SECTION 01410

TESTING AND INSPECTION OF EARTHWORK AND CONCRETE

# GENERAL

## SCOPE

### This section addresses testing, laboratory services, and inspections required during the course of construction, as specified.

## RELATED WORK SPECIFIED ELSEWHERE

### Section 01000 – General Requirements

### Section 01039 – Coordination and Meetings

### Section 01300 – Shop Drawings and Submittals

## TESTING LABORATORY

### Selection of Laboratory:

#### Testing and inspections will be performed by the DISTRICT or by an independent testing Laboratory selected by the DISTRICT.

### Testing Requirements:

#### Testing and inspection services which are performed will be in accordance with requirements of the Uniform Building Code and as specified herein.

## PAYMENTS

### Tests Showing Compliance

#### Costs of initial testing and inspection, except as specifically modified herein, or specified otherwise in technical sections, will be paid by the DISTRICT, providing such testing and inspection indicates compliance with Contract Documents. Initial tests and inspections are defined as the first test and inspections as specified herein.

### Tests Showing Failure

#### In the event a test or inspection indicates failure of a material or procedure to meet requirements of Contract Documents, costs for retesting and re-inspection will be borne by the Contractor.

### Additional Tests at DISTRICT's Request

#### Additional tests and inspections not specified herein but requested by the DISTRICT, will be paid for by the DISTRICT, unless result of such tests and inspections are found to be not in compliance with Contract Documents, in which case the DISTRICT will pay all costs for initial testing, as well as retesting and re-inspection, and then back-charge the Contractor.

### Additional Test Due to Changes

#### Costs for additional tests or inspections required because of change in materials being provided or change of source or supply shall be paid by Contractor direct to the testing laboratory.

### Correction of Deficiencies

#### Costs for construction activities which are required to correct deficiencies shall be borne by the Contractor.

### Additional Tests to Assist Contractor

#### Cost of testing which is required solely for the convenience of Contractor in his scheduling and performance of Work shall be borne by the Contractor.

## AVAILABILITY OF SAMPLES

### Acquisition of Samples

#### Contractor shall make materials required for testing available and assist in acquiring these materials as directed by Engineer. The samples shall be taken under the immediate direction and supervision of the Engineer.

### Uncovering Construction

#### If construction which is required to be tested or inspected is covered up without prior notice or approval, such construction may be uncovered at the discretion of the Engineer.

### Advance Notice for Inspections

#### Unless otherwise specified, Contractor shall notify the Engineer a minimum of 10 working days in advance of required inspections. Extra construction activities resulting from a failure to notify the Laboratory shall be paid for by the Contractor.

### Cancellation of Tests or Inspection

#### Contractor shall give sufficient advance notice to the Engineer in the event of cancellation or time extension of a scheduled test or inspection. Charges due to insufficient advance notice of cancellations or time extension shall be paid for by the Contractor.

## REMOVAL OF MATERIALS

### Unless otherwise directed, materials not conforming to the requirements of Contract Documents shall be promptly removed from the Project site.

# PRODUCTS (Not Applicable)

# EXECUTION

## EARTHWORK

### Engineer's Role

#### The Engineer will provide continuous inspection of fill and will field test fill and earth backfill as placed and compacted and inspect excavations and subgrade before concrete is placed and provide periodic inspection of open excavations, embankments, and other cuts or vertical surfaces of earth. The Engineer will submit a report indicating that he has observed and tested fills and that in his opinion the fills were placed in accordance with the Project Specifications.

### Removal of Unsatisfactory Material

#### Contractor shall remove unsatisfactory material, reroll, adjust moisture, place new material, or in the case of excavations, provide proper protective measures, perform other operations necessary, as directed by the Engineer whose decisions and directions will be considered final.

### Engineer may require overexcavation of unsuitable materials from the trench and so order such overexcavation and stabilization of trench base in accordance with SECTION 02223.

### Test and Inspection Procedure

#### General: Allow sufficient time for testing and evaluation of results before material is needed. The Engineer will be sole and final judge of suitability of all materials.

#### Tests: Laboratory compaction tests to be used will be in accordance with ASTM D1557-78.

#### Field Density Tests: Field density tests will be made in accordance with ASTM D1556 or ASTM D2922.

#### Number of Tests: The number of tests along the pipeline will be determined by Engineer, but generally every 300' to 400'.

#### Use of Tested Materials: Materials in question may not be used pending test results.

#### Excavation and Embankment Inspection Procedure: Engineer will visually or otherwise examine such areas for bearing values.

## TESTING OF CONCRETE

### General

#### Notify Engineer of brand and type of cement and sources of aggregates in time for review, sampling and testing, if required.

### Number of Tests

#### At least four cylinders for each 100 cubic yards or each separate mix design of concrete of required strength in excess of 2000 psi, or fraction thereof being placed each day will be taken.

### Sampling Procedures

#### Cylinders will be taken so as to represent as nearly as possible the batch of concrete from which they are taken. Sampling procedures shall conform to ASTM C 172-82.

### Test Cylinders

#### Test cylinders shall be made and cured in compliance with ASTM C 31-88, except as modified herein.

### Test Procedures

#### Test cylinders from respective batches, one at age of 7 days, one at 14 days and one at age of 28 days. The fourth shall be tested as directed if concrete strength is under that specified. Cylinder testing procedures shall conform to ASTM C39-86 for strength.

### Slump Tests

#### Slump tests shall be taken as required by Testing Laboratory to certify compliance with Contract Documents. Slump shall be tested in accordance with ASTM C143-89a.

### Compressive Strength

#### Minimum compressive strength of test cylinders, in pounds per square inch, shall not be less than the specified required design strength.

### Test Cores

#### If minimum strengths of test cylinders fall below those specified, Engineer may require test cores from hardened concrete to be taken and tested. Each core test, if taken, shall consist of 3 cores. Costs of such cores and tests shall be borne by the Contractor. Cores shall be taken in accordance with ASTM C42-84a, from locations selected by Engineer. Contractor shall repair core holes with dry-pack or a non-shrinking mortar.

### Test Core Strength

#### Concrete tested by coring shall be considered acceptable if the average strength of three cores is equal to at least 85 percent of the minimum specified 28 day strength and if no single core strength is less the 75 percent of the minimum 28 day strength.

## CONCRETE INSPECTIONS

### An authorized inspector of the DISTRICT will be present at all times during placing of structural, reinforced cast-in-place concrete. Before placing concrete, he will inspect and approve (if satisfactory) accuracy of all formwork and quantity and placement of all reinforcing steel. Concrete construction activities shall not proceed until inspections are complete and the inspected construction is approved.

* 1. **REINFORCING STEEL**

### Certificates: Provide mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered.

* 1. **STRUCTURAL STEEL**

### Certificates: Mill certificates or affidavits and manufacturers' certification shall be supplied to the Inspector for verification of steel materials. DISTRICT shall be notified at least two working days in advance of fabrication and supplied with the reports so that he can make a shop inspection of the steel.

### General Inspection

#### Inspection at Fabricator's Plant

The DISTRICT may visit the fabricator's plant to verify that materials used check with the mill tests, affidavits of test reports, and that fabrication and welding procedures meet specifications.

#### Inspection at Job Site

The DISTRICT will visually check fabricated steel delivered to the Project against the working and reviewed shop drawings for compliance and he will make physical tests, measurements, as required to meet the Specifications. Shop fillet welds will be visually checked.

#### Inspection of Steel Welding

Inspection of steel welding shall be made to ensure that seam welds and puddle welds are made in accordance with the Drawings and Specifications. Inspection shall insure that proper electrodes, current, travel and speed are used and that no cracks, serious undercutting, overlap, surface holes or slag inclusions occur.

END OF SECTION