

Architecture, Engineering, and Construction Division

Civil and Structural Testing and Inspection Services Guidelines

Release Date: December 10, 2011

All previous versions of this document are obsolete.

A copy of this document is available for download at http://aec.ldschurch.org/aec/design_guidelines/

Contact Chris Barker (Chris.Barker@ldschurch.org) in AEC with questions or suggestions for improvement.

Published by The Church of Jesus Christ of Latter-day Saints
Salt Lake City, Utah

Civil and Structural Testing and Inspection Services Guidelines

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Civil and Structural Testing and Inspection Services Guidelines

Introduction

This document contains guidelines, recommendations and requirements for civil and structural engineering testing and inspection. The following topics are covered:

- Definitions
- Design team responsibilities
- Testing and inspection agency responsibilities
- Testing guidelines
- Inspection guidelines
- Example of testing and inspection requirements for a Heritage98 style meetinghouse

Tables are presented which provide information and the minimum number of tests and inspections recommended and expected for meetinghouses, seminars and institutes, and welfare services projects.

An example for determining the testing and inspection requirements for a Heritage98 style meetinghouse is provided. Attachments “A” and “B” from the *Agreement Between Owner and Testing Agency* have been completed based upon this example. The example and the attachments provide further insight regarding the minimum number of tests and inspections recommended and expected and also the possible testing and inspection costs. Note that this is an example to provide rough estimates and actual costs vary from site to site.

Definitions

Contract Documents: The engineering and architectural drawings and specifications issued for construction, plus clarification drawings, addenda, approved change orders and contractor designed elements.

Field Quality Assurance: Testing, inspections, special testing and special inspections provided for by the owner.

Field Quality Control: Testing, inspections, special testing and special inspections provided for by the contractor.

General Contractor: The company or person with a formal contract to perform a specific job, supplying labor and materials and providing and overseeing staff if needed. The company responsible for the fulfillment of the contract document requirements.

Inspection/Special Inspection: Inspection of the materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards. An inspection *is not* required by code provisions but may be

required by the contract documents. A special inspection *is* required by code provisions and by the contract documents.

- **Special Inspection, Continuous:** The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- **Special Inspection, Periodic:** The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

Project Architect (PA): The architectural design professional overseeing the project design. The PA becomes the architect of record.

Project Civil Engineer (PCE): The civil engineering design professional in charge of the analysis and design of the civil engineering aspects of a project. The PCE becomes the civil engineer of record.

Project Manager (PM): The owner’s designated representative. The owner is the “Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints, a Utah Corporation sole.”

Project Structural Engineer (PSE): The structural engineering design professional in charge of the analysis and design of the structural engineering aspects of a project. The PSE becomes the structural engineer of record.

Service Provider (SP): An agency or firm qualified to perform field and laboratory tests and to inspect structural elements to determine the characteristics and quality of the building materials and the workmanship. Testing and inspection services are provided by the SP. The Service Provider (SP) is the Testing and Inspection Agency (TA). Note that it is not required that the same agency or firm provide all the testing and inspection services. Several different agencies or firms can be employed to provide different tests and inspections on the same project.

Special Inspector: The licensed individual or firm that implements the inspection program for the project.

Structural Observation: The visual observation of the structural system by a registered structural engineer for general conformance to the approved construction documents at significant construction stages and at completion of the structural system. Structural observations do not include or waive the requirements for inspections or special inspections.

Test/Special Test: Field or laboratory tests to determine the characteristics and quality of building materials and workmanship. A test *is not* required by code provisions but may be required by the contract documents. A special test *is* required by code provisions and by the contract documents.

Testing and Inspection Agency (TA): An agency or firm engaged to perform tests or inspections or both. Testing and inspection services are provided by the TA.

Testing Laboratory: An agency or firm qualified to perform field and laboratory tests to determine the characteristics and quality of building materials and workmanship.

Design Team Responsibilities

The PM retains a TA to test the material quality and inspect the work during construction. The PM assigns the responsibility for the administration of the testing and inspection program to the PA.

The PM and PA are responsible for the proper implementation of these testing and inspection guidelines. The PA reviews these guidelines with the PCE and the PSE. The PA, PCE and PSE review and site adapt the contract documents for testing and inspection requirements.

The PM (or the PA if assigned to do so by the PM) provides the TA a set of contract documents (plans and specifications) from which the TA can provide an accurate testing and inspection proposal using the *Agreement Between Owner and Testing Agency* and Attachments "A" and "B" of that agreement, or equivalent Attachments "A" and "B". The testing and inspection proposal is reviewed by the PM and the PA for accuracy.

The GC notifies the PA and the TA at least 24 hours prior to the time that a test or inspection is needed. This arrangement is allowed to be modified, if desired, by the PA with approval of the PM. Testing and inspection services are provided by certified professionals, with special expertise, employed by testing and inspection agencies. Tests and inspections ensure compliance of the construction with the project contract documents, referenced standards and building code requirements. The PM, PA, PCE, PSE, building officials and city inspectors do not provide inspections. The PCE and PSE verify that the civil and structural portions of a project are constructed in general conformance to the project contract documents at significant construction stages per the *Agreement Between Owner and Architect* and provide thorough site observations and reports.

Testing and Inspection Agency Responsibilities

If the TA finds that the GC is not ready for a test or inspection, the TA should (1) stay and wait for the construction to be ready or, (2) leave and return when the construction is ready. The TA is reimbursed for a single trip to the site by the PM but the GC is responsible for the cost of the TA's downtime.

The TA sends the results of tests and inspections to the PM, PA, the associated project engineer (PCE or PSE) and GC within 24 hours of the completion of a test or inspection.

If any item fails to meet the requirements of the contract documents, the TA first notifies the GC. If the GC does not or cannot remedy the deficiency, the TA notifies the Building Official and the PA and the associated project engineer (PCE or PSE) before completion of that phase of the work. The PA, the associated project engineer (PCE and/or PSE)

and the PM immediately decide if the deficiency or the failed test indicates unacceptable materials or workmanship. If the materials or workmanship are not acceptable, the GC corrects the problem as directed by the PA and then retests or re-inspects as directed by the PA. The cost of the additional tests or inspections and additional design work, due to failed tests or discovered deficiencies, is paid for by the PM. The PM is reimbursed for these costs by the GC.

The design and /or specification of remedial measures are the responsibility of the PA and the associated project engineer (PCE and/or PSE).

General Approach to Testing and Inspection Guidelines

Wood Framed Meetinghouses and Other Wood-Framed Projects

Only necessary and code required testing and inspections are provided on wood framed meetinghouses and other wood-framed projects. Building codes generally require testing and inspection of engineered fill. The owner requires some testing and/or inspection, to various degrees, of asphalt paving, concrete paving, concrete foundations, site work concrete and sometimes wood construction.

Welfare Services Projects

More extensive testing and inspections are required on welfare services projects. Engineered fill, asphalt paving, concrete paving, concrete foundations, site work concrete, masonry and steel all require testing and/or inspections.

Testing Guidelines

The TA provides all testing services.

Engineered Fill

Testing of all engineered fill is required for all projects. Written testing reports are to be provided per Attachment "A" of the *Agreement Between Owner (Trust) and Testing Agency*.

Testing should provide the following (unless indicated otherwise in the geotechnical evaluation report which sometimes requires more testing than indicated below):

- One moisture-maximum density relationship test for each type of engineered fill material.
- The most conservative result of the following two paragraphs should be followed:
 - One written compaction test for every 100 cubic yards of engineered fill placed within the paved/concreted and building pad areas.
 - One written compaction test per 10,000 square feet of surface area and for each lift of engineered fill placed in paved/concreted areas. One written compaction test per 2,500

square feet of surface area and for each lift of engineered fill placed in the building pad area.

- One written compaction test per 40 linear feet of footing and for each lift of engineered fill placed under continuous (strip) footings
- One written compaction test for each footing and for each lift of engineered fill placed under spot (spread) footings.
- One written compaction test per 100 lineal feet of trench and for each lift of engineered fill.
- Two written tests of top soil per Specification Section 32 9001.

During testing, inspect and verify that the material being used and the maximum lift thicknesses comply with the recommendations of the geotechnical report and the requirements of the contract documents. Testing and inspection services are ideally performed and provided at the same time. These services are often provided by the geotechnical engineer.

The FIELD QUALITY CONTROL section of SPECIFICATION SECTION 31 1123 – AGGREGATE BASE and the FIELD QUALITY CONTROL section of SPECIFICATION SECTION 31 2323 – FILL are to be reviewed and be site adapted by the design team. The specifications are used by the TA to complete Attachment “A” and “B” of the *Agreement Between Owner and Testing Agency*. The TA provides testing and inspection services per the specifications.

Concrete and Concrete Paving

Wood Framed Meetinghouses and Other Wood Framed Projects:

Testing of concrete is generally not required by building codes for wood framed meetinghouses and other wood framed projects. The Church, however, requires some minimal amount of testing consisting of two concrete test specimens for footings and foundation walls and interior slabs on grade and also six concrete test specimens for exterior site work concrete for projects over about 9,000 square feet (Fayette, Heritage, Legacy, Heritage 09T, Independence 170 (and larger) style meetinghouses, and larger seminary and institute buildings). The PM, at his discretion, and with the input of the PA’s design team, may require additional test specimens for more quality control. Periodic, or continuous, inspection of the placement of concrete would ideally be provided by the same person that takes test specimens.

The Church does not require concrete test specimens for footings, or foundation walls, or interior slabs on grade but does require three concrete test specimens for exterior site work concrete for projects under about 9,000 square feet (Sharon, Independence 130 (and smaller) style meetinghouses, and in smaller seminary and institute buildings). The PM, at his discretion, and with the input of the PA’s design team, may require additional test specimens for more quality control. Periodic, or continuous, inspection of the placement of concrete would ideally be provided by the same person that takes test specimens.

Often, a test specimen for sidewalks and curbs is taken at the rate of one test specimen per 5,000 sq. ft of surface area, a test specimen for interior slabs is taken at the rate of 10,000 sq. ft. of surface area, and a test specimen for foundations is taken at the rate of one test specimen per 150 yd³ of concrete needed.

Welfare Services Projects:

Testing of all concrete is required for welfare services projects. For welfare services projects, concrete test specimens to verify the strength of each class of concrete placed each day are to be taken for each day's pour of each concrete mixture exceeding five cu. yd. but less than 25 cu. yd., plus one sample for each 50 cu. yd. or fraction thereof. For all projects, each test specimen should consist of four cylinders (one cylinder is tested at seven days, two cylinders are tested at 28 days and one cylinder is held in reserve). Slump, air content, temperature and unit weight are also tested. Periodic, or continuous, inspection of the placement of concrete would ideally be provided by the same person that takes test specimens.

Concrete Paving:

Testing of concrete paving is required for all projects. Concrete test specimens to verify the strength of each class of concrete placed each day are to be taken for each day's pour of each concrete mixture exceeding five cu. yd. but less than 25 cu. yd., plus one test specimen for each 50 cu. yd. or fraction thereof. For all projects, each test specimen should consist of four cylinders (one cylinder is tested at seven days, two cylinders are tested at 28 days and one cylinder is held in reserve). Slump and air content, temperature and unit weight are also tested. Periodic, or continuous, inspection of the placement of concrete paving (if required by the design team) would ideally be provided by the same person that takes test specimens.

Concrete Moisture Vapor Emissions and Alkalinity Levels:

Testing of concrete moisture vapor emissions and alkalinity levels is required for all projects at interior concrete slabs on grade where floor covering will be installed (tile carpeting, sheet carpeting, resilient tile flooring, resinous flooring system, seamless flooring system, wood athletic flooring, etc.). Testing for concrete moisture vapor emissions can be performed either by calcium chloride tests or RH tests. Test locations must include at least one test (minimum) at each type of flooring system. It is required that three to six tests be performed for all new projects. Alkalinity tests for pH levels are performed at the same location, and time, as the concrete moisture vapor emission tests are performed. Testing for existing projects will be more extensive. For existing projects, use three test locations for areas up to 1000 ft² with one additional test for each 1000 ft² or fraction thereof. The FIELD QUALITY CONTROL section of SPECIFICATION SECTION 09 0503 – FLOORING SUBSTRATE PREPARATION is to be reviewed and be site adapted by the design team.

Miscellaneous:

A concrete mix design is required to be submitted by the concrete supplier and be reviewed by the design team for each class of concrete to be used on the project.

The FIELD QUALITY CONTROL section of SPECIFICATION SECTION 03 3111 – NORMAL WEIGHT STRUCTURAL CONCRETE is to be reviewed and be site adapted by the design team.

Asphalt Paving

Testing of asphalt paving is required for all projects. The TA is to provide full time nuclear density testing and inspection for asphalt paving during asphalt paving operations. Inspection of the placement of asphalt paving would ideally be provided at the same time and by the same person that provides testing services.

Provide one written field test report for each 10,000 square feet of paving (minimum of three written field test reports). Field test reports should show compliance with the contract documents regarding the type of aggregate base used, the depth and density of the aggregate base, the thickness and density of the paving, and the materials used. Field test reports should provide the test procedures used by the testing laboratory. During field tests, also verify the compaction effort required and the temperature of the paving as delivered and as placed.

In addition to field tests, laboratory tests are required. Pavement thickness and final densities are to be determined by the results of coring. Provide one core per 10,000 square feet (minimum of 3 cores).

A mix design is submitted and approved for each class of asphalt paving included in the project by the asphalt supplier.

The FIELD QUALITY CONTROL section of SPECIFICATION SECTION 32 1216 – ASPHALT PAVING: MARSHALL METHOD (or HVEEM METHOD, or SUPERPAVE) is to be reviewed and be site adapted by the design team.

Structural Steel Welding, Including the Attachment of Steel Deck

Structural testing of welds, including the attachment of steel deck, is not normally required for any meetinghouse, seminary, institute or welfare services projects.

Masonry (Structural)

Testing of structural masonry is required whenever it is used (principally used on welfare services projects). Testing of masonry used in screen walls is not required.

Prior to construction, certificates for materials used in masonry construction indicating compliance with the contract documents are submitted by the contractor to the PA. This is the “Unit Strength Method” approach.

During construction, the TA tests the masonry units, masonry grout, masonry mortar and masonry prisms for every 5,000 square feet, or

portion thereof, of masonry constructed. This testing guideline is slightly different from what codes technically require.

Wood (Panels, Joists, Trusses, Etc.)

Testing of wood (panels, joists, trusses, etc.) is not normally required for any project.

Installation of Post-Installed Concrete or Masonry Anchors

Testing of post-installed anchors in concrete or masonry is required whenever they are used. A pull test is to be performed on 10% of the anchors, or as otherwise required by the ICC Report for the anchor.

Inspection Guidelines

The TA provides all inspection services.

Engineered Fill

Written inspection of engineered fill is required for all projects. Details of testing and inspection requirements for engineered fill are found in the 2009 IBC, Section 1704.7 and Table 1704.7. Where engineered fill thicker than 12" is required, testing and inspection of the engineered fill is required by code. The geotechnical evaluation report for the project also provides additional information and recommendations as to the number of tests and inspections to provide. The PA should request this information from the geotechnical engineer if it is not provided in the geotechnical evaluation report.

Provide periodic inspections of the site prior to the placement of engineered fill. The inspector (often the geotechnical engineer) reviews all subgrades and excavations and determines if the site has been prepared in accordance with the geotechnical evaluation report prior to placing any engineered fill or concrete.

Provide continuous inspection of engineered fill placement. The inspector ensures that proper materials, densities and lift thicknesses are used in accordance with the provisions of the code and the approved geotechnical evaluation report.

Ideally, testing and inspection of engineered fill occur simultaneously and are performed by the same person.

Concrete and Concrete Paving

Most foundation concrete for buildings less than three stories, including footings, frost walls, and slabs-on-grade, are exempt from code required inspections. Also, the concrete design stresses are generally 2,500 psi, further reducing the need for testing and inspections of concrete or reinforcing steel placement.

Wood Framed Meetinghouses and Other Wood Framed Projects:

Inspection of concrete is not required for wood framed meetinghouses and other wood framed projects either by code or the Church. Some inspection, however, could be provided concurrently with any concrete test specimens being taken (if any). The PM, at his discretion, and with the input of the PA's design team, may require inspections for more quality control. Details for testing and inspection requirements for concrete are found in the 2009 IBC, Section 1704.4 and Table 1704.4 and in the ACI 318-08, Sections 1.3 and 5.6.

Welfare Services Projects:

Written periodic and continuous inspection of concrete is required for welfare services projects.

Provide periodic inspections for the following:

- Reinforcing steel placement
- Rebar welding
- Headed bolts, studs, embeds and inserts
- Concrete mix design
- Curing procedures
- Formwork and formwork removal
- Protection of concrete during cold or hot weather

Provide continuous inspections for concrete placement.

Concrete Paving:

Written periodic and continuous inspection of concrete is required for all projects although they are not required by codes.

Provide periodic inspections for the following:

- Reinforcing steel placement
- Concrete mix design
- Curing procedures
- Formwork and formwork removal
- Protection of concrete during cold or hot weather

Provide continuous inspections for concrete placement.

Concrete Moisture Vapor Emissions and Alkalinity Levels:

Inspections are not required, although testing is required.

Asphalt Paving

Written inspection of asphalt placement procedures, performed during asphalt paving field testing, are required for all projects although they are not required by codes. Inspection of the placement of asphalt paving would ideally be provided at the same time and by the same person that provides field testing services.

Structural Steel Welding, Including the Attachment of Steel Deck

Written, periodic inspection of structural steel welding, including the attachment of steel deck, is required for all projects. These inspections are required by code but are typically only needed on welfare services projects. Details for testing and inspection requirements are found in the 2009 IBC, Sections 1704.3, 1707.2, and Table 1704.3. Where fabrication of structural load bearing members and assemblies is performed on the premises of a fabricator's shop, periodic inspections of the fabricated items are required unless the fabricator is approved per 2009 IBC Section 1704.2.2.

Provide written periodic inspections of field performed welds and single-pass fillet welds.

Provide written periodic inspections of the attachment of steel deck, whether welded or mechanically fastened to the structure.

Masonry (Structural)

Written inspections are required for all structural masonry. These inspections are required by code but are typically only needed on welfare services projects. They are not required for screen walls. Details for testing and inspection requirements are found in the 2009 IBC, Section 1704.5 and Tables 1704.5.1 and 1704.5.2. Additional testing and inspection requirements are found in the ACI 530-05, Section 1.15 and Table 1.15.2 – Level B Quality Assurance.

Provide written periodic inspections of the following:

- Proportions of site-prepared mortar
- Construction of mortar joints
- Location of reinforcement and connectors
- Size and location of structural elements
- Type, size, location and placement of anchors
- Size, grade, type, and placement of reinforcement
- Verify that grout space is clean prior to grouting
- Protection of masonry during cold/hot weather

Provide written continuous inspections of the following:

- Grout placement
- Preparation of any required grout specimens, mortar specimens and prisms

Wood (Panels, Joists, Trusses, Etc.)

Wood is used principally on meetinghouses, seminaries and institutes and does not usually require inspection. Details for testing and inspection requirements are found in the 2009 IBC Sections 1704.1, 1704.6, 1707.3 and 2306.

Inspection of prefabricated metal plate wood trusses is not required by code as allowed by 2009 IBC Section 1704.2. The standard specifications require certification of the prefabricated metal plate wood truss manufacturer. If the manufacturer is not certified, then inspection of the trusses is required.

Inspection of wood shear walls and diaphragms, including nailing, bolting, anchoring and other fastening to other components of the seismic force resisting system is not required by code unless the fastener spacing is less than 4 inches on center. Where nails are spaced less than 4 inches on center, written inspections are required.

Where the truss clear span is 60 feet long or greater, the code (IBC 2009, Section 1704.6.2) requires the inspector to verify that the temporary installation of restraint/bracing and that the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package

Post-Installed Concrete or Masonry Anchors

Inspection of post-installed concrete or masonry anchors is required for all projects where post-installed anchors are used.

Provide periodic inspections of drilled hole sizes, hole depths and hole preparation.

Example of Testing and Inspection Requirements for a Heritage Style Meetinghouse

Basic Information

The following is assumed for this example:

- The site is approximately 2.54 acres (approximately 110,642 square feet).
- The meetinghouse is of approximately 16,558 square feet.
- 16" of engineered fill, excluding the 6" base, is required under the paving.
- 24" of engineered fill, excluding the 4" base, is required under the building pad.
- Assume that a 16" deep x 36" wide section of fill is required beneath approximately 515 linear feet of continuous footings.
- Concrete sidewalks are of approximately 10,000 square feet.
- 75 yd³ of concrete are used in the footings and 40 yd³ of concrete are used in the foundation walls.
- Asphalt paving is of approximately 70,000 square feet.
- The building is not located in an area subject to freeze and thaw cycles.

Engineered Fill (compacted fill and aggregate base)

Tests for engineered fill (compacted fill and aggregate base):

- Testing is based upon one test per 8" lift (or portion thereof) per 10,000 square feet of surface area at paved areas; one test per 8" lift (or portion thereof) per 2,500 square feet of surface area under the building pad; one test per 8" lift (or portion thereof) per 40' of footing length.
- Two 8" lifts (16" total) of engineered fill and one 6" lift of aggregate base is needed under paved areas.
- Three 8" lifts (24" total) of engineered fill one 4" lift of aggregate base is needed under the building.
- Two 8" lifts (16" total) of fill are needed under the continuous footings.

Required number of engineered fill tests is as follows:

$$(2 \text{ lifts})(70,000 \text{ sq. ft.})/(10,000 \text{ sq. ft.}) + (3 \text{ lifts})(16,558 \text{ sq. ft.})/(2,500 \text{ sq. ft.}) + (2 \text{ lifts})(515')/(40') = 59.6 \text{ tests. Require 60 written tests.}$$

Required number of aggregate base tests is as follows:

- 6" thick under paved areas and 4" thick under the building pad.
 $(70,000 \text{ sq. ft.})/(10,000 \text{ sq. ft.}) + (16,558 \text{ sq. ft.})/(2,500 \text{ sq. ft.}) = 13.6 \text{ tests.}$
Require 14 written tests.

Approximately 74 written tests are expected in this example.

In Table 1 - Quality Assurance Guidelines for Meetinghouses, these values have been adjusted. The minimum number of tests required for the aggregate base under paved areas is four, and the minimum number of tests required for the aggregate base under interior concrete slabs on grade is two.

Tests and inspections ideally occur at the same time and by the same person.

Concrete (concrete paving not used in this example)

Tests for concrete (no concrete paving in this example):

- For exterior concrete sidewalks and curbs, require one test specimen (4 cylinders) per 5,000 sq. ft. of surface area. For meetinghouses under about ,9,000 square feet, require three test specimens. Require six test specimens for larger projects. This is arbitrary but provides some guidance.
- For interior concrete slabs on grade, require one test specimen (4 cylinders) per 10,000 sq. ft. of surface area. For meetinghouses under about ,9,000 square feet, test specimens are not required. Require two test specimens for larger projects. This is arbitrary but provides some guidance.
- For foundations, require one test specimen (4 cylinders) for each 150 yd³ of concrete. For meetinghouses under about ,9,000 square feet, test specimens are not required. Require two test specimens for footings and for walls for larger projects. This is arbitrary but provides some guidance.
- Use three moisture and alkalinity tests for projects under about 9,000 square feet and six tests for larger projects.

Required number of test specimens for exterior concrete is as follows:

- $(10,000 \text{ sq. ft.}) / (5,000 \text{ sq. ft.}) = 2.0$ tests. Require 2 test specimens.

Required number of test specimens for interior concrete is as follows:

- $(16,558 \text{ sq. ft.}) / (10,000 \text{ sq. ft.}) = 1.6$ tests. Require 2 test specimens.

Required number of test specimens for foundations is as follows:

- $(75 \text{ yd}^3) / 150 \text{ cubic yards} = 0.5$ tests. Require 1 test specimen for footings.
 $(40 \text{ yd}^3) / 150 \text{ cubic yards} = 0.3$ tests. Require 1 test specimen for walls.

Approximately 8 concrete tests would be expected per this example.

Provide 6 concrete moisture vapor emission and alkalinity tests.

In Table 1 - Quality Assurance Guidelines for Meetinghouses, these values have been adjusted. Six test specimens have been required for exterior concrete, two test specimens have been required for footings and for walls and for interior slabs.

Asphalt Paving

Testing for asphalt paving:

- One written field test per 10,000 sq. ft. of surface area.
- One laboratory test per 10,000 sq. ft. of surface area.
 $(70,000 \text{ square feet}) / (10,000) = 7.0$ tests. Use seven tests.

Required number of written field tests is as follows:

- $(70,000 \text{ sq. ft.}) / (10,000 \text{ sq. ft.}) = 7.0$ tests. Require 7 written field tests

Required number of laboratory tests is as follows:

- $(70,000 \text{ sq. ft.}) / (10,000 \text{ sq. ft.}) = 7.0$ tests. Require 7 laboratory tests

Approximately 14 asphalt tests are expected in this example.

Tests and inspections ideally occur at the same time and by the same person.

Structural Steel Welding, Including the Attachment of Steel Deck

Testing of structural welding, including the attachment of steel deck is not required in this example.

Masonry (Structural)

Testing of masonry is not required. Testing of masonry in any screen walls is not required in this example.

Wood (Panels, Joists, Trusses, Etc.)

Testing of wood or wood assemblies is not required (wood shear walls, wood roof diaphragms, trusses) is not required in this example.

Post-Installed Concrete or Masonry Anchors

Testing of post-installed concrete or masonry anchors is not required in this example.

**Table 1. Quality Assurance Guidelines for Discontinued Meetinghouses
(Engineered Fill Varies Substantially from Project to Project)**

	90-1 Sharon	130-2 Sharon	170-2 Fayette	230-2 Fayette	230-3 Fayette	300-3 SC Legacy 98
Building Size	4,683 SF	5,718 SF	11,000 SF	13,973 SF	14,153 SF	24,460 SF
Site Area	1.02 Acres (46,267 SF)	1.10 Acres (47,916 SF)	1.86 Acres (81,022 SF)	1.86 Acres (81,022 SF)	2.25 Acres (98,010 SF)	3.52 Acres (153,331 SF)
Asphalt Paved Area (Est.)	20,000 SF	24,000 SF	25,000 SF	45,000 SF	60,000 SF	87,000 SF
QUALITY ASSURANCE TESTING:						
<u>Engineered Fill (soils):</u>						
Fill:	10 ²	12 ²	19 ²	26 ²	29 ²	47 ²
Base under Paving:	4 ³	4 ³	4 ³	5 ³	6 ³	9 ³
Base under Interior Slabs:	2 ⁴	3 ⁴	5 ⁴	6 ⁴	6 ⁴	10 ⁴
Fill under Footings:	14 ¹²	16 ¹²	21 ¹²	24 ¹²	24 ¹²	32 ¹²
<u>Concrete:</u>						
Site Cast (Sidewalks, etc.):	3 ⁵	3 ⁵	6 ⁵	6 ⁵	6 ⁵	6 ⁵
Interior Concrete Slabs:	0 ⁶	0 ⁶	2 ⁶	2 ⁶	2 ⁶	2 ⁶
Footings:	0 ⁷	0 ⁷	2 ⁷	2 ⁷	2 ⁷	2 ⁷
Foundation Walls:	0 ⁸	0 ⁸	2 ⁸	2 ⁸	2 ⁸	2 ⁸
Moisture/ph testing	3 ²¹	3 ²¹	6 ²¹	6 ²¹	6 ²¹	6 ²¹
<u>Asphalt Paving:</u>	4 ⁹	6 ⁹	6 ⁹	10 ⁹	12 ⁹	18 ⁹
<u>Welding/Steel Deck:</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Masonry (Material Testing):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Post Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰
INSPECTIONS:						
<u>Engineered Fill (soils):</u>						
Fill:	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
Base under Paving:	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴
Base under Interior Slabs:	Note 4	Note 4	Note 4	Note 4	Note 4	Note 4
Inspect Site and Excavations Before Fill Placement:	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹
<u>Concrete:</u>						
Site Cast (Sidewalks, etc):	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Interior Concrete Slabs:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Footings:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Foundation Walls:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Asphalt Paving:</u>	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13
<u>Masonry:</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰

**Table 2. Quality Assurance Guidelines for Independence Meetinghouses
(Engineered Fill Varies Substantially from Project to Project)**

	Ind 50	Ind 90	Ind 130	Ind 170	Ind 230	Ind 230 SC
Building Size	2,361 SF	4,532 SF	5,468 SF	11,303 SF	15,597 SF	16,986 SF
Site Area	0.50 Acres (21,780 SF)	0.67 Acres (29,185 SF)	0.89 Acres (38,768 SF)	1.79 Acres (77,972 SF)	2.50 Acres (108,900 SF)	3.61 Acres (157,252 SF)
Asphalt Paved Area (Est.)	6,976 SF	9,856 SF	16,560 SF	26,275 SF	53,210 SF	81,462 SF
QUALITY ASSURANCE TESTING:						
<u>Engineered Fill (soils):</u>						
Fill:	5 ²	8 ²	10 ²	19 ²	30 ²	37 ²
Base under Paving:	4 ³	4 ³	4 ³	4 ³	6 ³	7 ³
Base under Interior Slabs:	2 ⁴	2 ⁴	3 ⁴	5 ⁴	7 ⁴	8 ³
Fill under Footings:	10 ¹²	14 ¹²	15 ¹²	22 ¹²	27 ¹²	28 ¹²
<u>Concrete:</u>						
Site Cast (Sidewalks, etc.):	3 ⁵	3 ⁵	3 ⁵	6 ⁵	6 ⁵	6 ⁵
Interior Concrete Slabs:	0 ⁶	0 ⁶	0 ⁶	2 ⁶	2 ⁶	2 ⁶
Footings:	0 ⁷	0 ⁷	0 ⁷	2 ⁷	2 ⁷	2 ⁷
Foundation Walls:	0 ⁸	0 ⁸	0 ⁸	2 ⁸	2 ⁸	2 ⁸
Moisture/ph testing	3 ²¹	3 ²¹	3 ²¹	6 ²¹	6 ²¹	6 ²¹
<u>Asphalt Paving:</u>	4 ⁹	4 ⁹	4 ⁹	6 ⁹	12 ⁹	18 ⁹
<u>Welding/Steel Deck:</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Masonry (Material Testing):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Post Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰
INSPECTIONS:						
<u>Engineered Fill (soils):</u>						
Fill:	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
Base under Paving:	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴
Base under Interior Slabs:	Note 4	Note 4	Note 4	Note 4	Note 4	Note 4
Inspect Site and Excavations Before Fill Placement:	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹
<u>Concrete:</u>						
Site Cast (Sidewalks, etc.):	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Interior Concrete Slabs:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Footings:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Foundation Walls:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Asphalt Paving:</u>	Note 9, 13	Note 9, 13	Note 9, 13	Note 9,13	Note 9,13	Note 9,13
<u>Masonry:</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰

**Table 3. Quality Assurance Guidelines for Heritage 98 and 09T Meetinghouses
(Engineered Fill Varies Substantially from Project to Project)**

Her09T	Her09T SC	300-3
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			Heritage 98
Building Size	19,402 SF	21,043 SF	16,558 SF
Site Area	2.71 Acres (118,048 SF)	3.43 Acres (149,411 SF)	2.54 Acres (110,642 SF)
Asphalt Paved Area (Est.)	67,860 SF	79,555 SF	70,000 SF
QUALITY ASSURANCE TESTING:			
<u>Engineered Fill (soils):</u>			
Fill:	37 ²	42 ²	34 ²
Base under Paving:	7 ³	8 ³	7 ³
Base under Interior Slabs:	8 ⁴	9 ⁴	7 ⁴
Fill under Footings:	28 ¹²	30 ²	26 ¹²
<u>Concrete:</u>			
Site Cast (Sidewalks, (etc.):	6 ⁵	6 ⁵	6 ⁵
Interior Concrete Slabs:	2 ⁶	2 ⁶	2 ⁶
Footings:	2 ⁷	2 ⁷	2 ⁷
Foundation Walls:	2 ⁸	2 ⁸	2 ⁸
Moisture/ph testing	6 ²¹	6 ²¹	6 ²¹
<u>Asphalt Paving:</u>	14 ⁹	16 ⁹	14 ⁹
<u>Welding/Steel Deck:</u>	Not Req'd	Not Req'd	Not Req'd
<u>Masonry (Material Testing):</u>	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd
<u>Post Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰
INSPECTIONS:			
<u>Engineered Fill (soils):</u>			
Fill:	Note 2	Note 2	Note 2
Base under Paving:	1 ¹⁴	1 ¹⁴	1 ¹⁴
Base under Interior Slabs:	Note 4	Note 4	Note 4
Inspect Site and Excavations Before Fill Placement:	1 ¹¹	1 ¹¹	1 ¹¹
<u>Concrete:</u>			
Site Cast (Sidewalks, etc):	Not Req'd	Not Req'd	Not Req'd
Interior Concrete Slabs:	Not Req'd	Not Req'd	Not Req'd
Footings:	Not Req'd	Not Req'd	Not Req'd
Foundation Walls:	Not Req'd	Not Req'd	Not Req'd
<u>Asphalt Paving:</u>	Note 9, 13	Note 9, 13	Note 9, 13
<u>Masonry:</u>	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰

**Table 4. Quality Assurance Guidelines for Seminaries and Institutes
(Engineered Fill Varies Substantially from Project to Project)**

	Small Seminary Buildings				Large Seminary Buildings	
	SEM07-01	SEM07-02	SEM07-03	SEM07-04	SEM08-06	SEM07-08
Building Size	1,740 SF	3,598 SF	4,902 SF	6,207 SF	9,406 SF	11,727 SF
Site Area	0.30 Acres (13,068 SF)	0.62 Acres (27,007 SF)	0.62 Acres (27,007 SF)	0.62 Acres (27,007 SF)	1.05 Acres (45,738 SF)	1.05 Acres (45,738 SF)
Asphalt Paved Area (Estimated)	4,900 SF	10,125 SF	10,125 SF	10,125 SF	17,152 SF	17,152 SF
QUALITY ASSURANCE TESTING:						
<u>Engineered Fill (soils):</u>						
Fill:	3 ²	5 ²	8 ²	10 ²	15 ²	18 ²
Base under Paving:	4 ³	4 ³	4 ³	4 ³	4 ³	4 ³
Base under Interior Slabs:	2 ⁴	2 ⁴	2 ⁴	3 ⁴	4 ⁴	5 ⁴
Fill under Footings:	9 ¹²	12 ¹²	14 ¹²	16 ¹²	20 ¹²	22 ¹²
<u>Concrete:</u>						
Site Cast (Sidewalks, etc.):	3 ⁵	3 ⁵	3 ⁵	3 ⁵	6 ⁵	6 ⁵
Interior Concrete Slabs	0 ⁶	0 ⁶	0 ⁶	0 ⁶	2 ⁶	2 ⁶
Footings:	0 ⁷	0 ⁷	0 ⁷	0 ⁷	2 ⁷	2 ⁷
Foundation Walls:	0 ⁸	0 ⁸	0 ⁸	0 ⁸	2 ⁸	2 ⁸
Moisture/ph testing	3 ²¹	3 ²¹	3 ²¹	3 ²¹	6 ²¹	6 ²¹
<u>Asphalt Paving:</u>	4 ⁹	4 ⁹	4 ⁹	4 ⁹	4 ⁹	4 ⁹
<u>Welding/Steel Deck:</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Masonry (Material Testing):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰
INSPECTIONS:						
<u>Engineered Fill (soils):</u>						
Fill:	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
Base under Paving:	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴
Base under Interior Slabs:	Note 4	Note 4	Note 4	Note 4	Note 4	Note 4
Inspect Site and Excavations Before Fill Placement:	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹
<u>Concrete:</u>						
Site Cast (Sidewalks, etc.):	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Interior Concrete Slabs	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Footings:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Foundation Walls:	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Asphalt Paving:</u>	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13
<u>Masonry:</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Wood (Note 15):</u>	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd	Not Req'd
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰

**Table 5. Quality Assurance Guidelines for Welfare Services Projects
(Engineered Fill Varies Substantially from Project to Project)**

	<u>Bishop's Storehouse</u>		<u>Deseret Industries</u>	
	Small	Large	Medium	Large
Building Size	12,277 SF	17,100 SF	35,860 SF	45,215 SF
Site Area (Assumed)	2.20 Acres (95,832 SF)	3.00 Acres (130,680 SF)	6.20 Acres (270,072 SF)	7.50 Acres (326,700 SF)
Asphalt Paved Area (Assumed)	55,250 SF	77,000 SF	161,000 SF	203,000 SF
QUALITY ASSURANCE TESTING:				
<u>Engineered Fill (soils):</u>				
Fill:	26 ²	36 ²	76 ²	95 ²
Base under Paving:	6 ³	8 ³	17 ³	21 ³
Base under Interior Slabs:	5 ⁴	7 ⁴	15 ⁴	19 ⁴
Fill under Footings:	35 ¹²	47 ¹²	52 ¹²	59 ¹²
<u>Concrete:</u>				
Site Cast (Sidewalks, etc.):	3 ⁵	3 ⁵	6 ⁵	6 ⁵
Interior Concrete Slabs	3 ⁶	4 ⁶	8 ⁶	9 ⁶
Footings:	2 ⁷	2 ⁷	2 ⁷	2 ⁷
Foundation Walls:	2 ⁸	2 ⁸	2 ⁸	2 ⁸
Moisture/ph testing	6 ²¹	6 ²¹	6 ²¹	6 ²¹
<u>Asphalt Paving:</u>	12 ⁹	16 ⁹	34 ⁹	42 ⁹
<u>Welding/Steel Deck:</u>	0 ¹⁶	0 ¹⁶	0 ¹⁶	0 ¹⁶
<u>Masonry (Material Testing):</u>	3 ¹⁷	4 ¹⁷	4 ¹⁷	5 ¹⁷
<u>Wood (Note 15):</u>	0	0	0	0
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰
INSPECTIONS:				
<u>Engineered Fill (soils):</u>				
Fill:	Note 2	Note 2	Note 2	Note 2
Base under Paving:	1 ¹⁴	1 ¹⁴	1 ¹⁴	1 ¹⁴
Base under Interior Slabs:	Note 4	Note 4	Note 4	Note 4
Inspect Site and Excavations Before Fill Placement:	1 ¹¹	1 ¹¹	1 ¹¹	1 ¹¹
<u>Concrete:</u>				
Site Cast (Sidewalks, etc.):	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Interior Concrete Slabs	Not Req'd	Not Req'd	Not Req'd	Not Req'd
Footings:	5 ¹⁸	7 ¹⁸	7 ¹⁸	8 ¹⁸
Foundation Walls:	5 ¹⁸	7 ¹⁸	7 ¹⁸	8 ¹⁸
<u>Asphalt Paving:</u>	Note 9, 13	Note 9, 13	Note 9, 13	Note 9, 13
<u>Welding/Steel Deck:</u>	3 ¹⁹	4 ¹⁹	8 ¹⁹	9 ¹⁹
<u>Masonry:</u>	13 ²⁰	17 ²⁰	19 ²⁰	22 ²⁰
<u>Post-Installed Anchors:</u>	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰	Not Req'd ¹⁰

Footnotes for Tables 1-3

The extent of needed testing and inspections varies from site to site and is also dependent upon the GC's construction schedule. The design team needs to site adapt the testing and inspection requirements for each new project.

1. "SF" indicates "square feet." An "acre" is 43,560 square feet.
2. The amount of testing is based upon placing 16" of fill in two 8" thick lifts at paved areas and using one test per 10,000 square feet of surface area per lift. Added to this is the amount of testing required for 24" of fill placed in three 8" thick lifts under the building pad and using one test per 2,500 square feet of surface area per lift. For these tables, it was assumed that inspections for fill placement are performed concurrently with testing.
3. This amount of testing is based upon using one test per 10,000 square feet of surface area at paved/concreted areas but not less than four tests. A single lift of aggregate base was used. For these tables, it was assumed that inspections for aggregate fill placement are performed concurrently with testing.
4. This amount of testing is based upon using one test per 2,500 square feet of surface area but not less than two tests. A single lift of aggregate base used. For these tables, it was assumed that inspections for aggregate fill placement are performed concurrently with testing.
5. Testing of site cast concrete is not required on meetinghouses and other wood framed projects. For these projects, it is suggested that that three test specimens be taken for projects under about 9,000 square feet six test specimens be taken for larger projects. This is arbitrary and should be reviewed and adjusted for the project. In some cases, it would be acceptable to not take any test specimens. This would be reviewed by the design team.
6. Testing of concrete in interior slabs on grade is not required on meetinghouses and other wood framed projects. However, it is suggested that for projects over about 9,000 square feet that two tests be taken. This would be reviewed by the design team.
7. Testing of concrete in footings is not required on meetinghouses or other wood framed projects. However, it is suggested that for projects over about 9,000 square feet that two tests be taken. This would be reviewed by the design team.
8. Testing of concrete in foundation walls is not required on meetinghouses or other wood framed projects. However, it is suggested that for projects over about 9,000 square feet that two tests be taken. This would be reviewed by the design team.

9. Testing of asphalt in asphalt paving is based upon one field test and one laboratory test per 10,000 square feet of paved area with a minimum of two field and laboratory tests.
10. Perform pull tests for 10% of the anchors. Inspection should verify that all drilled holes are of the correct size and depth prior to anchor installation. Post-Installed anchors are often used on an “as-needed” basis to replace misplaced bolts. Provide testing and inspection on an “as-needed” basis.
11. Prior to the placement of engineered fill, the inspector should review all sub grades and excavations and determine if the site is prepared in accordance with the contract documents and geotechnical report prior to placing any engineered fill (or concrete).
12. This is an estimate based upon using one test per 40 linear feet of footing per lift. The linear feet for this estimate was set equal to square root of the building area multiplied by four (i.e. for a 16,986 sq. ft. building, linear feet of footing is equal to $(16,986^{.5}) * 4 = 521$). Two lifts were used to create the table.
13. The TA is to inspect placement procedures while taking tests.
14. Before placing paving, determine if the elevation of the base is correct.
15. Wood and wood assemblies do not require testing or inspections.
16. Welds and deck attachments require only visual inspections.
17. Testing of materials for masonry (units, grout, masonry, and prisms) is performed for every 5,000 square feet of wall surface.
18. Inspections of concrete in footings and foundation walls are assumed to occur every 150 linear feet of footing or foundation wall.
19. Inspections of steel welding are assumed to occur once for every 5,000 square feet of building area.
20. Inspections of masonry are assumed to occur once for every 1,000 square feet of wall surface area.
21. Use three tests for projects under 9,000 square feet and six tests for projects over 9,000 square feet. This would be reviewed by the design team.

Sample ATTACHMENT “A” and "B" of Agreement Between Owner and Testing Agency – Testing and Inspection Services. The Agreement

Between Owner and Testing Agency is available on the Meetinghouse and Facilities Department (MFD) Resource Library

ATTACHMENT A

Project Scope of Work, Compensation Rates Schedule and Cost Worksheet

Property Number: _____
 Property Address: _____
 Project Name: _____

1. The costs provided will include all costs including but not limited to all transportation, labor, services, materials and equipment required for the complete, prompt and efficient performance of the work.
2. The Testing Agency shall distribute testing and inspection reports to the Owner, Architect, Engineer of Record, Contractor and Authorities Having Jurisdiction within 24 hours of a test or inspection having been performed.
3. If a test or inspection fails, the Testing Agency shall immediately inform the Contractor and Architect.
4. The testing agency shall not change the requirement of the contract documents.

SITE DEVELOPMENT (Division 32 of specifications)	Estimated No. Trips	Hours Per Trip	Total Hours	Hourly Rate	Total Cost
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Earthwork (Soils) – Field (provide written reports for all tests and inspections).									
Engineering technician – site grading and fill compaction under exterior concrete (slabs, curbs, gutters, sidewalks, paving) – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – site grading and fill compaction under building pad and under building foundations – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – site grading and fill compaction adjacent to foundation walls – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – compaction of aggregate base under exterior paving and under interior concrete slabs on grade – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – sanitary sewer trench backfill, storm line trench backfill – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – landscape fill – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – drilled piers/piles – testing and inspection.	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – asphalt paving – testing and inspection	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – asphalt paving – obtain asphalt coves	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – concrete paving – testing and inspection	0	X	0	=	0	X	0	=	\$ 0.00
Subtotal:									\$ 0.00

Engineering technician – asphalt samples pick-up	0	X	0	=	0	X	0	=	\$ 0.00
Engineering technician – concrete cylinders samples pick-up	0	X	0	=	0	X	0	=	\$ 0.00
Subtotal:									\$ 0.00

Unit/Measure	Test Method	Estimated Total	Unit Rate	Total Cost
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Earthwork (Soils) – Laboratory (provide written reports for all tests).				
Soil tests				
Moisture density relationship	each	ASTM D1557	0	X 0 = \$ 0.00
Atterberg limits Test	each	ASTM D4318	0	X 0 = \$ 0.00
Sieve analysis	each	ASTM C136	0	X 0 = \$ 0.00
Asphalt paving tests				
Asphalt core thickness	each	ASTM D2726	0	X 0 = \$ 0.00

Theoretical maximum density (Rice)	each	ASTM 2041	0	X	0	=	\$ 0.00
Bulk Density	each	ASTM D2726	0	X	0	=	\$ 0.00
Marshall test	each	ASTM D1559	0	X	0	=	\$ 0.00
Extraction/Gradation	each	ASTM D2172	0	X	0	=	\$ 0.00
Concrete paving test cylinders	each	ASTM C31	0	X	1	=	\$ 0.00
Subtotal:							\$
							0.00

TOTAL: SITE DEVELOPMENT \$ 0.00

CONCRETE (Division 03 of specifications)	Estimated No. Trips	Hrs Per Trip	Total Hours	Hourly Rate	Total Cost
Concrete – Field					
Inspector – reinforced concrete	0	X 0	= 0	X 0	= \$ 0.00
Inspector – post installed anchors	0	X 0	= 0	X 0	= \$ 0.00
Technician – concrete test cylinders (sidewalks, retaining walls, misc.)	0	X 0	= 0	X 0	= \$ 0.00
Technician – concrete test cylinders (building foundations)	0	X 0	= 0	X 0	= \$ 0.00
Technician - concrete test cylinders (interior concrete slabs on grade)	0	X 0	= 0	X 0	= \$ 0.00
Technician – concrete test cylinders pick-up	0	X 0	= 0	X 0	= \$ 0.00
Technician – interior moisture vapor emission and alkalinity tests	0	X 0	= 0	X 0	= \$ 0.00
Subtotal:					\$ 0.00

Unit/ Measure	Estimated Total	Unit Rate	Total Cost
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Concrete – Laboratory					
Concrete Compressive Strength	(sets of 4)	0	X	0	= \$ 0.00
TOTAL CONCRETE					\$ 0.00

MASONRY (Division 04 of specifications)	Estimated No. Trips	Hrs Per Trip	Total Hours	Hourly Rate	Total Cost
Masonry - Field					
Inspector – structural masonry	0	X 0	= 0	X 0	= \$ 0.00
Technician – prism, grout, mortar samples pick-up	0	X 0	= 0	X 0	= \$ 0.00
Subtotal:					\$ 0.00

Unit/ Measure	Test Method	Estimated Total	Unit Rate	Total Cost
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Masonry - Laboratory					
Masonry Prisms	each	ASTM C1314	0	X 0	= \$ 0.00
Grout compressive strength	each	ASTM C476 and C1019	0	X 0	= \$ 0.00
Mortar compressive strength	each	ASTM C270	0	X 0	= \$ 0.00
Subtotal:					\$ 0.00

TOTAL: MASONRY \$ 0.00

WOOD (Division 06 of specifications)	Estimated No. Trips	Hrs Per Trip	Total Hours	Hourly Rate	Total
Wood - Field					
Inspector – trusses over 65', wood shear walls with nails spaced less than 4" O.C.	0	X 0	= 0	X 0	= \$ 0.00
TOTAL: WOOD					\$ 0.00

TRANSPORTATION	No. Trips	Trip	Total	Unit Rate	Total
Vehicle Charges					

Mileage	<u>0</u>	X	<u>0</u>	=	<u>0</u>	X	<u>0</u>	=	\$ <u>0.00</u>
TOTAL: TRANSPORTATION									\$ <u>0.00</u>

PROJECT ADMINISTRATION		Hours		Rate		Total
Management						
Project Manager		<u>0</u>	X	<u>0</u>	=	\$ <u>0.00</u>

TOTAL: PROJ. ADMIN. \$ 0.00

MISCELLANEOUS ITEMS

1 _____	_____
2 _____	_____
3 _____	_____
4 _____	_____
5 _____	_____

TOTAL: MISC. ITEMS \$ 0.00

TOTAL: PROJ. ESTIMATE \$ 0.00

ATTACHMENT B

Compensation Rate Schedule

Personnel:

Principal	\$	/hour
Senior Project Manager	\$	/hour
Senior Project Engineer	\$	/hour
Project Manager	\$	/hour
Project Engineer	\$	/hour
Senior Engineering Technician	\$	/hour
Field Engineer	\$	/hour
Field Technician	\$	/hour
Senior Engineering Technician	\$	/hour
Clerical	\$	/hour
.....	\$	/hour
.....	\$	/hour
.....	\$	/hour
.....	\$	/hour

Notes:

1. Overtime charges will be billed at _____ times the hourly rate for jobs running continuously more than 8 hours per day.
2. The rate of _____ times the hourly rate will be charged for Sundays and holidays in excess of 8 hours per day.
3. Hourly rates are charged for all project related time including travel to and from the project site.
- 4.
- 5.
- 6.

Materials Testing Services:

Engineered fill (soils):

Site grading and fill compaction under exterior concrete (slabs, curbs, gutters, sidewalks, paving), under building pad, footings and adjacent to foundation walls. Compaction of aggregate base under exterior paving and interior concrete slabs.	\$
Sanitary sewer trench backfill	\$
Water line trench backfill	\$
Storm sewer trench backfill.....	\$
Landscape fill	\$
Laboratory material evaluations for each type of soil encountered during fill placement (Proctor and Atterberg)	\$

Concrete (test for air content, slump, temperature and strength for concrete samples):

Exterior concrete slabs, sidewalks, paving, retaining walls, and miscellaneous exterior site concrete (4 cylinders per test)	\$
Building foundations; footings and walls (4 cylinders per test).....	\$
Interior slabs on grade (4 cylinders per test).....	\$
Interior concrete moisture vapor emission and alkalinity	\$
Drill-in (post installed) mechanical anchors/adhesive anchors/screw anchors.....	\$

Asphalt:

Tests to determine paving thickness, mix composition, compaction effort required, compaction, temperature, and in-place density during asphalt installation,	\$
Asphalt core for thickness	\$
Asphalt extraction and gradation	\$
.....	\$
.....	\$
.....	\$

Material Testing and Inspection Trips:

Engineered fill (soils):

Trips needed for testing of soils under exterior concrete (slabs, curbs, gutters, sidewalks, paving), under building pad, footings and adjacent to foundation walls. Trips needed for testing of aggregate base under exterior paving and interior concrete slabs. ..	\$
Trips needed for testing of soils at sanitary sewer trench backfill	\$
Trips needed for testing of water line trench backfill	\$
Trips for testing of storm sewer trench backfill.....	\$
Trips for testing of landscape fill.....	\$
Trips for laboratory material evaluations for each type of soil encountered during fill placement (Proctor and Atterberg)	\$

Concrete:

Trips needed to obtain concrete cylinders for exterior concrete slabs, sidewalks, paving, retaining walls, and miscellaneous exterior site concrete	\$
Trips needed to obtain concrete cylinders for building foundations; footings and walls	\$
Trips needed to obtain concrete cylinders for Interior slabs on grade.....	\$
Trips for interior concrete moisture vapor emission and alkalinity.....	\$
Trips for drill-in (post installed) mechanical anchors/adhesive anchors/screw anchors.....	\$

Asphalt:

Trips to determine paving thickness, mix composition, compaction effort required, compaction, temperature, and in-place density during asphalt installation,	\$	
.....	\$	
.....	\$	
.....	\$	

Inspection Services:

Engineered fill (soils):

Fill.	\$	/hour
Base under exterior paving.....	\$	/hour
Base under interior slabs on grade.....	\$	/hour
Verify excavations and verify site has been prepared for engineered fill (subgrade preparations)	\$	/hour

Concrete:

Exterior concrete slabs, sidewalks, paving, retaining walls, and miscellaneous exterior site concrete	\$	/hour
Building foundations; footings and walls (4 cylinders per test).....	\$	/hour
Interior slabs on grade (4 cylinders per test).....	\$	/hour
Interior concrete moisture vapor emission and alkalinity	\$	/hour
Drill-in (post installed) mechanical anchors/adhesive anchors/screw anchors.....	\$	/hour

Asphalt Paving	\$	/hour
Welding and/or steel deck attachment.....	\$	/hour
Masonry	\$	/hour
Wood (wood and wood assemblies).....	\$	/hour
Drill-in (post installed) mechanical anchors/adhesive anchors/screw anchors	\$	/hour
.....	\$	
.....	\$	
.....	\$	

Miscellaneous:

Field Testing:

Nuclear density and moisture measuring equipment.....	\$	/day
UT, MT, PT, rebound hammer, torque wrench, pachometer.....	\$	/day

Laboratory Testing and Inspection Services:

Atterberg limits (ASTM 4318).....	\$	/each
Wet preparation	\$	/each
Non plastic	\$	/each
California Bearing Ratio (CBR) – 1 point.....	\$	/each
California Bearing Ratio (CBR) – 3 point.....	\$	/each
Chunk/bulk density – paraffin coated.....	\$	/each
Collapse/Swell	\$	/each
Sample preparation	\$	/each
Consolidation (ASTM D2435).....	\$	/each
With time rates	\$	/each
Sample preparation	\$	/each
Density of undisturbed sample (ASTM D4564-in situ).....	\$	/each
Direct shear (ASTM D3080)		
In situ	\$	/each
Saturated	\$	/each
Sample preparation	\$	/each
Hydrometer (ASTM D422)	\$	/each
Laboratory vane shear (ASTM D4648).....	\$	/each
Moisture content (ASTM D2216).....	\$	/each
Moisture and density combined	\$	/each
Organic content (ASTM D2974).....	\$	/each
ph (ASTM D4972)	\$	/each
Permeability test (ASTM D2434)		
Granular	\$	/each
Cohesive	\$	/each
Sample preparation	\$	/each
Pocket penetrometer	\$	/each
Proctors ASTM D1557 and D698 – Moisture density relationships.....	\$	/each
Single point – any method.....	\$	/each
Rock and moisture correction oversize (ASTM D4718)	\$	/each
Resistivity (ASTM G57)	\$	/each
Sample preparation	\$	/each
Sieves (ASTM C136 and C117)		
2" plus	\$	/each
2" maximum including elutriation (ASTM C136 and C117).....	\$	/each
No. 200 only (ASTM D1140)	\$	/each
Special testing	\$	/hour
Specific gravity (ASTM D854 – coarse aggregates)	\$	/each
Specific gravity (ASTM D854 – fine aggregates)	\$	/each
Swell (ASTM D4546 – Method A, B or C – undisturbed).....	\$	/each

Swell (ASTM D4546 – Method A, B or C – remolded).....	\$	/each
Torvane (ASTM D2573)	\$	/each
Unconfined compression (ASTM D2166)		
Soil – undisturbed	\$	/each
Rock core	\$	/each
Sample preparation	\$	/each
Water soluble sulphate	\$	/each
	\$
	\$
	\$

Masonry:

Mortar or grout cubes/cylinders	\$	/each
Two course masonry unit prism test (prepared by contractor).....	\$	/each
Grout prism \$ /each		
	\$
	\$
	\$

Miscellaneous

.....	\$
.....	\$
.....	\$

Notes:

- 1.
- 2.
- 3.