3 - Spec. file

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer [signature] Date 3-21-69
Mgr. - Power Engr. [signature] Date 3-21-69
Nuclear Proj. Mgr. [signature] 3-21-69

SPECIFICATION FOR FURNISHING AND DELIVERING OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5569 OCTOBER 17, 1968

FPC-321-A3.2

[signature] 3-13-69
APPROVED - DEPT. PROJECT ENGR. DATE

[signature] 3-13-69
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - W.A.D.
W.O. 4203-00
Addendum A
October 17, 1968
Addendum B
January 22, 1969
Addendum C
March 13, 1969
SEE ADD. D

SP-5569
10-17-68

SECTION III

DETAILED SPECIFICATIONS

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3:00 DETAILED SPECIFICATIONS

3:01 Scope of Work

This Specification covers the furnishing and delivering of all structural concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately five miles northwest of Crystal River, Florida.

3:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

1. "OWNER" shall mean the Florida Power Corporation.
2. "ENGINEER" shall mean Gilbert Associates, Inc., Consulting Engineers.
3. "SUPPLIER" shall mean the successful bidder for the material as outlined in these Specifications.
4. "TESTING LABORATORY" shall mean an independent testing laboratory selected and paid for by Florida Power Corporation except as otherwise noted in these Specifications.

3:03 Payment

3:03.1 Payment for furnishing concrete will be made on the basis of the delivery tickets described hereinafter. Each request for payment shall be accompanied by one copy of the delivery tickets for which payment is requested. Requests for payment may be made weekly, but shall not be made less often than monthly.

3:03.2 Total payment for the concrete furnished under these Specifications shall be the sum of the unit prices stated in the Proposal multiplied by the actual number of corresponding units of each class furnished and accepted for placement.

3:04 Reference Codes and Specifications

All concrete shall be in accordance with the "Specification for Structural Concrete for Buildings," ACI 301-66, "Building Code Requirements for Reinforced Concrete," ACI 318-63, and all current editions of applicable codes as referred to herein, except as may be modified by these Specifications.

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3:06 Cement

3:06.1 All cement shall be Portland Cement conforming to "Portland Cement, Spec. for," ASTM C 150-67, Type II, for moderate heat hydration. All cement shall be confined to a single brand and whenever required by the OWNER, shall be sampled and tested by the TESTING LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by OWNER.

3:06.2 The manufacturer shall submit certified copies of mill test reports to the OWNER showing chemical composition and certifying that the cement complies with the Specifications.

3:06.3 The SUPPLIER shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

3:07 Aggregates

3:07.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:07.2 Coarse Aggregate:

Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the OWNER.

3:08 Water

Independent lab tests furnished by the SUPPLIER, of batch plant water shall be submitted initially and periodically as requested by OWNER to insure the mixing water shall be clean and potable, and shall not contain greater than 100 ppm each of chlorides, sulfides, and nitrates, and the turbidity shall not exceed 2000 ppm.

3:05 Design Mixes

Each concrete mix shall be designed and concrete shall be controlled to meet the following requirements.

3:05.1 Structural Concrete Containing No Fly Ash:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-2	5000	2	1-1/2"
70 F	5000-2	5000	2	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

3:05.2 Structural Concrete Containing Fly Ash:

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
3000-4	3000	4	1-1/2"
3000-4	3000	4	3/4"
1500-4	1500	4	1-1/2"

3:05.3 Maximum Fly Ash Content

1. The maximum fly ash content for any mix shall not exceed 20 percent of the total weight of the cement and fly ash used in the mix.

2. Fly ash accumulation, resulting from the OWNER'S operation of Crystal River Plant Unit No. 1, will be made available free of charge at the hopper of the OWNER'S storage bin at the Crystal River Plant. OWNER-furnished fly ash shall be transported to the concrete plant with suitable equipment designed to control dust.

3:05.4 The minimum strength specified shall be compressive strength at age 28 days as determined by ASTM C 39-66.

3:05.5 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 of ACI 301-66. The 5000 psi concrete shall be designed for prestressed and ultimate strength types, and the remainder of the concrete for working stress type. The SUPPLIER shall submit to the OWNER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

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3:09 Admixtures

3:09.1 Air Entraining Admixture:

1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	5-7
1-1/2 in.	4.5-5

2. An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for," ASTM C 260-66 T.

3:09.2 Water Reducing Densifier:

A water reducing densifier shall be added to all structural concrete. The admixture shall be "Plastiment," a product of Sika Chemical Company, "Pozzolith, 100-R," a product of the Master Builders Co., or "Protard", a product of Protex Industries, Inc. These products shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for," ASTM C 494-67 T, Type D. The quantity to be added, the controlling temperatures, and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

3:09.3 Calcium Chloride:

Admixtures containing calcium chloride shall not be used.

3:10 Water-Cement Ratio

Maximum water-cement ratio for various strength of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

3:11 Mixing Concrete

3:11.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to insure that the mix

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proportions comply with those for the design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall insure that a ticket is provided for each batch as specified in Item 3:11.6 of this Specification.

3:11.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The maximum number of revolutions at mixing speed shall be 100; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

3:11.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or OWNER. Concrete which does not meet this requirement may be rejected at no cost to the OWNER. However, the SUPPLIER will not be responsible for delays at the site which are beyond his control.

3:11.4 Hot Weather Concrete:

1. Except as modified herein, hot weather concrete shall comply with ACI 605. At air temperatures of 90 F or above, special procedures shall be adopted to keep the concrete as cool as possible. The temperature of the concrete when it is unloaded from the trucks shall not exceed 90 F.

2. Concrete for the containment structural walls, dome, and mat shall have a placing temperature of not more than 70 F.

3:11.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no changes in quantity of mixing water shall be made without the approval of the OWNER.

3:11.6 Batch Record:

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design strength, destination

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as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy to the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

3:12 Quality Control

3:12.1 The OWNER will obtain the services of a TESTING LABORATORY which will perform the functions hereinafter specified:

1. Sample and test cement, when required by the OWNER, to ascertain conformance with ASTM C 150-67, Type II.

2. Test samples of fine and coarse aggregates to ascertain conformance with the following ASTM specifications:

   a. C 29-67 T "Unit Weight of Aggregate, Test for."

   b. C 40-66 "Organic Impurities in Sands for Concrete, Test for."

   c. C 127-59 "Specific Gravity and Absorption of Coarse Aggregate, Test for."

   d. C 128-59 "Specific Gravity and Absorption of Fine Aggregate, Test for."

   e. C 136-67 "Sieve or Screen Analysis of Fine and Coarse Aggregates, Test for."

3. Conduct periodic tests to determine surface moisture content of aggregates.

4. During concreting operations, furnish the services of an inspector at the batch plant who will certify the mix proportions and conduct the tests itemized above.

5. Furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content, and record weather conditions. With OWNER/ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally, he will have the right to reject any concrete which does not meet or cannot be adjusted to meet the requirements of this Specification.

6. Maintain all quality control and test records, which will include certified copies of mill test reports for the cement and batch tickets for each batch of concrete.

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3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification. Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER/ENGINEER shall have the right, at the SUPPLIER'S expense, to order changes to the proportions of the mix to increase the strength.

3:12.3 The SUPPLIER shall reimburse the OWNER for the cost of removing and replacing defective concrete including the costs of forming, form removal, reinforcing steel, embedments, and all other related WORK and materials when and if the defective concrete is the fault of the SUPPLIER.

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