SECTION 9

TESTING MATERIALS

9.01 INSPECTION AND TESTING OF MATERIALS:

The following will be the minimum test requirements. All tests are to be performed by a recognized testing laboratory subject to the approval of the Owner.

Materials of construction, particularly those upon which strength and durability of the structure may depend, shall be inspected and tested to establish conformity with the Contract and suitability for uses intended. The following are differentiations of minimum service desired to protect the interest of the Owner. Other materials, not listed, shall also receive attention consistent with the importance of the use to which they are to be put.

The judgment of the Engineer shall prevail where it appears advisable to deviate from the limitations set forth hereinafter because of nonavailability of the material required other than concrete materials and concrete.

When so specified in the Special Provisions, the Owner will pay for testing; but when not specified, the testing shall be performed, at no cost to the Owner, by an approved independent testing laboratory.

9.02 PORTLAND CEMENT:

A. Where the total Project requirement is less than 200 barrels (one car):

Cement shall have been shipped from the mill not more than three months previous to receipt on the Work. Manufacturer's certificate required.

B. Where the total Project is between 200 barrels and 800 barrels:

Manufacturer's test and certificate of inspection conformance for each shipment shall be furnished except where, for special reasons, independent laboratory testing as for condition C is required.

C. Where the total Project requirement exceeds 800 barrels; also where cement other than a standard ASTM, or a Federal Specification Portland Cement, is used:

Tests shall be made on the entire cement requirement by an approved independent laboratory on car samples, or bin (sealed) samples, as may be required. (ASTM Specification C150)

Cement Testing shall be conducted under ASTM Specification C150 where not in conflict with Project Specifications.

9.03 AGGREGATES FOR USE IN CEMENT CONCRETE:

A. Concrete aggregates shall conform to "Standard Specifications for Concrete Aggregates", ASTM Serial Designation C33.

B. In the absence of test records indicating suitability, or of a satisfactory service record for a period of 5 or more years, the test requirements for fine and coarse aggregates shall be made.

C. The maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between forms of the member for which the concrete is to be used, nor larger than three-fourths of the minimum clear spacing between reinforcing bars.

9.04 FINE AGGREGATE:

Conformity with ASTM C33. Tests shall be made periodically as the Work progresses to assure uniformity.

9.05 COARSE AGGREGATE:

Conformity with ASTM C33.

9.06 SLUMP TESTS OF CONCRETE:

Where 25 or more cubic yards of concrete are placed, also as necessary to maintain desired consistency of the concrete, a slump test shall be made per ASTM C143. Not less than one such test shall be made for each 50 cubic yards of concrete placed at one

operation. Such test shall also be made on each sample of concrete used in making test specimens.

9.07 ADVANCE CONCRETE TESTS:

A. Where more than 50 and less than 500 cubic yards of concrete are required:

Before the start of concreting, make a single batch of a set of four standard 6-inch cylinders per ASTM C31 and cure. Test two at 7 days and two at 28 days per ASTM C39. Report as for "Concrete Control Test (Laboratory Curing)" below.

B. Where a total of more than 500 cubic yards of concrete is required:

Advance tests of concrete shall be made in an independent laboratory in accordance with ASTM C39. Six standard 6-inch compression cylinders, three to be tested at 7 days and three at 28 days, shall be made with the proportioning and materials, including cement, of the type, brand and mill source proposed to be used in the major part of the Project. The slump should not be less than the greatest slump expected to be used in the structure. The tests made on aggregates, as required above, may be made a part of these tests if suitably referenced on the reports which shall be issued at 7 and 28 days to interested parties. These tests shall be repeated if necessary because of changes in materials or unsatisfactory results. Strength requirements will be stated in the Contract.

9.08 CONCRETE DESIGN MIX AND TESTS:

A. The Contractor shall submit to the Owner for approval a design concrete mix by an approved commercial testing laboratory before placing any concrete.

B. All on-site concrete testing shall be at the Owner's expense.

9.09 CONCRETE CONTROL TESTS (LABORATORY CURING):

Where a total of more than 500 cubic yards of concrete is required:

During the progress of the Work, and for each different mix of concrete, a set of two standard 6-inch concrete cylinders shall be made and tested, where from 25 to 100 cubic yards of concrete are placed, during each and every day's operations. Also, an additional set of tests shall be made for each 100 cubic yards or major fractions thereof over and above the first 100 cubic yards. The cylinders of each set shall be molded from the same sample of concrete and tested at 7 days or at 28 days, as may be specifically desired. ASTM C31 shall govern. Testing shall be done per ASTM C39.

9.10 REINFORCING STEEL:

A. Where less than 50 tons are required:

Field inspection for section, rust, shape and dimensions. Manufacturer's certificate required.

B. Where 50 or more tons are required:

Inspection and tests by an approved laboratory for conformance with governing specification.

9.11 STRUCTURAL STEEL:

A. Where less than 100 tons are required:

Field inspection for rust, dimensions, riveting, welding, painting, etc. Manufacturer's certificate required.

B. Where 100 or more tons are required:

Mill and shop inspection by an independent laboratory.

9.12 STEEL BAR JOISTS:

Where more than 100 joists are required:

There shall be furnished the manufacturer's test data proving the efficiency of the design of his joists for the purpose intended, and in addition there shall be furnished certificates that the joists as furnished are in accordance with Project requirements and with the Standard Specifications for Steel Joists as given in the handbook "Steel Joists Construction" published by the Steel Joists Institute.

9.13 BRICK:

A. Where less than 50,000 are required:

Visual inspection as set forth in ASTM or other designated specification.

B. Where 50,000 or more are required:

Visual inspection and tests, as set forth in ASTM or other designated specification, by an independent laboratory.

9.14 BUILDING BLOCK AND STONE:

A. Where less than 1,000 pieces are required:

Visual inspection as set forth in ASTM or other designated specification.

B. Where 1,000 or more pieces are required:

Visual inspection and tests, as set forth in ASTM or other designated specification, by an independent laboratory.

9.15 CONCRETE SEWER PIPE:

Inspection and testing, as set forth in ASTM or other designated specification, by an independent laboratory. Inspection shall be made at the factory and each joint of approved pipe and fitting shall be stamped by the laboratory. Except when so specified in the Special Provisions, the supplier may use his own quality control program and provide and affidavit as to conformance with Contract requirements.

9.16 CAST IRON, DUCTILE IRON PIPE AND SPECIAL CASTINGS:

Each piece of pipe shall bear the manufacturer's serial number and shall be certified by the manufacturer to have met the requirements of the governing Standard Specifications. Also, each piece shall be visually inspected in the field for Specification conformance.

9.17 OTHER MATERIALS AND EQUIPMENT:

Materials other than the foregoing, including equipment, shall or course, also be suitably specified, and shall be inspected and tested to assure conformance with the Specifications and with manufacturer's certificates.

END OF SECTION