



SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by the Contractor ~~Department of Veterans~~.

1.2 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - T27-11.....Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
 - T96-02 (R2006).....Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - T99-10.....Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
 - T104-99 (R2007).....Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 - T180-10.....Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
 - T191-02(R2006).....Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method
- C. American Society for Testing and Materials (ASTM):
 - A370-12.....Standard Test Methods and Definitions for Mechanical Testing of Steel Products
 - C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - C33/C33M-11a.....Standard Specification for Concrete Aggregates
 - C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - C109/C109M-11b.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars



C136-06.....	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
C138/C138M-10b.....	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
C140-12.....	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
C143/C143M-10a.....	Standard Test Method for Slump of Hydraulic Cement Concrete
C172/C172M-10.....	Standard Practice for Sampling Freshly Mixed Concrete
C173/C173M-10b.....	Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method
C330/C330M-09.....	Standard Specification for Lightweight Aggregates for Structural Concrete
C567/C567M-11.....	Standard Test Method for Density Structural Lightweight Concrete
C780-11.....	Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C1019-11.....	Standard Test Method for Sampling and Testing Grout
C1064/C1064M-11.....	Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
C1077-11c.....	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
C1314-11a.....	Standard Test Method for Compressive Strength of Masonry Prisms
D422-63(2007).....	Standard Test Method for Particle-Size Analysis of Soils
D698-07e1.....	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
D1143/D1143M-07e1.....	Standard Test Methods for Deep Foundations Under Static Axial Compressive Load
D1188-07e1.....	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
D1556-07.....	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method



- D1557-09.....Standard Test Methods for Laboratory Compaction
 Characteristics of Soil Using Modified Effort
 (56,000ft lbf/ft³ (2,700 KNm/m³))
- D2167-08).....Standard Test Method for Density and Unit Weight
 of Soil in Place by the Rubber Balloon Method
- D2974-07a.....Standard Test Methods for Moisture, Ash, and
 Organic Matter of Peat and Other Organic Soils
- D3666-11.....Standard Specification for Minimum Requirements
 for Agencies Testing and Inspecting Road and
 Paving Materials
- D3740-11.....Standard Practice for Minimum Requirements for
 Agencies Engaged in Testing and/or Inspection
 of Soil and Rock as used in Engineering Design
 and Construction
- D6938-10.....Standard Test Method for In-Place Density and
 Water Content of Soil and Soil-Aggregate by
 Nuclear Methods (Shallow Depth)
- E329-11c.....Standard Specification for Agencies Engaged in
 Construction Inspection, Testing, or Special
 Inspection
- E543-09.....Standard Specification for Agencies Performing
 Non-Destructive Testing
- E1155-96(R2008).....Determining FF Floor Flatness and FL Floor
 Levelness Numbers
- D. American Welding Society (AWS):
- D1.D1.1M-10.....Structural Welding Code-Steel
- E. Post-Tensioning Institute (PTI):
- DC35.1.....Recommendations for Prestressed Rock and Soil
 Anchors

1.3 REQUIREMENTS

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."



- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Resident Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Resident Engineer to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to Resident Engineer, Contractor, unless other arrangements are agreed to in writing by the Resident Engineer. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Resident Engineer immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK

- A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:
 - 1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Resident Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Resident Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
 - 2. Provide full time observation of fill placement and compaction and field density testing in all areas to verify that earthwork compaction obtained is in accordance with contract documents.
 - 3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.
- B. Testing Compaction:
 - 1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698.



2. Make field density tests in accordance with the primary testing method following ASTM D6938 wherever possible. Field density tests utilizing ASTM D1556 or ASTM D2167 shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Resident Engineer before the tests are conducted.
 - a. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.
 - b. Pavement Subgrade: One test for each 335 m² (400 square yards), but in no case fewer than two tests.
 - c. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
 - d. Trenches: One test at maximum 30 m (100 foot) intervals per 304 mm (1 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.
 - e. Footing Subgrade: At least two (2) tests for each soil type on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to Resident Engineer. In each compacted fill layer below wall footings, perform one field density test for every 30 m (100 feet) of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.
- C. Fill and Backfill Material Gradation: One test per 100 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C136 or ASTM D422.
- D. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.
- E. Testing Materials: Test suitability of on-site and off-site borrow as directed by Resident Engineer.

3.2 FOUNDATION PILES

- A. Witness load test procedure for conformance with ASTM D1143 and interpret test data to verify geotechnical recommendations for pile capacity. Submit load test report in accordance with ASTM D1143.
- B. Review Contractor's equipment, methods, and procedures prior to starting any work on site. Provide continuous inspection of pile installation.



Maintain a record of all pertinent phases of operation for submittal to Resident Engineer.

- C. Auger-Cast Piles: Take and test samples of grout in accordance with ASTM C109 for conformance with specified strength requirements. Not less than nine (9) cubes shall be made for each day of casting. For each set of nine cubes, test three cubes at 7 days and three at 28 days, hold three (3) cubes for back-up testing.

3.3 SECANT PILE WALL

- A. Quality control and field inspection shall be provided by the Contractor as follows:
1. The Contractor shall provide personnel, qualified by training and experience, to perform the required tests and to monitor, record, plot and report the data. In addition, the Geotechnical Engineer will be present for selected installation and shall be allowed unrestricted access.
 2. The Contractor shall be responsible for making prompt and continuous evaluations of the secant pile installation and, whenever necessary, taking immediate steps to correct any deficiencies or to provide other corrective measures which may be required to prevent damage or excessive movements.
- B. At 100 foot intervals, three (3) representative bulk samples of the cutoff wall material shall be obtained at each of the following depth ranges: Obtain samples between a depth range of 0 to 10 feet (upper zone), and within 10 feet of the bottom of the cutoff wall (bottom zone). The bulk samples shall be taken at depth as indicated using a discrete wet bulk sampling method. Plastic molds used to cast the samples shall be 3 inch by 6 inch cylindrical test specimens. From each bulk sample, the Contractor shall cast four (4) test specimens. Gravel and other particle sizes greater than 3/4 inch diameter shall be removed and discarded from cylinder samples.
1. The wet samples shall be poured into the molds and then sealed. The specimens shall be stored in a constant temperature, damp environment until tested. The handling and storage requirements of the samples shall be in accordance with ASTM D4832.
 2. For each bulk sample collection, half of the test specimens shall be tested for hydraulic conductivity (permeability) (28-day) and half shall be tested for unconfined compressive strength (28-day) from a bulk sample representing a single batch.



C. Sample Collection and Testing:

1. Wet bulk sampling and testing by the Contractor, will be required as indicated below.
2. Acceptance of the work will depend on the Contractor's work demonstrating that the in-place wall is homogeneous, continuous, and has achieved the permeability and strength requirements. Quality Assurance sample collection and testing, in addition to the testing required by the Contractor, will be conducted by a laboratory that the Owner will select. Samples shall be collected using: (1) discrete wet bulk sampling at frequencies described below, and (2) other sampling methods as required to obtain representative samples of construction materials. Results of tests performed on wet bulk samples shall take precedence over results of other sampling methods.
3. Wet Bulk Sampling:
 - a. Wet bulk material shall be sampled and test cylinders prepared per ASTM D4832, with the following exceptions. Each cylinder shall be 3 inches in diameter and 6 inches in length. The wet bulk sample shall be taken using a device that allows for complete retrieval of the mixed material without additional mixing or segregation. Three (3) representative bulk samples of the cutoff wall material shall be obtained at each of the following depth ranges: Obtain samples between a depth range of 0 to 10 feet (upper zone), and within 10 feet of the bottom of the cutoff wall (bottom zone).
 - b. The retrieved sample shall be passed through a 3/4-inch sieve prior to cylinder fabrication; no other sieving is allowed. After the sample is retrieved from the wall additional mixing of the sample is prohibited. At a minimum, the Contractor shall perform a 28-day unconfined compressive strength and a permeability test for each sample for the acceptance. For each wet bulk sample collected, the Contractor shall fabricate a minimum of four (4) cylinders.
 - c. Approximately up to 10 percent of the tested locations will be selected for quality assurance testing by the Government. At these selected locations, the Contractor shall obtain and provide to the Agency a set of eight (8) representative cylinders for quality assurance testing.
4. Wet Bulk Sample Permeability Testing:
 - a. Laboratory permeability testing shall be in accordance with ASTM D5084. For permeability testing, the cell and backpressure states to be applied during the initial application to achieve 10 psi



effective confining pressure which produce a B coefficient equal to or greater than 0.9. In no case shall the cell pressure exceed 100 psi.

STAGE	CELL BACK PRESSURE (psi)	EFFECTIVE PRESSURE (psi)	CONFINING PRESSURE (psi)
1	5	3	2
2	10	8	2
3	20	15	5
4	30	20	10
5	40	30	10
6	60	50	10

- b. Saturation shall be confirmed by measuring the B coefficient. The initial gradient used during permeation shall be 20. Plots of the ratio inflow to outflow, gradient, and permeability versus time shall be required for each test. Lines describing the boundary limits for the listed termination criteria shall be included on the plots. The permeate liquid shall be clean water. The specimen top cap, bottom cap, and porous end pieces shall have a diameter equal to the diameter of the test specimen $\pm 2\%$. Head shall be increased on the inflow end at the bottom of the specimen to a pressure which will develop the gradient of 20.
5. Wet Bulk Sample Strength Testing: Laboratory strength testing shall be in accordance with ASTM D 4832.
- D. Full-time monitoring of secant pile installations will be provided by the Geotechnical Engineer. No piles shall be installed except in the presence of the Geotechnical Engineer.

3.4 LANDSCAPING

- A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.
1. Test for organic material by using ASTM D2974.
 2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.
- B. Submit laboratory test report of topsoil to Resident Engineer.

3.5 ASPHALT CONCRETE PAVING

- A. Aggregate Base Course:
1. Determine maximum density and optimum moisture content for aggregate base material in accordance with ASTM D1557, Method D.



2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with ASTM D6938, AASHTO T191, or ASTM D1556.
3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.

B. Asphalt Concrete:

1. Aggregate: Sample and test aggregates in stock pile and hot-bins as necessary to insure compliance with specification requirements for gradation (AASHTO T27), wear (AASHTO T96), and soundness (AASHTO T104).
2. Temperature: Check temperature of each load of asphalt concrete at mixing plant and at site of paving operation.
3. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

3.6 SITE WORK CONCRETE

Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

3.7 CONCRETE

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of Resident Engineer with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by Resident Engineer.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to Resident Engineer.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to



proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.
3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m³ (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. Label each cylinder with an identification number. Resident Engineer may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m³ (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m³ (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.



10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
 - a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
 - b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
 11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
 12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
 13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
 14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
 15. Observe preparations for placement of concrete:
 - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
 - b. Inspect preparation of construction, expansion, and isolation joints.
 16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
 17. Observe concrete mixing:
 - a. Observe minimum and maximum mixing times.
- C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by Resident Engineer. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding



or testing, in which case it shall be discarded and strength of spare cylinder shall be used.

2. Furnish certified compression test reports (duplicate) to Resident Engineer. In test report, indicate the following information:
 - a. Cylinder identification number and date cast.
 - b. Specific location at which test samples were taken.
 - c. Type of concrete, slump, and percent air.
 - d. Compressive strength of concrete in MPa (psi).
 - e. Weight of lightweight structural concrete in kg/m³ (pounds per cubic foot).
 - f. Weather conditions during placing.
 - g. Temperature of concrete in each test cylinder when test cylinder was molded.
 - h. Maximum and minimum ambient temperature during placing.
 - i. Ambient temperature when concrete sample in test cylinder was taken.
 - j. Date delivered to laboratory and date tested.

3.8 REINFORCEMENT

- A. Review mill test reports furnished by Contractor.
- B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
- C. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
- D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

3.9 MASONRY

- A. Mortar Tests:
 1. Laboratory compressive strength test:
 - a. Comply with ASTM C780.
 - b. Obtain samples during or immediately after discharge from batch mixer.
 - c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.
 - d. Test one sample at 7 days and 2 samples at 28 days.
 2. Two tests during first week of operation; one test per week after initial test until masonry completion.
- B. Grout Tests:
 1. Laboratory compressive strength test:
 - a. Comply with ASTM C1019.
 - b. Test one sample at 7 days and 2 samples at 28 days.
 - c. Perform test for each 230 m² (2500 square feet) of masonry.



C. Masonry Unit Tests:

1. Laboratory Compressive Strength Test:

a. Comply with ASTM C140.

b. Test 3 samples for each 460 m² (5000 square feet) of wall area.

D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 m² (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

3.10 TYPE OF TEST

Approximate Number of Tests Required:

A. Earthwork:

Laboratory Compaction Test, Soils (ASTM D1557)	4
Field Density, Soils (ASTM D698)	35

B. Landscaping:

Topsoil Test	1
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C. Aggregates:

Laboratory Compaction, (ASTM D1557)	3
Field Density, (ASTM D1556)	20
Aggregate, Gradation (AASHTO T27)	3
Wear (AASHTO T96)	1
Soundness (AASHTO T104)	1

D. Asphalt Concrete:

Field Density, (ASTM D1188)	4
Aggregate, Asphalt Concrete Gradation (AASHTO T27)	1
Wear (AASHTO T96)	1
Soundness (AASHTO T104)	1

E. Concrete:

Making and Curing Concrete Test Cylinders (ASTM C31)	_____
Compressive Strength, Test Cylinders (ASTM C39)	_____
Concrete Slump Test (ASTM C143)	_____
Concrete Air Content Test (ASTM C173)	_____
Unit Weight, Lightweight Concrete (ASTM C567)	_____
Aggregate, Normal Weight: Gradation (ASTM C33)	_____
Deleterious Substances (ASTM C33)	_____
Soundness (ASTM C33)	_____
Abrasion (ASTM C33)	_____
Aggregate, Lightweight Gradation (ASTM C330)	_____



Deleterious Substances (ASTM C330)	_____
Unit Weight (ASTM C330)	_____
Flatness and Levelness Readings (ASTM E1155) (number of days)	_____
F. Secant Pile Wall	
Preparation and Testing of Controlled Low Strength Material (CLSM)(ASTM D4832)	33
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (ASTM D5084)	33
G. Auger Cast Pile:	
Load Test (ASTM D1143)	2
Grout Mix (ASTM C109), sets of 9 cubes	35
H. Rock Anchors:	
Proof Test (PTI DC35.1)	23
Performance Test (PTI DC35.1)	3
I. Reinforcing Steel:	
Tensile Test (ASTM A370)	_____
Bend Test (ASTM A370)	_____
Mechanical Splice (ASTM A370)	_____
Welded Splice Test (ASTM A370)	_____
J. Masonry:	
Making and Curing Test Cubes (ASTM C109)	_____
Compressive Strength, Test Cubes (ASTM C109)	_____
Sampling and Testing Mortar, Comp. Strength (ASTM C780)	_____
Sampling and Testing Grout, Comp. Strength (ASTM C1019)	_____
Masonry Unit, Compressive Strength (ASTM C140)	_____
Prism Tests (ASTM C1314)	_____
K. Technical Personnel:	(Minimum 8 months)
1. Technicians to perform tests and inspection listed above. Laboratory will be equipped with concrete cylinder storage facilities, compression machine, cube molds, proctor molds, balances, scales, moisture ovens, slump cones, air meter, and all necessary equipment for compaction control.	

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