### Appendix B

**MATERIALS TESTING REPORT:**
**UNIFIED CLASSIFICATION SYSTEM**
**ASTM D2487**

<table>
<thead>
<tr>
<th>Identification</th>
<th>Coarse fraction</th>
<th>Fine fraction</th>
<th>Total soil</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Testing section sample No.**
- **Test hole No.**
- **Field sample No.**
- **Depth (B):**
- **Minimum size (mm):**
- **Particle shape:**
- **Particle condition:**
- **Gravel (in. to No. 4):**
- **Sand (No. 4 to 200):**
- **Fines (No. 200):**
- **Plasticity:**
- **Dry strength:**
- **Dilatancy:**
- **Organic content (wt.):**
- **Residual to HCL:**
- **Color (code):**

**Description**
(classification, grading, structure, consistency, moisture condition, inclusions, etc.)

**Group symbol**

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Signature</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
</table>

**Fig. 1B**—Materials testing report: unified classification system (ASTM D2487).
### MATERIALS TESTING REPORT:
**UNIFIED SOIL CLASSIFICATION SYSTEM VISUAL-MANUAL PROCEDURE**
ASTM D2488

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Symbol</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angular</td>
<td>Irregular shape: sharp edges.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Subangular</td>
<td>Irregular shape; fairly sharp edges.</td>
<td>SA</td>
<td></td>
</tr>
<tr>
<td>Subrounded</td>
<td>Irregular shape, rounded edges.</td>
<td>SR</td>
<td></td>
</tr>
<tr>
<td>Rounded</td>
<td>Fairly regular shape; rounded edges.</td>
<td>R</td>
<td></td>
</tr>
</tbody>
</table>

**Particle condition**
- **Soft** S: Rubber pestle will break particles.
- **Vesicular** V: Individual grains contain air voids.
- **Dense** D: Massive: grains contain no air voids.
- **High** H: Tough thread, will remold before plastic limit.
- **Medium** M: Medium tough thread, crumbles below plastic limit.
- **Low** L: Weak thread, will not remold at plastic limit.
- **None** N: Will not form thread.

**Plasticity**
- **High** H: Difficult to break by finger pressure.
- **Medium** M: Considerable finger pressure to crumble
- **Low** L: Will crumble at light finger pressure.
- **None** N: Will not form soil pat.

**Dry strength**
- **Rapid** R: Water surfaces immediately.
- **Slow** S: Water surfaces slowly.
- **None** N: Water will not surface.

**Dilatance**
- **Rapid** R: Water surfaces immediately.
- **Slow** S: Water surfaces slowly.
- **None** N: Water will not surface.

**HCL**
- **Positive** +: Effervescence
- **Negative** -: No reaction

**Organic odor**
- **Strong** S: Strong odor when moist and hot.
- **Weak** W: Weak odor when moist and hot.
- **None** N: No organic odor.

<table>
<thead>
<tr>
<th>Group</th>
<th>Organic odor</th>
<th>Visual examination</th>
<th>Character of fines (≤ No. 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Grading</td>
<td>Percent fines</td>
</tr>
<tr>
<td>ML</td>
<td>Weak</td>
<td></td>
<td>Over 50</td>
</tr>
<tr>
<td>CL</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>CH</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MH</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>OL,OH</td>
<td>Strong</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>SM</td>
<td>Weak</td>
<td>Not a criterion for classification</td>
<td>12 - 50</td>
</tr>
<tr>
<td>GM</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>SC</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>GC</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>SP</td>
<td>&quot;</td>
<td>Poor</td>
<td>Under 5</td>
</tr>
<tr>
<td>GP</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>SW</td>
<td>&quot;</td>
<td>Well</td>
<td>&quot;</td>
</tr>
<tr>
<td>GW</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>Pt</td>
<td>Strong</td>
<td>Identify by high fibrous organic content</td>
<td></td>
</tr>
</tbody>
</table>

*Fig. 2B—Materials testing report: unified soil classification system visual-manual procedure (ASTM D2488).*
Material Testing Report
Reference Density Compaction Curve

<table>
<thead>
<tr>
<th>Project</th>
<th>Laboratory No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field sample No.</td>
<td>Location</td>
</tr>
<tr>
<td>Geologic origin</td>
<td>Tested at</td>
</tr>
<tr>
<td>Classification</td>
<td>LL</td>
</tr>
<tr>
<td>Maximum particle size in test</td>
<td>Standard (ASTM D-698), method</td>
</tr>
<tr>
<td>Specific gravity (Gs):</td>
<td>No. 4</td>
</tr>
<tr>
<td>+No. 4</td>
<td></td>
</tr>
</tbody>
</table>

Remarks
___________________________________________________________________________________________
___________________________________________________________________________________________
___________________________________________________________________________________________

Fig. 3B—Material testing report, reference density compaction curve.
## Worksheet for Reference Density Compaction Data

<table>
<thead>
<tr>
<th>Project</th>
<th>Site</th>
<th>Sample No.</th>
</tr>
</thead>
</table>

### Compaction Data

<table>
<thead>
<tr>
<th>1. Weight of cylinder plus moist soil</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Weight of cylinder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Dry density = ([4] × 100) ÷ 100 + (6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Moisture Determination Data

| 6. Moisture content = ([10] ÷ [12]) × 100 |  |
| 7. Container No. |  |
| 8. Weight of container plus moist soil |  |
| 9. Weight of container plus dry soil |  |
| 11. Weight of container |  |

Volume of cylinder using: ASTM Standard D 698/D 1557, method

Procedure data: weight of hammer: lb, drop in., number of lifts

Completed by Date Computed by Date

Checked by Date Recorded by Date

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Fig. 4B—Worksheet for reference density compaction data.
BULK SAND DENSITY DETERMINATION AND CALIBRATION OF CONE AND BASE PLATE FOR ASTM D1556

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor:</td>
<td>Contract No.</td>
</tr>
<tr>
<td>Material source:</td>
<td>Tested by:</td>
</tr>
</tbody>
</table>

Bulk Density of Sand

<table>
<thead>
<tr>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Volume of Mold, ft³ (predetermined)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Initial Weight of Jar + Sand (lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Final Weight of Jar + Sand (lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Weight of Sand in Cone &amp; Plate (lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Weight of Sand in Mold, lbs (2) – (3) – (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Bulk Density of Sand, lbs/ft³ (5) / (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent Difference From Average

% Difference from Avg. = [(Avg. of 3 trials – Trial #___) / Avg. of 3 Trials] x 100

(Trials should not exceed 1% difference from the average.)

Weight of Sand in Cone & Plate

<table>
<thead>
<tr>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(7) Initial Weight of Jar + Sand (lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) Final Weight of Jar + Sand (lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Weight of Sand in Cone and Plate (8) – (7) (lbs)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent Difference From Average

% Difference from Avg. = [(Avg. of 3 trials – Trial #___) / Avg. of 3 Trials] x 100

(Trials should not exceed 1% difference from the average.)

Fig. 5B—Bulk sand density determination and calibration of cone and base plate for ASTM D1556.
IN-PLACE MOISTURE-DENSITY DETERMINATION:
TEST RECORD FOR SAND CONE METHOD
ASTM D1556

Fined grained soils—less than 5% + oversize\(^1\)

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Location of test</th>
<th>Spec. requirements</th>
<th>Test results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Station</td>
<td>Moisture range (%)</td>
<td>Moisture (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Centerline offset</td>
<td>Mass dry density (lb/ft(^3))</td>
<td>Mass dry density (lb/ft(^3))</td>
</tr>
</tbody>
</table>

Remarks:

\(^1\)Oversize correction required based on method selected in ASTM D698 or D1557.

Indicate weight and volume units used in test.

Fig. 6B—in-place moisture-density determination: test record for sand cone method (ASTM D1556), fine-grained soils—less than 5% + oversize\(^1\).
## IN-PLACE MOISTURE-DENSITY DETERMINATION:
### TEST DATA FOR SAND CONE METHOD
#### ASTM D1556

**Fine grained soils—less than 5% + oversize**

### Volume Determination

<table>
<thead>
<tr>
<th>Test No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bulk density of sand (predetermined):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Initial weight of sand, cone, and container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Final weight of sand, cone, and container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Weight of sand in plate plus cone (predetermined):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Volume of hole = [6] ÷ [1]:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Moisture Determination

<table>
<thead>
<tr>
<th>Container No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample tested using:</td>
<td>direct heat</td>
<td>oven</td>
<td>microwave</td>
<td></td>
</tr>
<tr>
<td>8. Weight of moist sample and container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Weight of dry sample and container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Weight of container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Moisture content = ([10] ÷ [12]) 100:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Correction for ignition:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Density Determination

<table>
<thead>
<tr>
<th>Container No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Weight of moist sample plus container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Weight of container:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Weight of moist sample =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Wet density = [18] ÷ [7]:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Dry density = [18] ÷ [1 + [15]/100]:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Required density =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Ratio$^1$ = ([20] ÷ [21]) 100:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

$^1$Oversize correction required based on method selected in ASTM D698 or D1557. 
Indicate weight and volume units used in test.

---

**Fig. 7B**—In-place moisture-density determination: test data for sand cone method (ASTM D1556) fine-grained soil—less than 5% + oversize$^1$.  

---
IN-PLACE MOISTURE-DENSITY DETERMINATION:
TEST RECORDS FOR THE RUBBER BALLOON METHOD
ASTM D2167
Fine-grained soils—less than 5% + no. 4 sieve

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Location of test</th>
<th>Borrow source, location, and depth</th>
<th>Material classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Station</td>
<td>Centerline offset</td>
<td>Elevation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Spec. requirements (%)</th>
<th>Test results (%)</th>
<th>Curve No.</th>
<th>Wet density check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Moisture range</td>
<td>Compaction</td>
<td>Moisture</td>
<td>Compaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks:

Fig. 8B—In-place moisture-density determination: test records for the rubber balloon method (ASTM D2167) fine-grained soils—less than 5% + no. 4 sieve.
# IN-PLACE MOISTURE-DENSITY DETERMINATION:
## TEST DATA FOR THE RUBBER BALLOON METHOD
### ASTM D2167
#### Fine-grained soils—less than 5% + no. 4 sieve

<table>
<thead>
<tr>
<th>Volume Determination</th>
<th>Test No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>1. Final base reading:</td>
<td></td>
</tr>
<tr>
<td>2. Initial case reading:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moisture Determination</th>
<th>Container No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Sample tested using:</td>
<td></td>
</tr>
<tr>
<td>direct heat ___ oven ___ microwave ___</td>
<td></td>
</tr>
<tr>
<td>4. Weight of moist sample and container:</td>
<td></td>
</tr>
<tr>
<td>5. Weight of dry sample and container:</td>
<td></td>
</tr>
<tr>
<td>7. Weight of container:</td>
<td></td>
</tr>
<tr>
<td>9. Moisture content = ([6] ÷ [8]) 100:</td>
<td></td>
</tr>
<tr>
<td>10. Correction for ignition:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Density Determination</th>
<th>Container No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>12. Weight of moist sample plus container:</td>
<td></td>
</tr>
<tr>
<td>13. Weight of container:</td>
<td></td>
</tr>
<tr>
<td>14. Weight of moist sample:</td>
<td></td>
</tr>
<tr>
<td>15. Wet density = [14] ÷[3]</td>
<td></td>
</tr>
<tr>
<td>17. Required density:</td>
<td></td>
</tr>
<tr>
<td>18. Ratio(^1) = ([16] ÷[17]) 100:</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Oversize correction required based on method selected in ASTM D698 or D1557. Indicate weight and volume units used in test.

Fig. 9B—In-place moisture-density determination: test data for the rubber balloon method (ASTM D2167), fine-grained soils—less than 5% + no. 4 sieve.
### IN-PLACE MOISTURE-DENSITY DETERMINATION:
### CALIBRATED CYLINDER METHOD TEST RECORD

**Location:**

**Site No.:**

**Project Name:**

**Contract No.:**

**Contractor:**

**Tested by:**

**Computed by:**

**Checked by:**

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Location of test</th>
<th>Borrow source, location, and depth</th>
<th>Material classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Station</td>
<td>Centerline offset</td>
<td>Elevation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Spec. requirements (%)</th>
<th>Test results (%)</th>
<th>Curve No.</th>
<th>Wet density check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Moisture range</td>
<td>Compaction</td>
<td>Moisture</td>
<td>Compaction</td>
</tr>
</tbody>
</table>

**Remarks:**

---

**Fig. 10B**—In-place moisture-density determination: calibrated cylinder method test record (ASTM D2937) fine-grained soils—less than 5% + no. 4 sieve.
IN-PLACE MOISTURE-DENSITY DETERMINATION:
CALIBRATED CYLINDER METHOD TEST DATA
ASTM D2937
Fine-grained soils—less than 5% + no. 4 sieve

<table>
<thead>
<tr>
<th>Volume Determination</th>
<th>Test No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Volume of cylinder (volume of hole)</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moisture Determination</th>
<th>Test No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample tested using: direct heat ____ oven ____ microwave ____</td>
<td></td>
</tr>
<tr>
<td>2. Weight of moist sample plus container:</td>
<td></td>
</tr>
<tr>
<td>3. Weight of dry sample plus container:</td>
<td></td>
</tr>
<tr>
<td>5. Weight of container:</td>
<td></td>
</tr>
</tbody>
</table>
| 7. Moisture content = ([4] ÷ [6])*100: | | | | |%
| 8. Correction for ignition: | | | | |%

<table>
<thead>
<tr>
<th>Density Determination</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Weight of moist sample plus cylinder:</td>
<td></td>
</tr>
<tr>
<td>11. Weight of cylinder:</td>
<td></td>
</tr>
<tr>
<td>13. Wet density = [12] ÷ [1]:</td>
<td></td>
</tr>
<tr>
<td>14. Fill dry density: [13] ÷ [1 + [9]/100]:</td>
<td></td>
</tr>
<tr>
<td>15. Maximum dry density:</td>
<td></td>
</tr>
<tr>
<td>16. Ratio(^1) = ([14] ÷ [15])*100:</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Ratio of fill dry density to maximum dry density.

Indicate weight and volume units used in test.

Fig. 11B—In-place moisture-density determination: calibrated cylinder method test data (ASTM D2937), fine-grained soils—less than 5% + no. 4 sieve.
IN-PLACE MOISTURE-DENSITY DETERMINATION: TEMPLATE AND PLASTIC LINER METHOD TEST RECORD
ASTM D5030

Location: ___________________________________________ Site No. ___________________________

Project Name: ___________________________________________ Contractor: ___________________________

Contract No. ___________________________ Contractor: ___________________________

Tested by: ___________________________ Computed by: ___________________________ Checked by: ___________________________

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Location of test</th>
<th>Borrow source, location, and depth</th>
<th>Material classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Station</td>
<td>Centerline offset</td>
<td>Elevation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Size of template: ___________________________________________

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Specified requirements</th>
<th>Test results</th>
<th>Compaction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Moisture range (%)</td>
<td>Moisture (%)</td>
<td>Density (lb/ft³)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Density (lb/ft³)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: ___________________________________________

__________________________

Fig. 12B—In-place moisture-density determination: template and plastic liner method test record (ASTM D5030).
### IN-PLACE MOISTURE-DENSITY DETERMINATION:
TEMPLATE AND PLASTIC LINER METHOD TEST DATA
ASTM D5030

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Volume Determination</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weight of water plus container before filling template:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Weight of water plus container after filling template:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Weight of water plus container before filling template and hole:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Weight of water plus container after filling template and hole:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Volume = [7] ÷ [62.4]:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Moisture Determination</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Weight of moist sample and container:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Weight of dry sample and container:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Weight of container:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Moisture content = ([11] ÷ [14]) 100:</td>
<td>( % )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Correction for ignition:</td>
<td>( % )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Density Determination</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Total weight of soil removed from the hole:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Total wet density = [18] ÷ [8]:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Total dry density = [19] ÷ [1 + (17 ÷ 100)]:</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Required density =</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Ratio(^1) =</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Ratio of fill dry density to maximum dry density.
Indicate weight and volume units used in test.

---

Fig. 13B—In-place moisture-density determination: template and plastic liner method test data (ASTM D5030).
### Nuclear Compaction Test Data for ASTM D6938

<table>
<thead>
<tr>
<th>Test number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode &amp; depth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density count</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet density</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture cnt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Moisture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture corr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry density</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. density</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opt. moisture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Compaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Remarks:

**Fig. 14B**—Nuclear compaction test data for ASTM D6938.
Moisture Content Determination
Summary Data Sheet for ASTM Methods

<table>
<thead>
<tr>
<th>Test no.</th>
<th>Date of test</th>
<th>Location of test (structure or station, offset)</th>
<th>Elevation</th>
<th>WW(^1)</th>
<th>DW(^1)</th>
<th>TW(^1)</th>
<th>Moisture content (%)(^2)</th>
<th>Tested by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Oven D2216</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Direct heat D4959</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Microwave D4643</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Carbide D7944</td>
<td></td>
</tr>
</tbody>
</table>

1. WW = Weight of moisture sample and container  
   DW = Weight of dry sample and container  
   TW = Weight of container

2. Moisture content (%) = \(\frac{(WW - DW)}{(DW - TW)}\) * 100

Fig. 15B—Moisture content determination summary data sheet for ASTM methods.
### ASTM D2216 | Moisture Content Oven

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Container Number</th>
<th>Date Placed in Oven</th>
<th>Mass of Container + Wet Specimen</th>
<th>Mass of Container + Dry Specimen</th>
<th>Mass of Container</th>
<th>Mass of Water</th>
<th>Mass of Dry Specimen</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>9/8/86</td>
<td>366.1 g</td>
<td>348.0 g</td>
<td>129.4 g</td>
<td>18.1 g</td>
<td>218.6 g</td>
<td>8.3%</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>9/8/86</td>
<td>374.6 g</td>
<td>342.1 g</td>
<td>118.0 g</td>
<td>32.5 g</td>
<td>224.1 g</td>
<td>14.5%</td>
</tr>
</tbody>
</table>

**Fig. 16B**—Moisture content oven.
<table>
<thead>
<tr>
<th>TIME IN OVEN (min)</th>
<th>TOTAL TIME IN OVEN (min)</th>
<th>MASS OF DISH SOIL (g)</th>
<th>MASS OF SOIL (g)</th>
<th>MASS OF WATER (g)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>231.62</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>217.75</td>
<td>71.45</td>
<td>13.87</td>
<td>19.4</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>216.22</td>
<td>69.92</td>
<td>15.40</td>
<td>22.0</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>215.72</td>
<td>69.42</td>
<td>15.90</td>
<td>22.9</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>215.48</td>
<td>69.18</td>
<td>16.14</td>
<td>23.3</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>215.32</td>
<td>69.02</td>
<td>16.30</td>
<td>23.6</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>215.22</td>
<td>68.92</td>
<td>16.40</td>
<td>23.8</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>215.19</td>
<td>68.89</td>
<td>16.43</td>
<td>23.8</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>215.19</td>
<td>68.89</td>
<td>16.43</td>
<td>23.8</td>
</tr>
</tbody>
</table>

**Fig. 17B**—Moisture content determination summary data sheet for ASTM methods.
### Example Computations

<table>
<thead>
<tr>
<th>PAN NUMBER (g)</th>
<th>113</th>
<th>REMARKS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASS OF PAN + WET SOIL (g)</td>
<td>282.82</td>
<td></td>
</tr>
<tr>
<td>MASS OF PAN + DRY SOIL (g)</td>
<td>260.40</td>
<td></td>
</tr>
<tr>
<td>MASS OF PAN (g)</td>
<td>165.95</td>
<td></td>
</tr>
<tr>
<td>MASS OF WATER (g)</td>
<td>22.42</td>
<td></td>
</tr>
<tr>
<td>MASS OF DRY SOIL (g)</td>
<td>94.45</td>
<td></td>
</tr>
<tr>
<td>PERCENT MOISTURE (g)</td>
<td>23.7</td>
<td>\text{NOTE}: Correction may be needed for loss due to ignition of organic material.</td>
</tr>
</tbody>
</table>

---

### Example Computations

<table>
<thead>
<tr>
<th>PAN NUMBER</th>
<th>REMARKS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASS OF PAN + WET SOIL (g)</td>
<td></td>
</tr>
<tr>
<td>MASS OF PAN + DRY SOIL (g)</td>
<td></td>
</tr>
<tr>
<td>MASS OF PAN (g)</td>
<td></td>
</tr>
<tr>
<td>MASS OF WATER (g)</td>
<td></td>
</tr>
<tr>
<td>MASS OF DRY SOIL (g)</td>
<td></td>
</tr>
<tr>
<td>PERCENT MOISTURE (g)</td>
<td>\text{NOTE}: Correction may be needed for loss due to ignition of organic material.</td>
</tr>
</tbody>
</table>

---

Fig. 18B—Moisture determination using direct heat.
### Example Computations

<table>
<thead>
<tr>
<th>SAMPLE NUMBER</th>
<th>NOMINAL SPECIMEN SIZE (g)</th>
<th>DIAL GAUGE READING ON CCRD</th>
<th>CORRECTED READING</th>
<th>MOISTURE CONTENT FROM CALIBRATION CURVE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60N</td>
<td>26</td>
<td>9.0</td>
<td>9.0</td>
<td>10.8</td>
</tr>
<tr>
<td>-12</td>
<td>26</td>
<td>10.5</td>
<td>10.5</td>
<td>12.6</td>
</tr>
<tr>
<td>-20</td>
<td>26</td>
<td>16.5</td>
<td>16.5</td>
<td>19.8</td>
</tr>
<tr>
<td>-24</td>
<td>26</td>
<td>17.7</td>
<td>17.7</td>
<td>21.2</td>
</tr>
<tr>
<td>-28</td>
<td>13 (half-size)</td>
<td>10.3</td>
<td>20.6</td>
<td>24.7</td>
</tr>
<tr>
<td>-30</td>
<td>13 (half-size)</td>
<td>11.3</td>
<td>22.6</td>
<td>27.0</td>
</tr>
<tr>
<td>60N-10B</td>
<td>26</td>
<td>9.6</td>
<td>9.6</td>
<td>11.5</td>
</tr>
<tr>
<td>-112</td>
<td>26</td>
<td>11.4</td>
<td>11.4</td>
<td>13.7</td>
</tr>
</tbody>
</table>

*If the moisture content of the full specimen exceeds the limit of the gauge on the testing equipment, a half-sized specimen is used.

**If (2) = half-size specimen, (4) = (3) x 2.
If (2) = full-size specimen, (4) = (3).
Fig. 20B—Calibration curve for determining moisture content of soils using ASTM D4944.
TEST FILL REPORT

Project Name: ___________________________ Location: ___________________________

Contract No. ___________________________ Contractor: ___________________________

Inspector: _____________________________ Date: _____________ Time: _____________

Location of Test Fill: ___________________________

Specified Lift Thickness (inches): _________ Specified Mass Density (pcf): ___________ Specified Moisture Content: _________

Material:

<table>
<thead>
<tr>
<th>Placing Method</th>
<th>Type of Fill</th>
<th>Unified Classification</th>
<th>% Passing ¾”</th>
<th>Maximum Particle Size (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test Fill Field Data:

<table>
<thead>
<tr>
<th>Thickness of Fill (inches)</th>
<th>Length and Width (feet)</th>
<th>In-Place Dry Density of Mass (pcf)</th>
<th>Moisture Content of Test Fill (%)</th>
<th>No. of Test</th>
<th>Test Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Equipment:

<table>
<thead>
<tr>
<th>Type of Compaction Equipment</th>
<th>Operational Speed (mph)</th>
<th>(Number of Passes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: ____________________________________________________________

Signature of Inspector: ___________________________ Date: _____________

---

Fig. 21B—Test fill report.