |
| 6" | | | |
| 5" | | | |
| 4" | | | |
| 3" | | | |
| 2 1/2" | | | |
| 2" | | | |
| 1 1/2" | | | |
| 1 1/4" | | | |
| 1" | | | |
| 3/4" | | | |
| 5/8" | | | |
| 1/2" | | | |
| 3/8" | 0.0 | 100 | |
| 5/16" | | | |
| 1/4" | | | |
| #4 | 0.0 | 100 | |
| #5 | | | |
| #6 | | | |
| #8 | | | |
| #10 | 0.0 | 100 | |
| #12 | | | |
| #16 | | | |
| #20 | 1.1 | 99 | |
| #30 | | | |
| #40 | 1.4 | 97 | |
| #50 | | | |
| #60 | 1.2 | 96 | |
| #70 | | | |
| #80 | | | |
| #100 | 1.9 | 94 | |
| #140 | | | |
| #200 | 7.5 | 87.0 | |
| #230 | 3.0 | 84.0 | |
| .02mm | | | |
| .005mm | | | |
| .002mm | | | |
| .001mm | | | |
| Fineness Modulus: | | | |

R&M performs sieve analyses using one or more of the following test methods (whichever apply): **P200 Wash:** ASTM-C117 or D1140 or AASHTO-T11; **Standard Gradation Only:** ASTM-C136 or AASHTO-T27 or T88; **Gradation w/ Hydrometer:** ASTM-D422 or ATM T-1; **Sieve Analysis of Mineral filler for Asphalt:** ASTM-D546 or AASHTO-T37; **Sieve Analysis of Extracted Aggregate:** ASTM-D5444 or AASHTO-T30

### GRAIN SIZE DISTRIBUTION CHART




**ASTM-USCS Classification**

| Boulders | Cobbles | Gravel | | Sand | | | Silt Clay | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt Clay | Silt Size[1] | C.S.[2] |

[1]ASTM D653 defines "Silt Size" as soil finer than .02mm and coarser than .002mm; [2]ASTM D653 defines "Clay Size" as soil finer than .002mm

| USCS % Boulders & Cobbles | USCS % Gravel | USCS % Sand | USCS % Silt Clay | USCS Classification | AASHTO % Boulders & Cobbles | AASHTO % Gravel | AASHTO % Sand | AASHTO % Silt Clay | AASHTO Classification |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 13.1 | 86.9 | | | 0.0 | 13.1 | 86.9 | |

Note: The USCS (ASTM) and AASHTO classifications were determined using the following test methods, respectively: ASTM-D2487 and AASHTO-M145.
For both USCS and AASHTO: % boulders & cobbles is based on the original field sample; % gravel, sand and silt clay are based on only minus 3 inch material.

Test Methods used are as follows:
**$D_{100}$, $D_{60}$, $D_{30}$, $D_{10}$, $C_C$, $C_U$**- ASTM D2487
**Atterberg Limits**- ASTM D421, D2217, D4318 or AASHTO T87, T89, T90, T146;
**Specific Gravity**- ASTM C127, C128, D854 or AASHTO T84, T85, or T100;
**Fineness Modulus**- ASTM C136 or AASHTO T27

| Chart for Coefficients of Curvature and Uniformity | | | | | |
|---|---|---|---|---|---|
| $D_{100}$ | $D_{60}$ | $D_{30}$ | $D_{10}$ | $C_C$ | $C_U$ |
| 9.5 | | | | | |

Note: D100 = particle diameter (mm) corresponding to 100% finer on the particle-size distribution curve. Similarly, D60, D30 and D10 = particle diameter (mm) corresponding to 60, 30 or 10% finer on the particle-size distribution curve, respectively. These values may have been obtained through interpolation or extrapolation. These values are based on only the minus 3-inch material.

| Atterberg Limits | | | |
|---|---|---|---|
| Prep: | Wet | Dry | Spec. |
| LL | | | |
| PL | | | |
| PI | | | |

| Specific Gravity | | | | | |
|---|---|---|---|---|---|
| Coarse | | | Fine | | |
| | Actual | Spec. | | Actual | Spec. |
| Bulk: | | | Bulk: | | |
| Bulk SSD: | | | Bulk SSD: | | |
| Apparent: | | | Apparent: | | |
| Absorption: | | | Absorption: | | |

More Test Results on the Following Page

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

## Density, Moisture, Unit Weight, etc.

**Field #: PND 5,6,7**

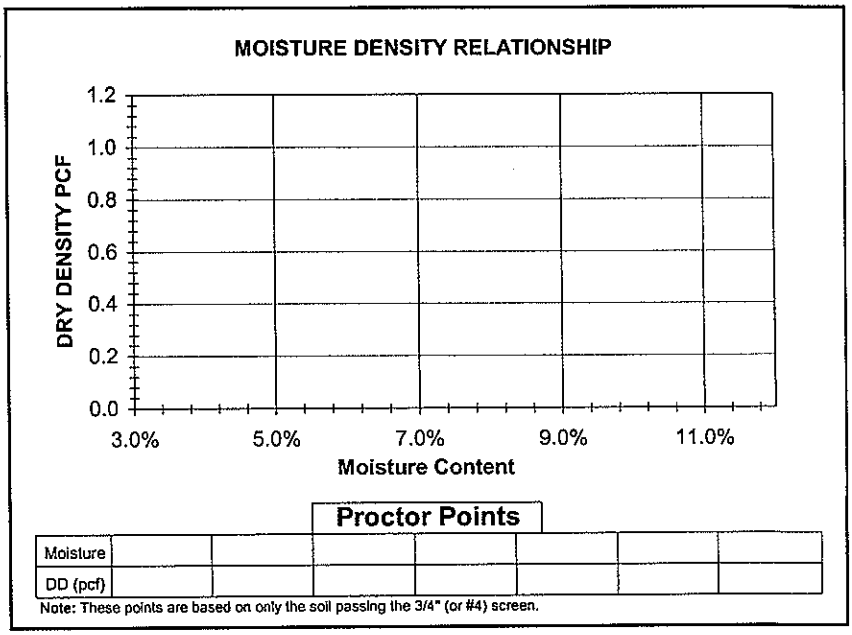
R&M uses the following methods for these tests: **Proctor**: ASTM-D698 or D1557 or D4718 or AASHTO-T99 or T180 or T224 or T272; **Moisture**: ASTM-C566 or D2216 or AASHTO-T217 or T255 or T265; **Unit Weight of Aggregate**: ASTM-C29 or AASHTO-T19; **Brass Liner Dry Density**: ASTM-D2937

| Density (BLDD/Proctor) |
|---|
| Natural Density(BLDD) |
| |
| Max Dry Density |
| |
| Corr. Max Density |
| |

| Moisture |
|---|
| Natural Moisture |
| |
| Optimum Moisture |
| |
| Corr. Opt. Moisture |
| |

| Density - Vibratory Table (D4253) | |
|---|---|
| Maximum Index Density: | |

| Unit Weight | | | |
|---|---|---|---|
| Weight Loose: | | Weight Rodded: | |




| Proctor Points | | | | | | | |
|---|---|---|---|---|---|---|---|
| Moisture | | | | | | | |
| DD (pcf) | | | | | | | |

Note: These points are based on only the soil passing the 3/4" (or #4) screen.

## Aggregate Quality (Degradation, LA Abrasion, Sodium Sulfate)

R&M performs aggregate quality tests using the following methods (whichever apply): **Degradation**: ATM-T13; **LA Abrasion**: ASTM-C131 or C535 or AASHTO-T96; **Sodium Sulfate**: ASTM-C88 or AASHTO-T104

| | Reading | D-Value | Spec. |
|---|---|---|---|
| ATM Deg. | | | |

| | Grading | % Loss | Spec. |
|---|---|---|---|
| LA Abrasion | | | |

| | Fine | Spec. | Coarse | Spec. |
|---|---|---|---|---|
| Sodium Sulfate | | | | |

## Fracture, SE, Organic, pH, Friable Particles, etc.

Test Methods Used are as follows: **Sand Equivalent**: ASTM-D2419 or AASHTO T176; **Organic Content**: ASTM-D2974 or AASHTO-T267; **pH Level**: ASTM-D4972 or AASHTO T-289 or ATM-T29; **Friable Particles**: ASTM-C142 or AASHTO-T112; **Uncompacted Voids**: ASTM-C1252 or AASHTO-T304; **Permeability**: ASTM-D2434 or AASHTO-T215

| | Actual | Spec. |
|---|---|---|
| Sand Equivalent Value: | | |
| Organic Content: | | |
| pH in $H_2O$: | | |
| pH in $CaCl_2$: | | |
| Friable Particles: | | |
| Uncompacted Voids: | | |
| Permeability: | | |

| Fracture Count | | | | |
|---|---|---|---|---|
| Size | 1 Face | Spec. | 2 Face | Spec. |
| + 1" | | | | |
| 1" - 3/4" | | | | |
| 3/4" - 3/8" | | | | |
| 3/8" - #4 | | | | |
| #4 - #10 | | | | |
| Combined | | | | |

ASTM DESCRIPTION: _____

REMARKS: _____

Checked By: Ryan McCormick

Signed By: _____

More Test Results on the Previous Page

# R&M Laboratory Test Results Lab # 550

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

AASHTO R18 AMRL Lab #793

## Client & Sample Information

**Field #: n/a**

Client: PND Engineers, Inc.
Client Address: Juneau, Alaska

Project: New Surface Dredge
Material/Use: n/a
Test Location: n/a

Sampled From: n/a
Source: n/a
Sampled By: PND
Depth: n/a
Date Sampled: n/a
Quantity Rep: n/a
PO Number:

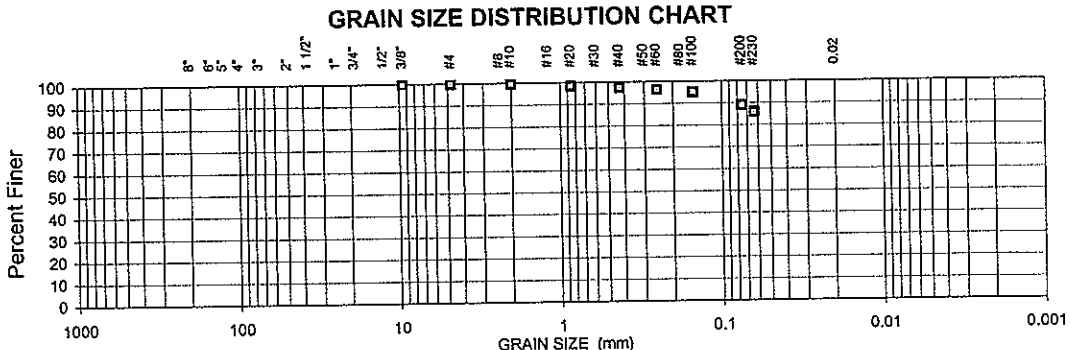
## Laboratory Sample Data

Received By: RJM
R&M Project No: 1446.01
Date Received: 3/26/2007
Lab No: 550
Tech Assigned: RJM
Date Completed: 3/28/2007

## Aggregate & Soils Classification, Atterberg, SpG, etc.

| Grain Size Distribution | | | |
|---|---|---|---|
| Sieve | % Ret. | % Pass | Spec. |
| 6" | | | |
| 5" | | | |
| 4" | | | |
| 3" | | | |
| 2 1/2" | | | |
| 2" | | | |
| 1 1/2" | | | |
| 1 1/4" | | | |
| 1" | | | |
| 3/4" | | | |
| 5/8" | | | |
| 1/2" | | | |
| 3/8" | 0.0 | 100 | |
| 5/16" | | | |
| 1/4" | | | |
| #4 | 0.3 | 100 | |
| #5 | | | |
| #6 | | | |
| #8 | | | |
| #10 | 0.2 | 99 | |
| #12 | | | |
| #16 | | | |
| #20 | 1.0 | 98 | |
| #30 | | | |
| #40 | 1.1 | 97 | |
| #50 | | | |
| #60 | 1.0 | 96 | |
| #70 | | | |
| #80 | | | |
| #100 | 1.4 | 95 | |
| #140 | | | |
| #200 | 6.0 | 89.0 | |
| #230 | 3.0 | 86.0 | |
| .02mm | | | |
| .005mm | | | |
| .002mm | | | |
| .001mm | | | |
| Fineness Modulus: | | | |

R&M performs sieve analyses using one or more of the following test methods (whichever apply): **P200 Wash:** ASTM-C117 or D1140 or AASHTO-T11; **Standard Gradation Only:** ASTM-C136 or AASHTO-T27 or T88; **Gradation w/ Hydrometer:** ASTM-D422 or ATM T-1; **Sieve Analysis of Mineral filler for Asphalt:** ASTM-D546 or AASHTO-T37; **Sieve Analysis of Extracted Aggregate:** ASTM-D5444 or AASHTO-T30




| ASTM-USCS Classification | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Boulders | Cobbles | Gravel | | Sand | | | Silt Clay | | |
| | | Coarse | Fine | Coarse | Medium | Fine | Silt Clay | Silt Size[1] | C.S.[2] |

[1]ASTM D653 defines "Silt Size" as soil finer than .02mm and coarser than .002mm; [2]ASTM D653 defines "Clay Size" as soil finer than .002mm

| USCS % Boulders & Cobbles | USCS % Gravel | USCS % Sand | USCS % Silt Clay | USCS Classification | AASHTO % Boulders & Cobbles | AASHTO % Gravel | AASHTO % Sand | AASHTO % Silt Clay | AASHTO Classification |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | 10.4 | 89.2 | | | 0.5 | 10.2 | 89.2 | |

Note: The USCS (ASTM) and AASHTO classifications were determined using the following test methods, respectively: ASTM-D2487 and AASHTO-M145.
For both USCS and AASHTO: % boulders & cobbles is based on the original field sample; % gravel, sand and silt clay are based on only minus 3 inch material.

Test Methods used are as follows:
$D_{100}$, $D_{60}$, $D_{30}$, $D_{10}$, $C_C$, $C_U$- ASTM D2487
**Atterberg Limits**- ASTM D421, D2217, D4318 or AASHTO T87, T89, T90, T146;
**Specific Gravity**- ASTM C127, C128, D854 or AASHTO T84, T85, or T100;
**Fineness Modulus**- ASTM C136 or AASHTO T27

| Chart for Coefficients of Curvature and Uniformity | | | | | |
|---|---|---|---|---|---|
| $D_{100}$ | $D_{60}$ | $D_{30}$ | $D_{10}$ | $C_C$ | $C_U$ |
| 9.5 | | | | | |

Note: D100 = particle diameter (mm) corresponding to 100% finer on the particle-size distribution curve. Similarly, D60, D30 and D10 = particle diameter (mm) corresponding to 60, 30 or 10% finer on the particle-size distribution curve, respectively. These values may have been obtained through interpolation or extrapolation. These values are based on only the minus 3-inch material.

| Atterberg Limits | | | |
|---|---|---|---|
| Prep: | Wet | Dry | Spec. |
| LL | | | |
| PL | | | |
| PI | | | |

| Specific Gravity | | | | | |
|---|---|---|---|---|---|
| Coarse | | | Fine | | |
| | Actual | Spec. | | Actual | Spec. |
| Bulk: | | | Bulk: | | |
| Bulk SSD: | | | Bulk SSD: | | |
| Apparent: | | | Apparent: | | |
| Absorption: | | | Absorption: | | |

More Test Results on the Following Page

R&M Laboratory Test Results Lab # 550
R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

## Density, Moisture, Unit Weight, etc.

**Field #:** n/a

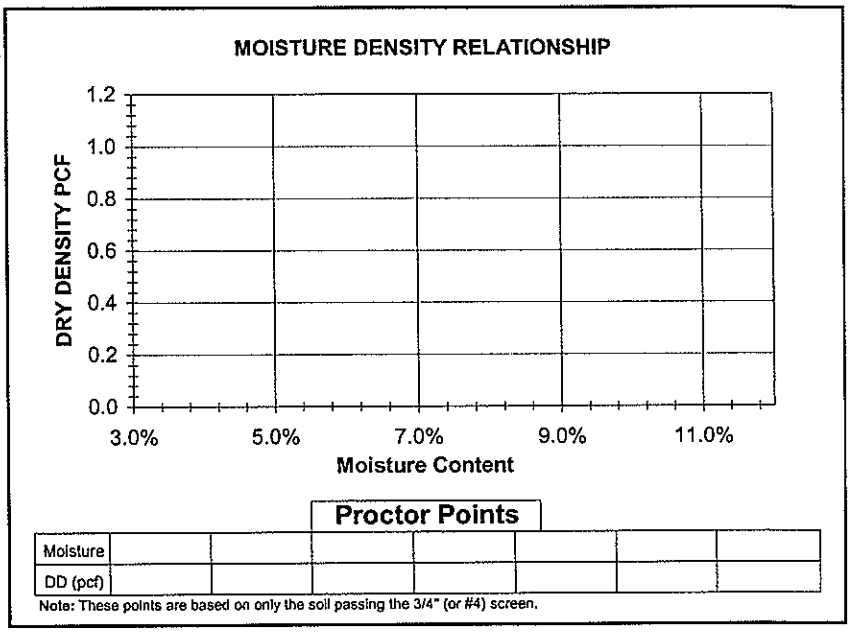
R&M uses the following methods for these tests: **Proctor:** ASTM-D698 or D1557 or D4718 or AASHTO-T99 or T180 or T224 or T272; **Moisture:** ASTM-C566 or D2216 or AASHTO-T217 or T255 or T265; **Unit Weight of Aggregate:** ASTM-C29 or AASHTO-T19; **Brass Liner Dry Density:** ASTM-D2937

| Density (BLDD/Proctor) |
|---|
| Natural Density(BLDD) |
| |
| Max Dry Density |
| |
| Corr. Max Density |
| |

| Moisture |
|---|
| Natural Moisture |
| |
| Optimum Moisture |
| |
| Corr. Opt. Moisture |
| |

| Density - Vibratory Table (D4253) | |
|---|---|
| Maximum Index Density: | |

| Unit Weight | | | |
|---|---|---|---|
| Weight Loose: | | Weight Rodded: | |




| Proctor Points | | | | | | | |
|---|---|---|---|---|---|---|---|
| Moisture | | | | | | | |
| DD (pcf) | | | | | | | |

Note: These points are based on only the soil passing the 3/4" (or #4) screen.

## Aggregate Quality (Degradation, LA Abrasion, Sodium Sulfate)

R&M performs aggregate quality tests using the following methods (whichever apply): **Degradation:** ATM-T13; **LA Abrasion:** ASTM-C131 or C535 or AASHTO-T96; **Sodium Sulfate:** ASTM-C88 or AASHTO-T104

| | Reading | D-Value | Spec. |
|---|---|---|---|
| ATM Deg. | | | |

| | Grading | % Loss | Spec. |
|---|---|---|---|
| LA Abrasion | | | |

| | Fine | Spec. | Coarse | Spec. |
|---|---|---|---|---|
| Sodium Sulfate | | | | |

## Fracture, SE, Organic, pH, Friable Particles, etc.

Test Methods Used are as follows: **Sand Equivalent:** ASTM-D2419 or AASHTO T176; **Organic Content:** ASTM-D2974 or AASHTO-T267; **pH Level:** ASTM-D4972 or AASHTO T-289 or ATM-T29; **Friable Particles:** ASTM-C142 or AASHTO-T112; **Uncompacted Voids:** ASTM-C1252 or AASHTO-T304; **Permeability:** ASTM-D2434 or AASHTO-T215

| | Actual | Spec. |
|---|---|---|
| Sand Equivalent Value: | | |
| Organic Content: | | |
| pH in $H_2O$: | | |
| pH in $CaCl_2$: | | |
| Friable Particles: | | |
| Uncompacted Voids: | | |
| Permeability: | | |

| Fracture Count | | | | |
|---|---|---|---|---|
| Size | 1 Face | Spec. | 2 Face | Spec. |
| + 1" | | | | |
| 1" - 3/4" | | | | |
| 3/4" - 3/8" | | | | |
| 3/8" - #4 | | | | |
| #4 - #10 | | | | |
| Combined | | | | |

ASTM DESCRIPTION: _____

REMARKS: _____

Checked By: Ryan McCormick

Signed By: _____

More Test Results on the Previous Page

# R&M Laboratory Test Results Lab # 550

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

AASHTO R18 AMRL Lab #793

## Client & Sample Information

**Field #: n/a**

Client: PND Engineers, Inc.
Client Address: Juneau, Alaska

Project: Harbor Dredge
Material/Use: n/a
Test Location: n/a

Sampled From: n/a
Source: n/a

Sampled By: PND
Depth: n/a

Date Sampled: n/a
Quantity Rep: n/a
PO Number:

## Laboratory Sample Data

Received By: RJM
R&M Project No: 1446.01

Date Received: 3/26/2007
Lab No: 550

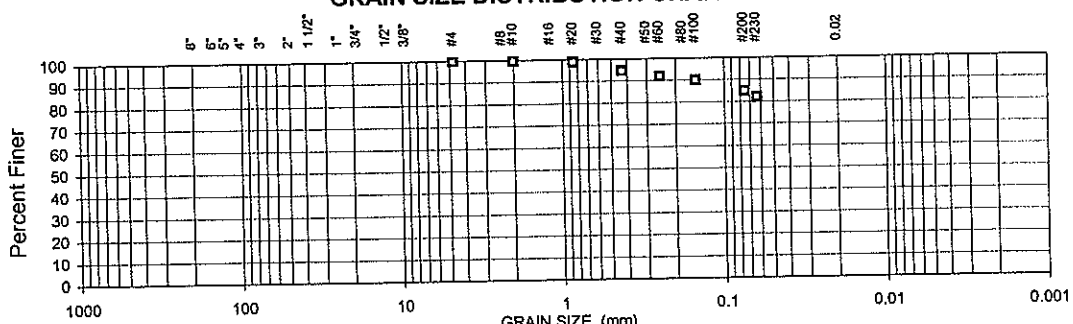
Tech Assigned: RJM
Date Completed: 3/28/2007

## Aggregate & Soils Classification, Atterberg, SpG, etc.

| Grain Size Distribution | | | |
|---|---|---|---|
| Sieve | % Ret. | % Pass | Spec. |
| 6" | | | |
| 5" | | | |
| 4" | | | |
| 3" | | | |
| 2 1/2" | | | |
| 2" | | | |
| 1 1/2" | | | |
| 1 1/4" | | | |
| 1" | | | |
| 3/4" | | | |
| 5/8" | | | |
| 1/2" | | | |
| 3/8" | | | |
| 5/16" | | | |
| 1/4" | | | |
| #4 | 0.0 | 100 | |
| #5 | | | |
| #6 | | | |
| #8 | | | |
| #10 | 0.2 | 100 | |
| #12 | | | |
| #16 | | | |
| #20 | 0.7 | 99 | |
| #30 | | | |
| #40 | 4.3 | 95 | |
| #50 | | | |
| #60 | 2.8 | 92 | |
| #70 | | | |
| #80 | | | |
| #100 | 1.9 | 90 | |
| #140 | | | |
| #200 | 5.1 | 85.0 | |
| #230 | 3.0 | 82.0 | |
| .02mm | | | |
| .005mm | | | |
| .002mm | | | |
| .001mm | | | |
| Fineness Modulus: | | | |

R&M performs sieve analyses using one or more of the following test methods (whichever apply): **P200 Wash:** ASTM-C117 or D1140 or AASHTO-T11; **Standard Gradation Only:** ASTM-C136 or AASHTO-T27 or T88; **Gradation w/ Hydrometer:** ASTM-D422 or ATM T-1; **Sieve Analysis of Mineral filler for Asphalt:** ASTM-D546 or AASHTO-T37; **Sieve Analysis of Extracted Aggregate:** ASTM-D5444 or AASHTO-T30

**GRAIN SIZE DISTRIBUTION CHART**




**ASTM-USCS Classification**

| Boulders | Cobbles | Gravel | | Sand | | | Silt Clay | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt Clay | Silt Size[1] | C.S.[2] |

[1]ASTM D653 defines "Silt Size" as soil finer than .02mm and coarser than .002mm; [2]ASTM D653 defines "Clay Size" as soil finer than .002mm

| USCS % Boulders & Cobbles | USCS % Gravel | USCS % Sand | USCS % Silt Clay | USCS Classification | AASHTO % Boulders & Cobbles | AASHTO % Gravel | AASHTO % Sand | AASHTO % Silt Clay | AASHTO Classification |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 15.3 | 84.7 | | | 0.2 | 15.1 | 84.7 | |

Note: The USCS (ASTM) and AASHTO classifications were determined using the following test methods, respectively: ASTM-D2487 and AASHTO-M145.
For both USCS and AASHTO: % boulders & cobbles is based on the original field sample; % gravel, sand and silt clay are based on only minus 3 inch material.

Test Methods used are as follows:
**$D_{100}$, $D_{60}$, $D_{30}$, $D_{10}$, $C_C$, $C_U$**- ASTM D2487
**Atterberg Limits**- ASTM D421, D2217, D4318 or AASHTO T87, T89, T90, T146;
**Specific Gravity**- ASTM C127, C128, D854 or AASHTO T84, T85, or T100;
**Fineness Modulus**- ASTM C136 or AASHTO T27

| Atterberg Limits | | | |
|---|---|---|---|
| Prep: | Wet | Dry | Spec. |
| LL | | | |
| PL | | | |
| PI | | | |

| Chart for Coefficients of Curvature and Uniformity | | | | | |
|---|---|---|---|---|---|
| $D_{100}$ | $D_{60}$ | $D_{30}$ | $D_{10}$ | $C_C$ | $C_U$ |
| 4.75 | | | | | |

Note: D100 = particle diameter (mm) corresponding to 100% finer on the particle-size distribution curve. Similarly, D60, D30 and D10 = particle diameter (mm) corresponding to 60, 30 or 10% finer on the particle-size distribution curve, respectively. These values may have been obtained through interpolation or extrapolation. These values are based on only the minus 3-inch material.

| Specific Gravity | | | | | |
|---|---|---|---|---|---|
| Coarse | | | Fine | | |
| | Actual | Spec. | | Actual | Spec. |
| Bulk: | | | Bulk: | | |
| Bulk SSD: | | | Bulk SSD: | | |
| Apparent: | | | Apparent: | | |
| Absorption: | | | Absorption: | | |

More Test Results on the Following Page →

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

## Density, Moisture, Unit Weight, etc.

**Field #:** n/a

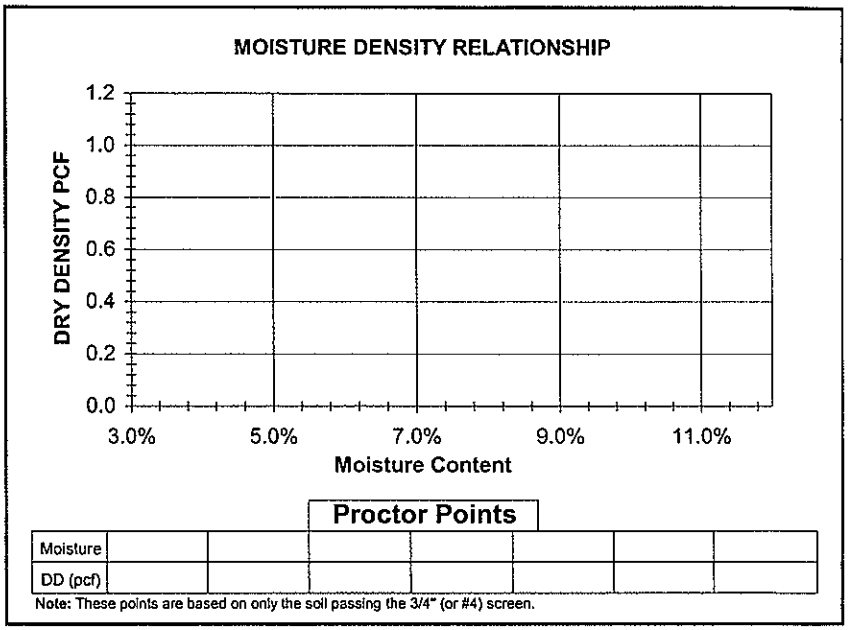
R&M uses the following methods for these tests: **Proctor:** ASTM-D698 or D1557 or D4718 or AASHTO-T99 or T180 or T224 or T272; **Moisture:** ASTM-C566 or D2216 or AASHTO-T217 or T255 or T265; **Unit Weight of Aggregate:** ASTM-C29 or AASHTO-T19; **Brass Liner Dry Density:** ASTM-D2937

| Density (BLDD/Proctor) |
|---|
| Natural Density(BLDD) |
| |
| Max Dry Density |
| |
| Corr. Max Density |
| |

| Moisture |
|---|
| Natural Moisture |
| |
| Optimum Moisture |
| |
| Corr. Opt. Moisture |
| |

| Density - Vibratory Table (D4253) | |
|---|---|
| Maximum Index Density: | |

| Unit Weight | | | |
|---|---|---|---|
| Weight Loose: | | Weight Rodded: | |




| Proctor Points | | | | | | | |
|---|---|---|---|---|---|---|---|
| Moisture | | | | | | | |
| DD (pcf) | | | | | | | |

Note: These points are based on only the soil passing the 3/4" (or #4) screen.

## Aggregate Quality (Degradation, LA Abrasion, Sodium Sulfate)

R&M performs aggregate quality tests using the following methods (whichever apply): **Degradation:** ATM-T13; **LA Abrasion:** ASTM-C131 or C535 or AASHTO-T96; **Sodium Sulfate:** ASTM-C88 or AASHTO-T104

| | Reading | D-Value | Spec. |
|---|---|---|---|
| ATM Deg. | | | |

| | Grading | % Loss | Spec. |
|---|---|---|---|
| LA Abrasion | | | |

| | Fine | Spec. | Coarse | Spec. |
|---|---|---|---|---|
| Sodium Sulfate | | | | |

## Fracture, SE, Organic, pH, Friable Particles, etc.

Test Methods Used are as follows: **Sand Equivalent:** ASTM-D2419 or AASHTO T176; **Organic Content:** ASTM-D2974 or AASHTO-T267; **pH Level:** ASTM-D4972 or AASHTO T-289 or ATM-T29; **Friable Particles:** ASTM-C142 or AASHTO-T112; **Uncompacted Voids:** ASTM-C1252 or AASHTO-T304; **Permeability:** ASTM-D2434 or AASHTO-T215

| | Actual | Spec. |
|---|---|---|
| Sand Equivalent Value: | | |
| Organic Content: | | |
| pH in $H_2O$: | | |
| pH in $CaCl_2$: | | |
| Friable Particles: | | |
| Uncompacted Voids: | | |
| Permeability: | | |

| Fracture Count | | | | |
|---|---|---|---|---|
| Size | 1 Face | Spec. | 2 Face | Spec. |
| + 1" | | | | |
| 1" - 3/4" | | | | |
| 3/4" - 3/8" | | | | |
| 3/8" - #4 | | | | |
| #4 - #10 | | | | |
| Combined | | | | |

ASTM DESCRIPTION: _____

REMARKS: _____

Checked By: Ryan McCormick

Signed By: _____

More Test Results on the Previous Page