

Leon County, Florida

**Lake Munson Dam Rehabilitation**

January 2011

**Project Manual**

*Bid Set*

**PROJECT MANUAL**

**FOR THE**

**Leon County, Florida  
Lake Munson Dam Rehabilitation**



**January 2011**

**Bid Set**

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Stephen L. Whiteside, P.E. Date  
Florida Registered  
Professional Engineer No. 55002  
5400 Glenwood Ave, Suite 300  
Raleigh, NC 27612  
Florida Building Code 2007 with 2009  
amendments, Chapters 18  
Specifications Division 1 and 2

**Civil**

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Juan Carlos Mastrapa, P.E. Date  
Florida Registered  
Professional Engineer No. 68217  
2301 Maitland Center Pkwy, Suite 300  
Maitland, FL 32751  
Florida Building Code 2007 with 2009  
amendments, Chapters 16, 19, and 20  
Specification Division 3 and Section 05500

**Structural**

**PROJECT MANUAL**

**FOR THE**

**Leon County, Florida  
Lake Munson Dam Rehabilitation**

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Jeffrey A. Mills, P.E. Date  
Florida Registered  
Professional Engineer No. 31511  
2301 Maitland Center Pkwy, Suite 300  
Maitland, FL 32751  
Specifications Section 15151

**Mechanical**



**January 2011**

**Bid Set**

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#### DIVISION 1 – GENERAL REQUIREMENTS

**The Division 1, General Requirements and Covenants, State of Florida, Department of Transportation, Standard Specifications, Latest Edition, are included by reference. For any conflicts/exceptions between the Standard Specifications and the project-specific General and Technical Specifications included herein, the project-specific specifications shall govern.**

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*APPENDIX A – Boring Logs and Laboratory Test Data*

*Geotechnical Investigation – Environmental & Geotechnical Specialists, Inc. (2000)*  
*Subsurface Soil Investigation - Ardaman & Associates Report (1967)*

END OF SECTION

SECTION 00200

INFORMATION AVAILABLE FOR BIDDERS

1. INFORMATION USED DURING DESIGN

A. In the preparation of Drawings and Specifications for the Work, the ENGINEER has relied upon the following technical data:

1. Boring Logs
2. Laboratory Test Data

Borings were performed at the dam site and in the immediate vicinity of the existing dam by others. The locations are shown on Sheet C-1. The boring logs and associated laboratory data are presented in Appendix A.

B. CONTRACTOR may rely upon the general accuracy of the “technical data”, except for the completeness thereof for the purposes of bidding or construction. Interested Bidders may obtain copies of such technical data at the office of the ENGINEER at reproduction costs.

END OF SECTION

## SECTION 01010

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 LOCATION OF WORK

- A. All of the work of this Contract is located on land owned by Leon County or within rights-of-way or easements of Leon County, FL, as shown on the Drawings.

##### 1.02 WORK TO BE DONE

- A. Furnish all labor, materials, equipment, tools, services and incidentals and complete all Work included in this Contract.
- B. Perform the Work complete, in place, disinfected where applicable and ready for continuous service, including repairs, replacements and restoration required as a result of damages caused during this construction.
- C. Furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the Work, whether specifically indicated in the Contract Documents or not.

##### 1.03 GENERAL DESCRIPTION OF CONTRACT

- A. The Drawings and Specifications allow for the rehabilitation of an existing concrete dam and stabilization of downstream areas in Leon County.
- B. Location: Lake Munson Dam, Tallahassee, FL
- C. Description of Work:

The permanent facilities outlined in these specifications include, but are not limited to:

1. Clearing and Grubbing
2. Upstream Sheetpile Cutoff and Approach Slab
3. Gate Removal and Replacement with New Gate, Concrete Bulkheads, and Stop Logs
4. Raising Existing Concrete Overflow Weirs
5. Concrete Bank Protection
6. Maintenance Access-way across Top of Dam
7. Earthwork

8. Graded Filter and Riprap in Downstream Area

Temporary measures outlined in these specifications include, but are not limited to:

1. Site Access and Restoration
2. Stream Diversion
3. Erosion and Sedimentation Control
4. Dewatering

1.04 SCHEDULE OF COMPLETION

- A. Partial Utilization: The following items shall be completed within the time frames specified herein:
1. Permitting
  2. Erosion and Sediment Control
  3. Stream Diversion Measures In-Place
- B. Substantial Completion: In general, all of the Work shall be installed, completed, and in service, ready for Final Inspection and operational field test by the Substantial Completion date. Prior to Final Inspection, the CONTRACTOR shall submit written certification to the OWNER that:
1. Contract Documents have been reviewed.
  2. All Work has been inspected for compliance with Contract Documents.
  3. All equipment and systems have been tested in the presence of the OWNER's representative and are operational.
  4. All Work is completed and ready for final inspection.
- C. Ready for Final Payment: In general, all of the Work shall be satisfactorily completed including field operating tests and subsequent correction, submittal of close-out documents and ready for Final Payment and Acceptance by the Ready for Final Payment date. The project close-out submittal shall comply with the following:
1. Division 1 – General Requirements.
  2. Project Record Documents of Section 01720.

## 1.05 WORK SEQUENCE

- A. Perform Work in proper sequence to ensure completion of the Work within the Contract Time as set forth within the Contract. Completion dates of the various stages shall be in accordance with the concurred construction schedule submitted by the CONTRACTOR.

The Drawings include a stream diversion plan and construction sequence that was developed to depict one logical sequence of construction. The CONTRACTOR shall be responsible for developing a stream diversion plan, erosion and sediment control plan, and construction sequence for the CONTRACTOR's proposed work plan.

The sequence shown on the Drawings is a suggested Work sequence only and does not relieve the CONTRACTOR of his responsibilities to meet any interim milestones as set forth in the Contract. The CONTRACTOR shall develop his construction sequence and work plan to meet these milestones.

- B. **SUBSTANTIAL COMPLETION:** To satisfy the definition of substantial completion, the facilities shall be constructed, complete, field tested, and fully operational including OWNER training, subject to the ENGINEER's approval.
- C. **READY FOR FINAL PAYMENT:** The last stage of construction shall be final construction, and shall include the final remaining items subject to the ENGINEER's approval as well as all items listed in the General Requirements.

## 1.06 ABBREVIATIONS AND REFERENCES

- A. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for bids, even though reference has been made to an earlier standard. The following list of specifications is hereby made a part of the Contract the same as if herein repeated in full. In the event of any conflict between any of these specifications, standards, codes or tentative specifications, and the Specifications, the latter shall govern. In the event that one of the following conflicts with another, the decision as to which shall govern will be decided by the ENGINEER, whose judgment will be final.
- B. Reference to a technical society, organization, or body may be made in the Specifications by abbreviations, in accordance with those listed in the General Requirements and the following list:
  - 1. American Institute of Steel Construction (AISC)
  - 2. Florida Department of Environmental Protection (FDEP)
  - 3. Northwest Florida Water Management District (NFWMD)
  - 4. United States Army Corps of Engineers (USACE)
- C. When no reference is made to a code, standard, or specification, the standard specifications of the ASTM, the ANSI, the ASME, the IEEE, or the NEMA shall govern.

#### 1.07 CONTRACTOR'S USE OF PREMISES

- A. CONTRACTOR shall limit the use of the construction areas for Work and for storage to allow for the OWNER's use.
- B. CONTRACTOR shall coordinate use of work site with the OWNER.
- C. CONTRACTOR shall assume full responsibility for the protection and safekeeping of products, materials, and equipment stored on the site, including those of subcontractors. Site security shall be maintained at all times. Temporary fencing and gates shall be provided as necessary.
- D. CONTRACTOR shall move any stored products, under CONTRACTOR's contract, which interfere with operations of the OWNER or other contractors.
- E. CONTRACTOR shall obtain and pay for the use of additional storage or work areas as needed for operations.
- F. CONTRACTOR shall at all times conduct his operation as to ensure the least inconvenience to the facility operations and general public.
- G. No blasting is allowed for any portion of this project.

#### 1.10 PLANS AND SPECIFICATIONS

##### A. Technical Specifications

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements, which govern the work. Products and Execution modify and supplement these detailed requirements of the work and shall always govern whenever there appears to be a conflict.

##### B. Intent

All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the CONTRACTOR as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description, concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these specifications shall be made upon that basis.

The inclusion of the General Requirements (or work specified elsewhere) in the General part of the Specifications is only for the convenience of the CONTRACTOR and shall not be interpreted as a complete list of related Specification Sections.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

## SECTION 01025

### MEASUREMENT AND PAYMENT

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. All contract prices included in Proposal will be full compensation for all labor, materials, tools, equipment, and incidentals necessary to complete the Work, as shown on the Drawings and specified in the Contract Documents, to be performed under this Contract.
- B. The items listed below refer to and are the same pay items listed in the Bid Form. They constitute all of the pay items for the completion of the Work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, services, field offices, layout surveys, job signs, sanitary requirements, testing, safety devices, water supplies, power, maintaining traffic, removal of waste, watchmen, and all other requirements DIVISION 1 - GENERAL REQUIREMENTS. Compensation for all such services, equipment and materials shall be included in the prices stipulated for the lump sum and unit pay items listed herein.
- C. Each lump sum and unit bid price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.
- D. For purposes of measurement and payment, the term surface area is defined as the horizontal surface measured from a certified survey. The unit price bid for all items measured in surface area shall account for any necessary slope adjustments.

##### 1.02 PAY ITEMS

###### TOTAL BID - ITEMS 1 - 16

- A. Item 1(a) – Mobilization
  - 1. The lump sum price bid for Mobilization to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals necessary for mobilization in accordance with Section 02110.
- B. Item 1(b) – Site Preparation
  - 1. The lump sum price bid for Site Preparation to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals necessary for site preparation and site access in accordance with Section 02110.
- C. Item 1(c) – Temporary Sediment and Erosion Control
  - 1. The lump sum price bid for Temporary Sediment and Erosion control measures to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals necessary for designing, permitting, furnishing, installing, maintaining and removing sediment and erosion control measures required for adequate control of sedimentation from the site in accordance with Section 02111 and FDEP requirements. Control measures shall include, but not be limited to: silt fence; turbidity barriers; sediment traps; and all other structures and devices incidental to the proper treatment and handling of on-site sediment in accordance with the approved Erosion and Sedimentation Control Permit. Temporary Sediment and Erosion Control payments will be prepared on a monthly basis.

D. Item 2(a) – Concrete Approach Slab

1. Measurement: The quantity of Concrete for the Upstream Approach Slab to be paid for under this Item will be the actual number of cubic yards placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place concrete for Upstream Approach Slab. Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.

E. Item 2(b) – Concrete Tie-in Wall to Existing Concrete Weirs

1. Measurement: The quantity of Concrete Tie-In Wall to be paid for under this Item will be the actual number of cubic yards placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place concrete for Concrete Tie-In Wall (portion of wall above top of approach slab on Drawing S-3). Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.

F. Item 2(c) – Concrete for Grade Beam/Sheet Pile Cap at Upstream End of Approach Slab

1. Measurement: The quantity Concrete for the Grade Beam/Sheet Pile Cap to be paid for under this Item will be the actual number of cubic yards placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place concrete for Concrete Grade Beam/Sheet Pile Cap (portion of beam below bottom of approach slab on Drawing S-3). Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.

G. Item 3 – Steel Sheet Pile Cut-off Wall

1. Measurement: The quantity of Steel Sheet Pile Cut-off Wall to be paid for under this Item will be the actual number of linear feet measured in a straight-line along the approach slab placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
2. Payment: The unit price bids per linear foot of this Item will be full compensation for furnishing and installing Steel Sheet Pile Cut-Off Wall as shown on the Drawings and specified herein. Payment for this Item shall include, but not be limited to: furnishing, transporting, and driving sheet piles; keeping installation records; monitoring vibration/movement of adjacent dam during installation; and all else incidental thereto for which separate payment is not provided under other Bid Items.

- H. Item 4 – Retrofit/Raise Existing Concrete Overflow Weirs
1. Measurement: The quantity of concrete for Retrofit/Raise Existing Concrete Overflow Weirs to be paid for under this Item will be the actual number of cubic yards of placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
  2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place concrete for Retrofit/Raise Existing Concrete Overflow Weirs. Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; drilling, furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.
- I. Item 5(a) – Walkway, Rails, and Operating Platform
1. The lump sum price bid to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals necessary to furnish and install the new walkway, rails, and operating platform complete, as shown on the Drawings.
- J. Item 5(b) – Walkway Footings
1. The lump sum price bid to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals necessary to furnish and install the new walkway footings as shown on the Drawings.
- K. Item 6 –Demolition and Removal of Existing Tainter Gates and Wooden Walkway
1. The lump sum price bid for the Demolition and Removal to be paid under this Item will be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to properly demolish, remove, and dispose of existing tainter gates and wooden walkway as shown on the Drawings and directed by the OWNER.
- L. Item 7 – Concrete Bulkheads for Existing Gate Openings
1. Measurement: The quantity of Concrete Bulkheads for Existing Gate Openings to be paid for under this Item will be the actual number of cubic yards placed and approved in the two eastern gate openings to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
  2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place Concrete Bulkheads for Existing Gate Openings. Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.
- M. Item 8(a) – Concrete Bulkheads for New Gate Systems
1. Measurement: The quantity of Concrete Bulkheads for New Gate Systems to be paid for under this Item will be the actual number of cubic yards placed and approved in the two western gate openings to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
  2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and

place Concrete Bulkhead for New Gate Systems. Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.

N. Item 8(b) – Cast-Iron Slide Gate and Appurtenances

1. The lump sum price bid for this Item shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to furnish and install the Cast-Iron Slide Gate and Appurtenances in low-level outlet as shown on the Drawings and as specified herein. Installation includes, but is not limited to: operating gate stem; hoist, lift; wall thimbles; and all else incidental thereto for which separate payment is not provided under other bid items.

O. Item 8(c) – Cast-Iron Weir Gate and Appurtenances

1. The lump sum price bid for this Item shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to furnish and install the Cast-Iron Weir Gate and Appurtenances in upper outlet as shown on the Drawings and as specified herein. Installation includes, but is not limited to: operating gate stem; hoist, lift; wall thimbles; and all else incidental thereto for which separate payment is not provided under other bid items.

P. Item 9(a) – Earthwork, Riprap Removal, and Broken Concrete Removal

1. Measurement: The quantity of Earthwork, Riprap Removal, and Broken Concrete Removal, which will be paid for this Item will be the actual number of cubic yards excavated for placement of graded filter and riprap materials to the lines and grade shown on the Drawings, as measured by comparing the topographic surveys performed before and after removal of riprap, broken concrete, and regrading of areas in preparation for proposed design elements, less the quantities of other pay items. The ENGINEER will verify the volume measurement for payment.
2. Payment: The unit price bid for the subdivisions of this Item will be full compensation for excavating existing materials as shown on the Drawings and specified herein including but not limited to: surveying; excavation; riprap excavation; broken concrete slab; regrading as necessary; hauling/disposal off-site; conformance to all State, Federal and local standards and requirements; and all other work required or incidental to the satisfactory completion of all Work under this Contract for which payment is not provided under other items in the bid form. No payment will be made for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

Q. Item 9(b) – Excavation and Backfill of Unsuitable Materials

1. Measurement: The quantity of Excavation and Backfill of Unsuitable Materials to be paid for under this Item will be the number of actual cubic yards of unsuitable materials excavated below the lines and grades of graded filter materials and concrete bank protection shown on the Drawings and backfilled with suitable fill material as directed by the ENGINEER and as measured by comparing topographic surveys performed before and after excavation of unsuitable material and after backfill with suitable fill material. The volume will be verified by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for labor, materials, tools, equipment, supervision and incidentals required for the Excavation and Backfill of Unsuitable Materials below the lines and grades of graded filter materials and concrete bank protection. Payment for this Item shall include, but not be limited to: surveying; excavation and proper disposal of all unsuitable material; placement and

compaction of suitable fill material; grading; and all other work required for or incidental to the satisfactory completion of all Work under this contract for which payment is not provided under other bid items. No payment will be made for any undercut of fill for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

R. Item 9(c) – Demolition and Removal of Concrete Slab and Bank Protection

1. Measurement: The quantity of Demolition and Removal of Concrete Slab and Bank Protection to be paid for under this Item will be the number of actual cubic yards of removed concrete excavated below the lines and grade shown on the Drawings as measured by comparing the topographic survey performed prior to removal of concrete, slabs, and bank protection areas and the topographic survey performed upon the completion of the removal of concrete, slabs, and bank protection areas less the quantities of other pay items. The volume will be verified by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for labor, materials, tools, equipment, supervision and incidentals required for the Demolition and Removal of Concrete Slab and Bank Protection. Payment for this Item shall include, but not be limited to: jack hammering, saw cutting, and hoe ramming of concrete slab, concrete bank protection, and concrete overrun upstream of existing gate; and all other work required for or incidental to the satisfactory completion of all Work under this contract for which payment is not provided under other bid items. No payment will be made for any undercut of fill for which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

S. Item 9(d) – Graded Filter Materials, Filter Sand

1. Measurement: The quantity of Filter Sand to be paid for under this Item will be the number of actual cubic yards of materials furnished and placed to the lines and grades shown on the Drawings and as directed by the ENGINEER and as measured by comparing topographic surveys performed before and after placement of filter sand. The volume will be verified by the ENGINEER.
2. Payment: The unit price bids per cubic yard for this Item will be full compensation for furnishing and installing Filter Sand as shown on the Drawings and specified herein, including but not limited to: placement and compaction of ASTM C-33 filter sand to the thickness and limits shown on the Drawings including compaction; testing; certifying survey; and all else incidental thereto for which separate payment is not provided under other Bid Items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

T. Item 9(e) – Graded Filter Materials, Coarse-Graded Stone

1. Measurement: The quantity of Coarse-Graded Stone to be paid for under this Item will be the number of actual cubic yards of materials furnished and placed to the lines and grades shown on the Drawings and as directed by the ENGINEER and as measured by comparing topographic surveys performed before and after placement of coarse-graded stone. The volume will be verified by the ENGINEER.
2. Payment: The unit price bids per cubic yard for this Item will be full compensation for furnishing and installing Coarse-Graded Stone as shown on the Drawings and specified herein, including but not limited to: placement and compaction of sound, durable, crushed sandy gravel consisting of a blend of approximately 50% by weight each of FDOT No.6 and No.9 stone bedding to the thickness and limits shown on the Drawings including compaction, excavation and backfill of unsuitable material; testing; certifying survey; and all else incidental thereto for which separate payment is not provided under other Bid

Items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

U. Item 9(f) – Riprap Bedding Material

1. Measurement: The quantity of Riprap Bedding Material to be paid for under this Item will be the number of actual cubic yards of materials furnished and placed to the lines and grades shown on the Drawings and as directed by the ENGINEER and as measured by comparing topographic surveys performed before and after placement of riprap bedding material. The volume will be verified by the ENGINEER.
2. Payment: The unit price bids per cubic yard for this Item will be full compensation for furnishing and installing Riprap Bedding Material as shown on the Drawings and specified herein, including but not limited to: placement and compaction of Riprap Bedding Material to the thickness and limits shown on the Drawings including compaction; testing; certifying survey; and all else incidental thereto for which separate payment is not provided under other Bid Items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

V. Item 9(g) – Riprap

1. Measurement: The quantity of Riprap to be paid for under this Item will be the number of actual cubic yards of materials furnished and placed to the lines and grades shown on the Drawings and as directed by the ENGINEER and as measured by comparing topographic surveys performed before and after placement of riprap. The volume will be verified by the ENGINEER.
2. Payment: The unit price bids per cubic yard for this Item will be full compensation for furnishing and installing Riprap as shown on the Drawings and specified herein, including but not limited to: placement and compaction of Riprap to the thickness and limits shown on the Drawings including compaction; testing; certifying survey; and all else incidental thereto for which separate payment is not provided under other Bid Items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

W. Item 9(h) – Riprap Grout

1. Measurement: The quantity of Riprap Grout to be paid for under this Item will be the number of actual cubic yards placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place Riprap Grout. Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing grout; furnishing and installing accessories to grout; and all else incidental thereto for which separate payment is not provided under other Bid Items.

X. Item 9(i) – Filter Sand for Concrete Slope Protection

1. Measurement: The quantity of Filter Sand for Concrete Slope Protection to be paid for under this Item will be the number of actual cubic yards of materials furnished and placed to the lines and grades shown on the Drawings and as directed by the ENGINEER and as

measured by comparing topographic surveys performed before and after placement of filter sand. The volume will be verified by the ENGINEER.

2. Payment: The unit price bids per cubic yard for this Item will be full compensation for furnishing and installing Filter Sand for Concrete Slope Protection as shown on the Drawings and specified herein, including but not limited to: placement and compaction of ASTM C-33 filter sand to the thickness and limits shown on the Drawings including compaction, excavation and backfill of unsuitable material; testing; certifying survey; and all else incidental thereto for which separate payment is not provided under other Bid Items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

Y. Item 9(j) – Coarse-Graded Stone for Concrete Slope Protection

1. Measurement: The quantity of Coarse-Graded Stone for Concrete Slope Protection to be paid for under this Item will be the number of actual cubic yards of materials furnished and placed to the lines and grades shown on the Drawings and as directed by the ENGINEER and as measured by comparing topographic surveys performed before and after placement of coarse-graded stone. The volume will be verified by the ENGINEER.
2. Payment: The unit price bids per cubic yard for this Item will be full compensation for furnishing and installing Coarse-Graded Stone for Concrete Slope Protection as shown on the Drawings and specified herein, including but not limited to: placement and compaction of sound, durable, crushed sandy gravel consisting of a blend of approximately 50% by weight each of FDOT No.6 and No.9 stone bedding to the thickness and limits shown on the Drawings including compaction, excavation and backfill of unsuitable material; testing; certifying survey; and all else incidental thereto for which separate payment is not provided under other Bid Items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

Z. Item 9(k) – New Concrete Bank Protection

1. Measurement: The quantity of New Concrete Bank Protection to be paid for under this Item will be the actual number of cubic yards placed and approved to the lines, grades, and dimensions shown on the Drawings or required by the ENGINEER.
2. Payment: The unit price bid per cubic yard for this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to furnish and place New Concrete Bank Protection. Payment for this Item shall include, but not be limited to: furnishing, transporting, placing, forming, and curing concrete; furnishing and installing accessories to concrete; furnishing and placing reinforcement; and all else incidental thereto for which separate payment is not provided under other Bid Items.

AA. Item 10 – New Chain Link Fence and Gate

1. Measurement: The amount to be paid for under this Item will be the actual number of linear feet of chain link fence as measured by survey and one pedestrian gate.
2. Payment: The unit price bid per linear foot to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to install New Chain Link Fence and Gate in accordance with Section 02830 and as shown on the Drawings.

BB. Item 11 – Repair Concrete Spalls and Cracks

1. The lump sum price bid for Repair of Concrete Spalls and Cracks on existing dam structure to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision, and incidentals necessary to repair concrete spalls and cracks as directed by the Engineer for up to 100 linear feet of crack repair and 105 square feet of concrete spalling repair.

CC. Item 12 – Apply Surface Protection to Existing Concrete Surfaces

1. Measurement: The amount to be paid for under this Item will be the actual number of square feet of Protective Surface Coating applied to concrete surfaces as measured by survey.
2. Payment: The unit price bid per square foot to be paid under this Item shall be full compensation for all labor, materials, tools, equipment, supervision and incidentals required to apply the Surface Protection to the concrete as shown on the Drawings and specified herein, including, but not limited to: surveying; and all else incidental thereto for which separate payment is not provided under other bid items. No payment will be made for areas in which certifying surveys required by Section 01050 have not been submitted and approved by the ENGINEER.

DD. Item 13(a) – Install, Maintain, and Remove Temporary Dams/Bulkheads for Upstream Repairs

1. The lump sum price bid to Install, Maintain, and Remove Temporary Dams/Bulkheads for Upstream Repairs to be paid under this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to maintain the lake and divert stream flow during construction, and remove system(s) after construction.

EE. Item 13(b) – Install Flashboards and Earth Berms for Downstream Repairs (one-side at a time)

1. The lump sum price bid to Install Flashboards and Earth Berms for Downstream Repairs to be paid under this Item will be full compensation for all labor, materials, tools, equipment, supervision, and incidentals required to maintain the lake and divert stream flow during construction, and remove system(s) after construction.

FF. Item 14 – Reclamation of Disturbed Areas

1. The lump sum price bid to Reclaim Disturbed Areas required to be reclaimed in accordance with Section 02901. Lump sum price bids for this Item will be full compensation for all labor, materials, equipment, supervision, and incidentals required to perform Reclamation of Disturbed Areas. Payment for this Item shall include, but not be limited to: grading of disturbed areas, re-excavation of topsoil from stockpile areas, hauling, placing and spreading topsoil, seeding and mulching, and all other work incidental to reclamation.

GG. Item 15 - Miscellaneous Work and Clean-up

1. The lump sum price for Miscellaneous Work and Clean-up shall be full compensation for all labor, materials, and equipment required to perform the work specified in Section 02901 of the Specifications and as shown on the Drawings and any other work not specifically included for payment under any other item but obviously necessary to complete the Contract. Partial payments will be based on the breakdown of the item as required in Section 02901. The lump sum price shall include, but not limited to: full compensation for; Pre- and Post-construction video photography as required by Section 01390; Project Record Documents as required by Section 01720; traffic control; seeding of unused stockpile areas; Quality Control Laboratory (QCL) testing; furnishing and installing Project Sign; furnishing and installing control gate and appurtenances at project entrance; four test pits (5'x10'x5') excavated for Engineer's inspection prior to sheet pile construction and backfilled with compacted structural fill; site restoration including

existing structures and property, paving, stabilized roads, drainage piping and ditches, head walls, driveways, lawns and ground areas, walkways, and irrigation systems which are altered, removed, or damaged during construction.

END OF SECTION

SECTION 01035

CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Change Orders shall be executed in accordance with the requirements of Division 1, General Requirements and Covenants.
- B. Promptly implement change order procedures.
  - 1. Provide full written data required to evaluate changes.
  - 2. Maintain detailed records of work done on a time-and-material/ force account basis.
  - 3. Provide full documentation to Engineer on request.
- B. Designate in writing the member of Contractor's organization:
  - 1. Who is authorized to accept changes in the work.
  - 2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the work.
- C. Owner will designate in writing the person who is authorized to execute Change Orders.

1.02 PREPARATION OF CHANGE ORDERS AND FIELD ORDERS

- A. Engineer will prepare each Change Order and Field Order.
- B. Change Order will describe changes in the work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
- C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.
- D. Field Order will describe interpretations or clarifications of Contract Documents, order minor changes in the work, and/or memorialize trade-off agreements.
- E. Field Order work will be accomplished without change in the Contract Sum, Contract Time, and/or claims for other costs.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

CHANGE ORDER

Contract Number: \_\_\_\_\_

Change Order Number: \_\_\_\_\_

Original Contract Price \$ \_\_\_\_\_

Net Increase/Decrease in Contract Price (this change order) \$ \_\_\_\_\_

Total Adjusted Contract Price (including this change order) \$ \_\_\_\_\_

This change order increases/decreases the time to complete the work by \_\_\_\_\_ Calendar days.

The extended completion date is \_\_\_\_\_.

This change order checked by \_\_\_\_\_  
(Chief) Resident Engineer Date

This change order is requested by \_\_\_\_\_.

This change order is recommended by:  
\_\_\_\_\_  
Consultant Engineer P.E. # Date

The undersigned agree to the terms of the change order.

\_\_\_\_\_  
Contractor Date

\_\_\_\_\_  
Owner Date

Approval as to appropriation:  
\_\_\_\_\_  
Certification Officer Date

Name of City/District etc. \_\_\_\_\_

Contract Number \_\_\_\_\_

Contract Title \_\_\_\_\_

Change Order Number \_\_\_\_\_

Owner's Name: \_\_\_\_\_

Owner's Address: \_\_\_\_\_

Contractor's Name: \_\_\_\_\_

Contractor's Address: \_\_\_\_\_

Description of Change

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reason for Change

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FIELD ORDER

PROJECT: \_\_\_\_\_

FIELD ORDER NO: \_\_\_\_\_

DATE: \_\_\_\_\_

CONTRACT: \_\_\_\_\_

OWNER: \_\_\_\_\_

OWNER'S PROJECT NO: \_\_\_\_\_

TO: \_\_\_\_\_

CONTRACT DATE: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

-----

This Field Order is issued to interpret/clarify the Contract Documents, order minor changes in the work and/or memorialize trade-off agreements. Both parties hereby agree that the work described by this Field Order is to be accomplished without change in Contract Sum, Contract Time, and/or claims for other costs.

-----

DESCRIPTION: (Here insert a written description of the interpretation, change or agreement.)

-----  
FIELD ENGINEER: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

BY: \_\_\_\_\_

BY: \_\_\_\_\_

SECTION 01050  
FIELD ENGINEERING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. CONTRACTOR shall provide certified survey work required in execution of the Project. The term "certified" as used throughout this Section shall mean work by a surveyor registered to practice in Florida.
- B. Provide civil, structural, or other professional engineering services specified or required to execute CONTRACTOR's construction methods.
- C. Provide Record Drawings to be used for recovering quantities and documenting construction. All Record Drawings shall be AutoCad DWG Release 2008 format as specified in the following Sections.
- D. The CONTRACTOR shall retain the services of a Professional Land Surveyor licensed in the State of Florida to perform all surveying.
- E. The ENGINEER shall provide AutoCAD files and standards for Record Drawings that are to be maintained by the CONTRACTOR. The CONTRACTOR will be required to sign and submit the AutoCAD Disclaimer Form at the end of this Section before receiving the AutoCAD files.
- F. As a condition for reaching Substantial Completion, submit certified drawings with complete AutoCAD files signed and sealed by a Florida Professional Land Surveyor.

1.02 RELATED WORK

- A. Section 01010: Summary of Work
- B. Section 01025: Measurement and Payment
- C. Section 01052: Applications for Payment
- D. Section 01700: Contract Closeout
- E. Section 01720: Project Record Documents

1.03 SUBMITTALS

- A. Submit name, address, and copy of license of Professional Land Surveyor to be used on this project to the ENGINEER within 15 days of the Notice to Proceed.
- B. Submit certificate with each submittal signed by a Florida Professional Land Surveyor certifying that elevations and locations of new work and improvements are in conformance or non-conformance with the Contract Documents.

- C. The CONTRACTOR is required to submit surveys prepared, signed, and sealed by a Registered Land Surveyor. All surveys shall be tied to Florida State Plane Coordinate System, North American Datum, NAD 1983 (Horizontal) and National Geodetic Vertical Datum, NGVD-29 (Vertical). These drawings shall constitute the project record documents. The CONTRACTOR shall submit each survey on Mylar, along with 3 prints, and on a compact disk (CD) in AutoCAD Release 2008 format. All information in the AutoCAD file must be at appropriate 3-D elevation and coordinate. All entities shall be placed on layer names, which adequately describe the entity being mapped.

The CONTRACTOR's surveyor is required to perform, and submit to the ENGINEER the following types of surveys:

1. Certified aerial and field topographic map surveys and Digital Terrain Models (DTM) shall be performed at the following stages of construction:
  - a. Immediately following clearing and grubbing or stripping and dewatering of lake, and prior to starting sediment removal. This topographic mapping shall be developed from either aerial photos or Global Positioning System (GPS).
  - b. Immediately following removal of sediment within the boundaries of the regrading area and prior to regrading; and immediately following regrading. These intermediate surveys for the purpose of verifying pay quantities can be developed from aerial photos or GPS surveys.
  - c. The entire Lake Munson Dam Rehabilitation Project at the time the CONTRACTOR intends to submit documentation to support a claim for substantial completion. This topographic mapping shall be developed from either aerial photos or GPS surveys.

The surveys shall meet the following criteria:

- 1) 1" = 100' scale reproducible plot.
  - 2) Produced at national map accuracy standards for 1" = 100' scale maps with 1' contour interval.
  - 3) The DTM must contain adequate 3-D points and 3-D breaklines required to accurately model the photographed or surveyed surface to within above stated accuracy. The DTM must also provide a 2-D polyline defining the limits of the area surveyed. The points, breaklines, and survey limits line shall be on separate layers. The AutoCAD file of the DTM model must be compatible for use with Land Development Desktop software.
2. A Certified "As-Built" Survey of the surface and subsurface structures (including topography) installed by CONTRACTOR for the Lake Munson Dam Rehabilitation Project site shall be provided after completion of the project and shall include the following:
    - a. Surface Facilities - Including, but not limited to, the new earth embankment slopes, repaired spillway structures, limits of new articulated concrete block matting, limits of seeding and mulching, locations of landscape plantings, and over ground utilities.

3. As required, provide a certified topographic map survey(s) and DTM of the limits of undercut and unsuitable material. The initial survey shall define the aerial limits and unsuitable material surface elevations. The final survey shall define the limits and elevations of the completed unsuitable material excavation and backfill area and shall meet the following criteria:
  - a. 1" = 100' scale reproducible plot.
  - b. Produced at national map accuracy standards for 1" = 100' scale maps with 1' contour interval.
  - c. DTM must contain adequate 3-D points and 3-D breaklines required to accurately model the surveyed surface to within above stated accuracy. The DTM must also provide a 2-D polyline defining the limits of the area surveyed. The AutoCAD file of the DTM models must be compatible for use with Land Development Desktop software.

#### 1.04 QUALIFICATIONS OF SURVEYOR

- A. Professional Land Surveyor of the discipline required for the specific service on the Project, currently licensed in the State of Florida.

#### 1.05 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are those designated on Drawings.
- B. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.
  1. Make no changes or relocations without prior written notice to the ENGINEER.
  2. Report to the ENGINEER when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
  3. Require surveyor to correctly replace project control points which may be lost or destroyed.
    - a. Establish replacements based on original horizontal and vertical survey control.

#### 1.06 PROJECT SURVEY REQUIREMENTS

- A. Establish a minimum of two permanent bench marks on site, referenced to data established by survey control points.
  1. Record locations, with horizontal and vertical data, on Project Record Documents.
- B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:
  1. Site improvements
    - a. Stakes for grading, fill and topsoil placement.
- C. From time to time, verify layouts by same methods.
- D. Establish all lines and grades prior to construction of line work for all pipelines at 50-ft increments and at defined breaks in grade except as otherwise noted.

1.07 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. Update the Project Record Drawings on a monthly basis based on the work performed during the month ending at the pay request as a condition for approval of monthly progress payment requests.
- C. Maintain an accurate record of all changes, revisions, and modifications.
- D. All field survey notes will be retained by the Surveyor. The results from the field surveys will be documented on a set of Survey Record (As-Built) Drawings signed and sealed by a Registered Professional Engineer or Professional Land Surveyor licensed in the State of Florida. The CONTRACTOR shall certify to the OWNER that the results of the survey demonstrate compliance with the Contract Documents. These drawings shall, at a minimum, show the final elevations and locations of all surfaces and appurtenances surveyed.
- E. All proofs associated with the construction of the Lake Munson Dam Rehabilitation Project shall become the property of Leon County, Florida.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

AUTOCAD DISK COPY  
DISCLAIMER

As an accommodation to \_\_\_\_\_ (CONTRACTOR), Camp Dresser and McKee agrees to provide CONTRACTOR an electronic copy of the AutoCAD disk used to develop the Contract Drawings for the Leon County for the Lake Munson Dam Rehabilitation Project. The information contained may include all information which is shown on the Contract Drawings. CONTRACTOR is aware of the potential errors that may arise through the electronic copying of the AutoCAD disk.

This AutoCAD disk is provided to CONTRACTOR AS IS and CONTRACTOR may use this AutoCAD disk for the construction of the Lake Munson Dam Rehabilitation Project, Leon County, Florida. Any use on any other project is strictly prohibited. The copyright of information contained on this disk shall remain with Camp Dresser & McKee.

Camp Dresser & McKee, makes no warranties, express or implied, including merchantability or fitness for the particular purpose relating to the accuracy or completeness of the information contained on this disk itself or the subsequent use of the information contained on this disk.

Acknowledgment by CONTRACTOR:

Name (printed):

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

Dated: \_\_\_\_\_

END OF SECTION

## SECTION 01095

### REFERENCE STANDARDS AND DEFINITIONS

#### PART 1 GENERAL

##### 1.01 DEFINITIONS

- A. Basic Contract definitions are included in the Conditions of the Contract and the Division 1, General Requirements and Covenants.
1. Indicated refers to graphic representations, notes, or schedules on the Drawings; Paragraphs or Schedules in the Specifications; and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.
  2. Directed: Terms such as directed, requested, authorized, selected, approved, required and permitted mean directed by the ENGINEER, requested by the ENGINEER, and similar phrases.
  3. Approve, when used in conjunction with the ENGINEER's action on submittals, applications and requests, is limited to the ENGINEER's duties and responsibilities as stated in the Conditions of the Contract.
  4. Regulation includes laws, ordinances, statutes, and lawful orders issued by authorities with jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
  5. Furnish means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
  6. Install describes operations at the Project site including unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations to make ready for intended use.
  7. Provide means to furnish and install, complete, and ready for the intended use.
  8. Installer is the CONTRACTOR or another entity engaged by the CONTRACTOR, either as an employee, subcontractor, or CONTRACTOR of lower tier, to perform a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
    - a. The term experienced, when used with the term Installer means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated and having complied with requirements of the authority with jurisdiction.
  9. Project site is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of the project. The extent of the Project

site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

10. Specifications consist of the Bidding and Contract Documents (Division 0), the General Requirements inclusive of The FDOT Standard Specifications – Division 1 and the Supplemental General Specifications (Division 1), and the Technical Specifications (Divisions 2 through 16).

#### 1.02 TESTING AGENCIES

- A. A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

#### 1.03 SPECIFICATION FORMAT

- A. These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16 Division format and MASTERFORMAT numbering system.
  1. Abbreviated Language: Language used in Specifications is abbreviated. Implied words and meanings shall be interpreted as appropriate. Singular words will be interpreted as plural where applicable and the context so indicates.
  2. Imperative language is used generally. Requirements expressed in the imperative mood are to be performed by the CONTRACTOR. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the CONTRACTOR, or by others when so noted.
    - a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.
    - b. The words "RELATED REQUIREMENTS" OR "RELATED WORK" in Part 1 - GENERAL of the specifications include, but are not limited to the following related requirements or work.

#### 1.04 ABBREVIATIONS AND NAMES

- A. Where acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority with jurisdiction, or other entity applicable to the context of the Text provision except where otherwise shown on the drawings or specifications. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

1.05 PERMITS, LICENSES AND CERTIFICATES

- A. For the OWNER's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

## SECTION 01110

### ENVIRONMENTAL PROTECTION PROCEDURES

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place prior to any construction activity in that area. Specific requirements for erosion and sedimentation controls are shown on the drawings and specified herein.
- D. These Specifications are intended to ensure that construction is achieved with a minimum disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the CONTRACTOR's responsibility to utilize the specific construction techniques as detailed herein and shown on the plans to meet these guidelines.
- E. Special construction and restoration requirements for work in wetlands shall be met as specified herein.
- F. The removal of trees outside the limits of construction shall not be permitted, and trees to remain within the limits of construction shall be carefully protected.

##### 1.02 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement. Any violations of laws and fines imposed shall be the sole responsibility of the CONTRACTOR including payment of fines.

### 1.03 NOTIFICATIONS

- A. The ENGINEER will notify the CONTRACTOR in writing of any non-compliance with the foregoing provisions or of any environmentally objectional acts and corrective action to be taken. Failure of the ENGINEER to provide such notice shall not relieve the CONTRACTOR of his responsibility to comply with all applicable specification provisions, regulations, and laws. State or local agencies responsible for verification of certain aspects of the environmental protection requirements may notify the CONTRACTOR in writing of any non-compliance with State or local requirements. The CONTRACTOR shall, after receipt of such notice from the ENGINEER or from the regulatory agency, immediately take corrective action. Such notice, when delivered to the CONTRACTOR or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the CONTRACTOR fails or refuses to comply promptly, the OWNER may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the CONTRACTOR unless it is later determined that the CONTRACTOR was in compliance.

### PART 2 PRODUCTS (Not Used)

### PART 3 EXECUTION

#### 3.01 EROSION AND SEDIMENT CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures shall be used as appropriate. Flow of surface water into regrading areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of regrading areas. At the completion of the work, erosion control devices shall be removed and the ground surface restored, prepared, and seeded as specified.
- B. Specific erosion and sediment control facilities shall be developed by the CONTRACTOR specified in Section 02111. These requirements shall be considered as elementary requirements and not the total requirements. Specific local control needs will vary from site to site and as the construction activities change with time. The CONTRACTOR shall constantly modify the control facilities to preclude any significant erosion of the work site and any release of erosion products to surface waters.

#### 3.02 PROTECTION OF STREAMS

- A. Care shall be taken to prevent any degradation or damage to any stream from pollution by debris, sediment or other material or from the manipulation of equipment and/or materials in or near streams. Rainfall runoff water from the work site and water that has been used for washing or processing or that contains oils or sediments shall not be directly returned to the stream. Such waters will be diverted through a settling basin or filter before discharge into streams.
- B. The CONTRACTOR shall not discharge water from dewatering operations directly into any stream, channel, wetlands, surface water or storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to capture sediment and minimize the turbid water discharged to streams. All work site runoff water shall be positively controlled until the site is completely vegetated with grass and trees.

- C. Positive preventive measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan meeting the approval of applicable authorities. CONTRACTOR shall submit two copies of approved contingency plans to the ENGINEER.
- D. Excavation and storage of excavation shall be conducted in a manner to minimize the suspension of silt in runoff water.
- E. All necessary steps shall be taken to prevent trash, debris, and other pollutants from entering adjacent waterways.

### 3.03 PROTECTION OF LAND RESOURCES

- A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will be aesthetically graded and completely vegetated outside of paved areas and not detract from the appearance of the project. Confine all construction activities within the limits of construction (disturbance) shown on the Drawings.
- B. The locations of the CONTRACTOR's storage and other construction buildings required temporarily in the performance of the work shall be on work areas as shown on the Drawings.
- C. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in Section 02901.
- D. All debris and excess excavation shall be disposed of outside of the work site except where the ENGINEER specifically directs or allows on-site disposal.

### 3.04 PROTECTION OF AIR QUALITY

- A. Burning. The use of burning at the project site for the disposal of refuse and debris shall not be permitted.
- B. Dust Control. The CONTRACTOR shall maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust by keeping the area wetted by sprinkling.
- C. Sprinkling shall be repeated at such intervals as to keep all parts of the disturbed area damp at all times, and the CONTRACTOR shall have sufficient equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the ENGINEER.

### 3.05 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. During the life of this Contract, operate and maintain all facilities provided for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.06 NOISE CONTROL

- A. The CONTRACTOR shall make every effort to minimize noise caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise and in compliance with local, State, and Federal regulations.

END OF SECTION

## SECTION 01121

### DIVERSION AND CARE OF STREAM

#### PART 1 GENERAL

##### 1.01 GENERAL

- A. The CONTRACTOR shall furnish all labor, equipment, and materials for, and shall construct and maintain all temporary diversion and protective works necessary for diversion and care of Lake Munson and Lake Munson Slough during construction, including, but not limited to, drains, sumps, pumps and stream crossings.
- B. The CONTRACTOR shall prepare and submit a stream diversion plan based on the CONTRACTOR's proposed construction sequence. In accordance with Section 02111 Erosion and Sediment Control, the CONTRACTOR shall design erosion and sediment control measures and obtain an erosion and sediment control permit that is consistent with the CONTRACTOR's stream diversion plan and work plan.

The CONTRACTOR's stream diversion system shall be designed and certified by a professional engineer licensed in the State of Florida. The engineer shall have at least five years of experience in designing stream diversion systems.

- C. The CONTRACTOR shall be responsible for monitoring weather forecasts, obtaining rainfall amounts from public sources, monitoring the water levels in the stream, and taking precautions to protect the work. In the event storms are forecast, the CONTRACTOR shall remove construction equipment and materials from the area vulnerable to flooding and otherwise take precautions to secure and protect work against damage during passage of the flood. Damage to equipment, materials, foundations, concrete, embankments, structures, or any other part of the work caused by flood waters, or failure of the stream diversion system shall be repaired by the CONTRACTOR at no additional cost to the OWNER.

##### 1.02 RELATED WORK

- A. Section 01300: Submittals
- B. Section 02111: Erosion and Sediment Control

##### 1.03 SUBMITTALS

- A. Submittals shall be in accordance with this paragraph and Section 01300.
- B. At least 30 days prior to beginning any work on the stream diversion and care of the stream the CONTRACTOR shall submit, for approval, the stream diversion designs and sequencing.

#### PART 2 PRODUCTS (Not Used)

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Except as provided below, the CONTRACTOR shall not interrupt or interfere with the natural flow of the stream for any purpose or reason without the prior written approval of the OWNER.
- B. The CONTRACTOR shall, at all times, pass the full flow of the stream through the diversion except: the CONTRACTOR will be permitted to reduce such flow by the amount of water used for construction purposes. Flow reduction shall require the prior written approval of the OWNER and ENGINEER, and in accordance with Federal, State, and local laws and regulations. Stream diversion stages shall be as shown on the plans in accordance with the CONTRACTOR's approved submittal. The stream may be disrupted for the time it takes to divert the stream.
- C. Stream diversion shall be performed and sequenced in accordance with the narrative shown on the plans, the specification herein, and the CONTRACTOR's approved submittal.
- D. Provide erosion and sediment control measures as required. Provide vegetative cover to prevent erosion. If weather does not allow vegetative cover to be established, provide protection from erosion by other materials.

### 3.03 CLEANUP

- A. After having served their purpose, all materials placed for temporary diversion and protection shall remain the property of the CONTRACTOR and shall be removed from the site and all waste materials shall be properly disposed.

END OF SECTION

## SECTION 01300

### SUBMITTALS

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. This Section includes the requirements for compiling, processing and transmitting submittals required for execution of the project. All submittals shall be sent to the County for processing.
- B. Submittals are categorized into two types: Action Submittals and Informational Submittals, as follows:
  - 1. **Action Submittal:** Written and graphic information submitted by the Contractor that requires approval. The following are examples of action submittals:
    - a. Shop drawings (including working drawings and product data)
    - b. Samples
    - c. Operation & maintenance manuals
    - d. Site Usage Plan (Contractor's staging - including trailer siting and material laydown area)
    - e. Schedule of values
    - f. Payment application format
  - 2. **Informational Submittal:** Information submitted by the Contractor that does not require approval. The following are examples of informational submittals:
    - a. Shop drawing schedule
    - b. Construction schedule
    - c. Statements of qualifications
    - d. Health and Safety Plans
    - e. Construction photography and videography
    - f. Work plans
    - g. Maintenance of traffic plans
    - h. Outage requests
    - i. Proposed testing procedures

- j. Test records and reports
- k. Vendor training outlines/plans
- l. Test and start-up reports
- m. Certifications
- n. Record Drawings
- o. Record Shop Drawings
- p. Submittals required by laws, regulations and governing agencies
- q. Submittals required by funding agencies
- r. Other requirements found within the technical specifications
- s. Warranties and bonds
- t. As-built surveys
- u. Contract close-out documents

#### 1.02 CONTRACTOR'S RESPONSIBILITIES

##### A. All submittals shall be clearly identified as follows:

1. Date of submission
2. Project number
3. Project name
4. Contractor identification
  - a. Contractor
  - b. Supplier
  - c. Manufacturer
  - d. Manufacturer or supplier representative
5. Identification of the product
6. Reference to Contract drawing(s)
7. Reference to specification section number, page and paragraph(s)

8. Reference to applicable standards, such as ASTM or Federal Standards numbers
  9. Indication of Contractor's approval
  10. Contractor's Certification statement
  11. Identification of deviations from the Contract Documents, if any
  12. Reference to previous submittal (for resubmittals)
  13. Made in America
- B. Submittals shall be clear and legible, and of sufficient size for legibility and clarity of the presented data.

C. SUBMITTAL LOG

Maintain a log of all submittals. The submittal log shall be kept accurate and up to date. This log should include the following items (as applicable):

1. Description
2. Submittal number
3. Date transmitted to the Engineer
4. Date returned to Contractor (from Engineer)
5. Status of Submittal (Approved/Not Approved/etc.)
6. Date of Resubmittal to Engineer and Return from Engineer (if applicable and repeat as necessary)
7. Date material released for fabrication
8. Projected (or actual) delivery date

D. NUMBERING SYSTEM

Utilize a 10-character submittal identification numbering system in the following manner:

1. The first character shall be a D, S, P, M or R which represents Shop/working Drawing and other Product Data (D), Sample (S), Preliminary Submittal (P), Operating/Maintenance Manual (M) or Request for Informational (R), respectively.
2. The next five digits shall be the applicable Section Number.
3. The next three digits shall be the numbers 001 to 999 to sequentially number each separate item or drawing submitted under each specific Specification Section, in the order submitted.

4. The last character shall be a letter, A to Z, indicating the submission (or resubmission) of the same submittal, i.e., "A" = 1st submission, "B" = 2nd submission, "C" = 3rd submission, etc. A typical submittal number would be as follows:

D-03300-008-B

D = Shop Drawing  
03300 = Section for Concrete  
008 = the eighth different submittal under this section  
B = the second submission (first resubmission) of that particular shop drawing.

#### E. VARIANCES

Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.

#### F. ACTION SUBMITTALS

##### 1. SHOP DRAWINGS, WORKING DRAWINGS, PRODUCT DATA AND SAMPLES

###### a. SHOP DRAWINGS

- 1) Shop drawings as defined in the General Conditions, and as specified in individual Sections include, but are not necessarily limited to, custom prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, wiring diagrams, coordination drawings, equipment inspection and test reports, including performance curves and certifications, as applicable to the work.
- 2) Contactor shall verify all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and coordinate each item with other related shop drawings and the Contract requirements.
- 3) All details on shop drawings shall show clearly the relation of the various parts to the main members and lines of the structure and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted.
- 4) All shop drawings submitted by subcontractors and vendors shall be reviewed by the Contractor for field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and that it has been coordinated with other related shop drawings and the Contract requirements. Submittals directly from subcontractors or vendors will not be accepted by the Engineer.
- 5) The Contractor shall be responsible the accuracy of the subcontractor's or vendor's submittal; and, for their submission in a timely manner to support the requirements of the Contractor's construction schedule. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractor or vendor to correct before submission to the Engineer. All shop drawings shall be approved by the Contractor.

- 6) Delays to construction due to the untimely submission of submittals will constitute inexcusable delays, for which Contactor shall not be eligible for additional cost nor additional contract time. Inexcusable delays consist of any delay within the Contactor's control.
- 7) Submittals for equipment specified under Divisions 11, 13, 14, 15 and 16 shall include a listing of installations where identical or similar equipment manufactured by that manufacturer has been installed and in operation for a period of at least five years.

b. WORKING DRAWINGS

- 1) Detailed installation drawings (sewers, equipment, piping, electrical conduits and controls, HVAC work, and plumbing, etc.) shall be prepared and submitted for review and approval by the Engineer prior to installing such work. Installation drawings shall be to-scale and shall be fully dimensioned.
- 2) Piping working drawings shall show the laying dimensions of all pipes, fittings, valves, as well as the equipment to which it is being connected. In addition, all pipe supports shall be shown.
- 3) Equipment working drawings shall show all equipment dimensions, anchor bolts, support pads, piping connections and electrical connections. In addition, show clearances required around such equipment for maintenance of the equipment.
- 4) Electrical working drawings shall show conduits, junction boxes, disconnects, control devices, lighting fixtures, support details, control panels, lighting and power panels, and Motor Control Centers. Coordinate all locations with the Contract Documents and the Contractor's other working drawings.

c. PRODUCT DATA

Product data, as specified in individual Specification Sections, include, but are not limited to, the manufacturer's standard prepared data for manufactured products (catalog data), such as the product specifications, installation instructions, availability of colors and patterns, rough-in diagrams and templates, product photographs (or diagrams), wiring diagrams, performance curves, quality control inspection and reports, certifications of compliance (as specified or otherwise required), mill reports, product operating and maintenance instructions, recommended spare parts and product warranties, as applicable.

d. SAMPLES

- 1) Furnish, samples required by the Contract Documents for the Engineer's approval. Samples shall be delivered to the Engineer as specified or directed. Unless specified otherwise, provide at least two samples of each required item. Materials or equipment for which samples are required shall not be used in the work unless and until approved by the Engineer.

- 2) Samples specified in individual Specification Sections, include, but are not limited to: physical examples of the work (such as sections of manufactured or fabricated work), small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and other specified units of work.
- 3) Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify and Contract Requirements.
- 4) Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Approved samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the approved samples. Samples which fail testing or are not approved will be returned to the Contractor at his expense, if so requested at time of submission.

e. PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

If temporary or permanent works required in any of the technical Specification Sections require the Contractor to employ a Professional Engineer or Professional Land Surveyor, submit a Professional Engineer (P.E.) / Professional Land Surveyor (P.L.S.) Certification for each item required, using the form appended to this Section, signed and sealed by the P.E. licensed or registered in the state wherein the work is located.

2. CONTRACTOR'S CERTIFICATION

- a. Each shop drawing, working drawings, product data, and sample shall have affixed to it the following Certification Statement:

*"Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements."*

- b. In addition to the Contractor's Certification Statement required in 2.a. above, each shop drawing, catalog cut, working drawing, sample and product data pertaining to iron, steel, or manufactured goods, as defined in Section (01 0000) (01000) shall have affixed to it, by the manufacturer, the following certification statement:

*"Certification Statement: By this submittal, the Manufacturer hereby represents and warrants that all iron, steel, or manufactured goods represented in this submittal will be and/or have been produced in the United States in a manner that complies with the Buy American Requirements, unless a waiver of the requirements is approved, and the Manufacturer will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support reporting requirements or a*

***waiver of the Buy American Requirements, as may be requested by the Owner.”***

- c. Shop drawings, working drawings, and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The transmittal cover sheet for each identified shop drawing shall fully describe the packaged data and include a listing of all items within the package.
3. No submittals will be approved unless they have the manufacturer's Certification Statement affixed to them, or a waiver has been applied for and received. No materials or equipment shall be shipped to the site without the Certification Statement or waiver.
4. The review and approval of shop drawings, working drawings, product data, or samples by the Engineer shall not relieve the Contractor from the responsibility for the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.
5. Project work, materials, fabrication, and installation shall conform to approved shop drawings (including working drawings and product data) and applicable samples.
6. No portion of the work requiring a shop drawing (including working drawings and product data) or sample shall be started, nor shall any materials be fabricated or installed before approval of such item. Procurement, fabrication, delivery or installation of products or materials that do not conform to approved shop drawings shall be at the Contractor's risk. Furthermore, such products or materials delivered or installed without approved shop drawings, or in non-conformance with the approved shop drawings will not be eligible for progress payment until such time as the product or material is approved or brought into compliance with approved shop drawings. Neither the Owner nor Engineer will be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

7. OPERATION AND MAINTENANCE DATA

Operation and maintenance data shall be submitted in assembled manuals as specified. Such manuals shall include detailed instructions for Owner personnel on safe operation procedures, controls, start-up, shut-down, emergency procedures, storage, protection, lubrication, testing, trouble-shooting, adjustments, repair procedures, and other maintenance requirements.

8. SCHEDULE OF VALUES

On projects consisting of lump sums (in whole or in part) submit a proposed schedule of values providing a breakdown of lump sum items into reasonably small components – generally disaggregated by building, area, and/or discipline. The purpose of the schedule of values is for processing partial payment applications. If requested by the Engineer, provide sufficient substantiation for all or some items as necessary to determine the proposed schedule of values is a reasonable representation of the true cost breakdown of the Work. The schedule of values shall not be unbalanced to achieve early payment or over-payment in excess of the value of work or any other mis-distribution of the costs. If, in the opinion of the Engineer, the schedule of values is unbalanced, Contractor shall reallocate components to achieve a balanced schedule acceptable to Engineer.

9. PAYMENT APPLICATION FORMAT

If an application form is included in the Contract Documents, use that form unless otherwise approved by the County. If an application form is not included in the Contract Documents, Contractor may propose a form for approval.

10. SITE USAGE

Submit a proposed site staging plan, including but not limited to the location of office trailers, storage trailers and material laydown. Such plan shall be a graphic presentation (drawing) of the proposed locations; and, shall include on-site traffic modifications, and temporary utilities, as may be applicable.

G. INFORMATIONAL SUBMITTALS

1. SHOP DRAWING SCHEDULE

Prepare and submit a schedule indicating when shop drawings are required to be submitted to support the as-planned construction schedule. The submittal schedule shall allow sufficient time for preparation and submittal, review and approval, and fabrication and delivery to support the construction schedule.

2. CONSTRUCTION SCHEDULE

Prepare and submit construction schedules and monthly status reports as specified.

3. STATEMENTS OF QUALIFICATIONS

Provide evidence of qualification, certification, or registration, as required in the Contract Documents, to verify qualifications of licensed land surveyor, professional engineer, materials testing laboratory, specialty subcontractor, technical specialist, consultant, specialty installer, and other professionals.

4. HEALTH AND SAFETY PLANS

When specified, prepare and submit a general company Health and Safety Plan (HSP), modified or supplemented to include job-specific considerations.

5. CONSTRUCTION PHOTOGRAPHY AND VIDEOGRAPHY

Provide periodic construction photographs and videography as specified – including but not limited to preconstruction photographs and/or video, monthly progress photos and/or video and post-construction photographs and/or video.

6. WORK PLANS

Prepare and submit copies of all work plans needed to demonstrate to the Owner that Contractor has adequately thought-out the means and methods of construction and their interface with existing facilities.

7. MAINTENANCE OF TRAFFIC PLANS

Prepare maintenance of traffic plans where and when required by the Contract Documents and by local ordinances or regulations. If Contractor is not already knowledgeable about local ordinances and regulations regarding maintenance of traffic requirements, become familiar with such requirements and include all costs for preparation and submittal of traffic management plans and all associated costs for permits and fees to implement the traffic management plan, in the bid amount. In addition, unless a supplemental payment provision is provided in the bid form, include the cost of police attendance, when required.

8. OUTAGE REQUESTS

Provide sufficient notification of any outages required (electrical, flow processes, etc) as may be required to tie-in new work into existing facilities. Unless specified otherwise elsewhere, a minimum of seven calendar days notice shall be provided.

9. PROPOSED TESTING PROCEDURES

Prepare and submit testing procedures it proposes to use to perform testing required by the various technical specifications.

10. TEST RECORDS AND REPORTS

Provide copies of all test records and reports as specified in the various technical specifications.

11. VENDOR TRAINING OUTLINES/PLANS

At least two weeks before scheduled training of Owner's personnel, provide lesson plans for vendor training in accordance with the specification for O&M manuals.

12. TEST AND START-UP REPORTS

Manufacture shall perform all pre-start-up installation inspection, calibrations, alignments, and performance testing as specified in the respective Specification Section. Provide copies of all such test and start-up reports.

13. CERTIFICATIONS

- a. Provide various certifications as required by the technical specifications. Such certifications shall be signed by an officer (of the firm) or other individual authorized to sign documents on behalf of that entity.
- b. Certifications may include, but are not limited to:
  - 1) Welding certifications and welders qualifications
  - 2) Certifications of Installation, Testing and Training for all equipment
  - 3) Material Testing reports furnished by an independent testing firm

- 4) Certifications from manufacturer(s) for specified factory testing
- 5) Certifications required to indicate compliance with any sustainability or LEEDS accreditation requirements indicated in the Contract Documents

14. RECORD DRAWINGS

No later than Substantial Completion, submit a record of all changes during construction not already incorporated into drawings – in accordance with specification on Project Record Documents.

15. SUBMITTALS REQUIRED BY LAWS, REGULATIONS AND GOVERNING AGENCIES

Prepare and submit all documentation required by state or local law, regulation or government agency directly to the applicable agency. This includes, but is not limited to, notifications, reports, certifications, certified payroll (for projects subject to wage requirements) and other documentation required to satisfy all requirements. Provide to Engineer one copy of each submittal made in accordance with this paragraph.

16. SUBMITTALS REQUIRED BY FUNDING AGENCIES

Prepare and submit all documentation required by funding agencies. This includes, but is not limited to segregated pay applications and change orders when required to properly allocate funds to different funding sources; and certified payrolls for projects subject to wage requirements. Provide one copy of each submittal made in accordance with this paragraph to the Engineer.

17. OTHER REQUIREMENTS OF THE TECHNICAL SPECIFICATION SECTIONS

Comply with all other requirements of the technical specifications.

18. AS-BUILT SURVEYS

Engage the services of a licensed land surveyor in accordance with the Project Controls specification. Prior to Final Completion, provide an as-built survey of the constructed facility, as specified.

19. CONTRACT CLOSE-OUT DOCUMENTS

Submit Contract documentation as indicated in the specification for Contract Close-out.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SUBMITTAL SCHEDULE

- A. Provide an initial submittal schedule at the pre-construction meeting for review by Owner and Engineer. Incorporate comments from Owner or Engineer into a revised submittal schedule.

- B. Maintain the submittal schedule and provide sufficient copies for review by Owner and Engineer. An up-to-date submittal schedule shall be provided at each project progress meeting.

### 3.02 TRANSMITTALS

- A. Prepare separate transmittal sheets for each submittal. Each transmittal sheet shall include at least the following: the Contractor's name and address, Owner's name, project name, project number, submittal number, description of submittal and number of copies submitted.
- B. Submittals shall be transmitted or delivered directly to the County, as indicated in the Contact Documents or as otherwise directed.
- C. Provide copies of transmittals (only, i.e., without copies of the respective submittal) directly to the Resident Project Representative.

### 3.03 PROCEDURES

#### A. ACTION SUBMITTALS

##### 1. CONTRACTOR'S RESPONSIBILITIES

- a. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work of other related Sections, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required). Coordinate with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. Extensions to the Contract Time will not be approved for the Contractor's failure to transmit submittals sufficiently in advance of the Work.
- b. The submittals of all shop drawings (including working drawings and product data) shall be sufficiently in advance of construction requirements to allow for possible need of re-submittals, including the specified review time for the Engineer.
- c. No less than 30 calendar days will be required for Engineer's review time for shop drawings and O&M manuals involving only one engineering discipline. No less than 45 calendar days will be required for Engineer's review time for shop drawings and O&M manuals that require review by more than one engineering discipline. Resubmittals will be subject to the same review time.
- d. Submittals of operation and maintenance data shall be provided within 30 days of approval of the related shop drawing(s).
- e. Before submission to the Engineer, review shop drawings as follows:
  - 1) make corrections and add field measurements, as required
  - 2) use any color for its notations except red (reserved for the Engineer's notations) and black (to be able to distinguish notations on black and white documents)
  - 3) identify and describe each deviation or variation from Contract documents

- 4) include the required Contractor's Certification statement
  - 5) provide field measurements (as needed)
  - 6) coordinate with other submittals
  - 7) indicate relationships to other features of the Work
  - 8) highlight information applicable to the Work and/or delete information not applicable to the Work
- f. Submit the following number of copies:
- 1) Shop drawings (including working drawings and product data) – Submit no fewer than four, and no more than nine; three of which will be retained by the County and Engineer.
  - 2) Samples – three
  - 3) Site Usage Plan – three copies
  - 4) Schedule of values – four copies
  - 5) Payment application format – four copies
- g. If Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, provide written notice thereof to the Engineer immediately; and do not release for manufacture before such notice has been received by the Engineer.
- h. When the shop drawings have been completed to the satisfaction of the Engineer, carry out the construction in accordance therewith; and make no further changes therein except upon written instructions from the Engineer.

## 2. ENGINEER'S RESPONSIBILITIES

- a. Engineer will not review shop drawings (including working drawings and product data) that do not include the Contractor's approval stamp. Such submittals will be returned to the Contractor, without action, for correction.
- b. Partial shop drawings (including working drawings and product data) will not be reviewed. If, in the opinion of the Engineer, a submittal is incomplete, that submittal will be returned to the Contractor for completion. Such submittals may be returned with comments from Engineer indicating the deficiencies requiring correction.
- c. If shop drawings (including working drawings and product data) meet the submittal requirements, Engineer will forward copies to appropriate reviewer(s). Otherwise, noncompliant submittals will be returned to the Contractor without action - with the Engineer retaining one copy.

- d. Submittals which are transmitted in accordance with the specified requirements will be reviewed by the Engineer within the time specified herein. The time for review will commence upon receipt of submittal by Engineer.

3. REVIEW OF SHOP DRAWINGS (INCLUDING WORKING DRAWINGS AND PRODUCT DATA) AND SAMPLES

- a. The review of shop drawings, working drawings, data and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
  - 1) as permitting any departure from the Contract requirements
  - 2) as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials
  - 3) as approving departures from details furnished by the Engineer, except as otherwise provided herein
- b. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- c. If the shop drawings (including working drawings and product data) or samples as submitted describe variations and indicate a deviation from the Contract requirements that, in the opinion of the Engineer are in the interest of the Owner and are so minor as not to involve a change in Contract Price or Contract Time, the Engineer may return the reviewed drawings without noting an exception.
- d. Only the Engineer will utilize the color "RED" in marking submittals.
- e. Shop drawings will be returned to the Contractor with one of the following codes.

Code 1 – "APPROVED" – This code is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "APPROVED AS NOTED" - This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "APPROVED AS NOTED/CONFIRM" - This combination of codes is assigned when a confirmation of the notations and comments is required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 - "APPROVED AS NOTED/RESUBMIT" - This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the entire package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 – “NOT APPROVED” – This code is assigned when the submittal does not meet the intent of the contract documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the requirements of the contract documents.

Code 6 – “COMMENTS ATTACHED” – This code is assigned where there are comments attached to the returned submittal, which provide additional data to aid the Contractor.

Code 7 – “RECEIPT ACKNOWLEDGED (Not subject to Engineer’s Review or Approval)” – This code is assigned to acknowledge receipt of a submittal that is not subject to the Engineer’s review and approval, and is being filed for informational purposes only. This code is generally used in acknowledging receipt of means and methods of construction work plans, field conformance test reports, and health and safety plans.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

f. REPETITIVE REVIEWS:

1. Shop drawings and other submittals will be reviewed no more than twice at the OWNER's expense. All subsequent reviews will be performed at times convenient to the ENGINEER and at the CONTRACTOR's expense, based upon a flat rate of \$120.00 per hour. The CONTRACTOR shall reimburse the OWNER for all such fees invoiced to the OWNER by the ENGINEER. Submittals are required until approved.
2. Any need for more than one resubmission, or any other delay in obtaining ENGINEER's review of submittals, will not entitle CONTRACTOR to extension of the Contract Time.

4. ELECTRONIC TRANSMISSION

- a. ACTION SUBMITTALS may be transmitted by electronic means provided the following conditions are met:
  - 1) The above-specified transmittal form is included.

- 2) All other requirements specified above have been met including, but not limited to, coordination by the Contractor, review and approval by the Contractor, and the Contractor's Certification.
- 3) The submittal contains no pages or sheets large than 11 x 17 inches.
- 4) With the exception of the transmittal sheet, the entire submittal is included in a single file.
- 5) The electronic files are PDF format (with printing enabled).
- 6) In addition, transmit three hard-copy (paper) originals to the Engineer.
- 7) The Engineer's review time will commence upon receipt of the hard copies of the submittal.
- 8) For Submittals that require certification, corporate seal, or professional embossment (i.e. P.E.s, Surveyors, etc) transmit at least two hard-copy originals to the Engineer. In addition, provide additional photocopied or scanned copies, as specified above, showing the required certification, corporate seal, or professional seal.

## B. INFORMATIONAL SUBMITTALS

### 1. CONTRACTOR'S RESPONSIBILITIES

- a. Number of copies: Submit three copies, unless otherwise indicated in individual Specification sections
- b. Refer to individual technical Specification Sections for specific submittal requirements.

### 2. ENGINEERS'S RESPONSIBILITIES

- a. The Engineer will review each informational submittal within 15 days. If the informational submittal complies with the Contract requirements, Engineer will file for the project record and transmit a copy to the Owner. Engineer may elect not to respond to Contractor regarding informational submittals meeting the Contract requirements.
- b. If an informational submittal does not comply with the Contract requirements, Engineer will respond accordingly to the Contractor within 15 days. Thereafter, the Contractor shall perform the required corrective action, including retesting, if needed, until the submittal, in the opinion of the Engineer, is in conformance with the Contract Documents.

### 3. ELECTRONIC TRANSMISSION

- a. INFORMATIONAL SUBMITTALS may be transmitted by electronic means providing all of the following conditions are met:

- 1) The above-specified transmittal form is included.
- 2) The submittal contains no pages or sheets large than 11 x 17 inches.
- 3) With the exception of the transmittal sheet, the entire submittal is included in a single file.
- 4) The electronic files are PDF format (printing enabled).
- 5) For Submittals that require certification, corporate seal, or professional embossment (i.e. P.E.s, Surveyors, etc)) transmit two hard-copy originals to the Engineer.

END OF SECTION

P.E./P.L.S. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer/Professional Land Surveyor registered in the State of Florida and that he/she has been employed by

\_\_\_\_\_ to design  
(Name of Contractor)

\_\_\_\_\_  
(Insert P.E. Responsibilities)

In accordance with Specification Section \_\_\_\_\_ for the

\_\_\_\_\_.  
(Name of Project)

The undersigned further certifies that he/she has performed the said design in conformance with all applicable local, state and federal codes, rules and regulations; and, that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the

\_\_\_\_\_  
(Insert Name of Owner)

or Owner's representative within seven days following written request therefor by the Owner.

\_\_\_\_\_  
P.E./P.L.S. Name

\_\_\_\_\_  
Contractor's Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Address

SECTION 01370

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the COUNTY a Schedule of Values allocated to the various portions of the work as listed in the Bid Form (provided in these contract documents) within 21 days after the effective date of the Agreement.
- B. Upon request, support the values with data, which will substantiate their correctness.
- C. The accepted Schedule of Values shall be used only as the basis for the CONTRACTOR's Applications for Payment.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper, the form of which is included in in these contract documents. Identify schedule with:
  - 1. Title of Project and location.
  - 2. Engineer and Project number.
  - 3. Name and Address of Contractor.
  - 4. Contract designation.
  - 5. Date of submission.
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction. At a minimum the component parts listed in the bid form shall be used.
- C. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line item list sub-values of major products or operations under the item.
- E. For the various portions of the Work:
  - 1. Each item shall include a directly proportional amount of the CONTRACTOR's overhead and profit.
  - 2. For items on which progress payments will be requested for stored materials, break down the value into:
    - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the ENGINEER.
    - b. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a sub-schedule of unit costs and quantities for:
  - 1. Products on which progress payments will be requested for stored products.
- B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.
- C. The unit quantity for bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
  - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
  - 2. Copies of invoices for component material shall be included with the payment request in which the material first appears.
  - 3. Paid invoices shall be provided with the second payment request in which the material appears or no payment shall be allowed and/or may be deleted from the request.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the schedule of values.
- F. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

## SECTION 01390

### PRE- AND POST- CONSTRUCTION VIDEOGRAPHY

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals required to videotape all construction areas within the project area, as shown in the Drawings and as specified herein.

##### 1.02 RELATED WORK (REQUIREMENTS)

- A. The Contract Documents include, but are not limited to, the following related requirements:
  - 1. Section 01720: Project Record Documents

##### 1.03 QUALIFICATIONS

- A. The videography shall be done by a competent camera operator who is fully experienced, and qualified with the specified equipment.
- B. The audio shall be done by a person qualified and knowledgeable in the specifics of the contract, who shall speak with clarity and diction so as to be easily understood.

##### 1.04 COSTS OF PHOTOGRAPHY

- A. The CONTRACTOR shall pay costs for specified videography and prints.

##### 1.05 PRE-CONSTRUCTION VIDEOGRPAHY

- A. Video recordings shall not be made more than 30 days prior to construction. No construction shall begin prior to review and approval of the tapes covering the construction area by the OWNER. The OWNER shall have the authority to reject all or any portion of videotape not conforming to specifications and require that it be redone at no additional charge. The CONTRACTOR shall reschedule unacceptable coverage within five days after being notified. The OWNER shall designate those areas, if any, to be omitted from or added to the audiovisual coverage. All tapes and written records shall become the property of OWNER.
- B. Recordings showing the current condition of slough, banks of the slough, park equipment, trees, fencing, etc. and shall be taken from multiple views to show construction detail, quality and condition of existing equipment. The record shall be used as the basis for restoration of these items upon completion of project.

## 1.06 POST-CONSTRUCTION VIDEOGRPAHY

- A. Video recordings shall be made not more than ten days after Final Inspection, and prior to Final Payment. The OWNER shall have the authority to reject all or any portion of videotape not conforming to specifications and require that it be redone at no additional charge. The CONTRACTOR shall reschedule unacceptable coverage within five days after being notified. The OWNER shall designate those areas, if any, to be omitted from or added to the audiovisual coverage. All tapes and written records shall become the property of OWNER.
- B. Recordings showing the final condition of slough, banks of the slough, park equipment, trees, fencing, etc. and shall be taken from multiple views to show construction detail, quality and condition of final equipment.

## PART 2 PRODUCTS

### 2.01 AUDIOVISUAL RECORDING

- A. The total audio-visual system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project. The video portion of the recording shall produce bright, sharp, clear pictures with accurate colors and shall be free from distortion or any other form of picture imperfection. All video recordings shall be electronic means, display on the screen the time of day, the month, day and year of the recording. This time and date information must be continuously and simultaneously generated with the actual recording. The audio portion of the recording shall produce the commentary of the camera operator with proper clarity and be free from distortion.
- B. Equipment
  - 1. Camera: The color video camera used in the recording system shall be of Industrial Grade and shall provide video images and audio that complies with the performance requirements of this specification.
  - 2. Recorder: The recording shall be made with an Industrial Grade DVD recorder.
  - 3. DVD: The DVD used for the recordings shall be high resolution, extended still frame capable. DVDs shall be new and thus shall not have been used for any previous recording. Two (2) complete sets of DVDs (one original and one copy) and logs will be provided upon acceptance of recordings.

## PART 3 EXECUTION

### 3.01 TECHNIQUE

- A. Factual presentation.
- B. Correct exposure and focus.
  - 1. High resolution and sharpness.
  - 2. Maximum depth-of-field.

3. Minimum distortion.

3.02 VIEWS REQUIRED

- A. Photograph from locations to adequately illustrate the existing condition of the construction site and prior to initiating construction.

3.03 PAYMENT

- A. The work specified in this Section shall be considered incidental and the cost shall be included as part of the unit prices for the project.

3.04 AUDIOVISUAL RECORDING

- A. The recordings shall contain coverage of all surface features within the construction zone of influence. These features shall include, but not be limited to, the dam and bank conditions in the slough, roadways, pavement, curbs, driveways, sidewalks, landscaping, trees, and fences. Of particular concern shall be the existence or non-existence of any faults, fractures or defects of areas to be protected during the work. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object.
- B. Accompanying the video recording on each DVD shall be a corresponding and simultaneously recorded audio recording. This audio recording, exclusively containing the commentary of the camera operator, shall assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the features being shown in the video portion of the recording. The audio recording shall also be free from any conversation between the camera operator and any other production technicians.
- C. Video Indexing
  - 1. Video Identification: All DVDs and plastic cases (archivac type) shall be permanently labeled and shall be properly identified by video number, OWNER'S name, date of taping, location and standing limit of tape and project name and number.
  - 2. Video Log: Each DVD shall have a log of that DVD's contents. The log shall describe the various segments of coverage contained on that DVD in terms of the names of the streets or easements, coverage beginning and end, directions of coverage, video unit counter numbers, engineering stationing numbers when possible, and the date of the recording. Video logs shall be supplied in three ring vinyl cover binders and labeled on the front and spine with project name, date and location (i.e., service area).
- D. Visibility: All recording shall be performed during times of good visibility; no recording shall be done during periods of significant precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subject and to produce sharp, bright video recordings of those subjects.
- E. In order to ensure the continuity of coverage, the coverage shall consist of a single continuous unedited recording which begins at one end of a particular construction area; however, where coverage is required in areas not accessible by conventional wheeled vehicles and smooth

transportation of the recording system is not possible, such coverage shall consist of an organized interrelated sequence of recordings at various positions along that proposed construction area (e.g., wooded easement area). Such coverage shall be obtained by walking or by a special conveyance approved by the ENGINEER.

- F. The average rate of travel during a particular segment of coverage shall be directly proportional to the number, size, and value of the surface features within that construction area's zone of influence.
- G. Camera Operation
  - 1. Camera Height and Stability: When conventional wheeled vehicles are used as conveyances for the recording system, the vertical distance between the camera lens and the ground shall not exceed 10 feet. The camera shall be firmly mounted such that transport of the camera during the recording process will not cause an unsteady picture.
  - 2. Camera Control: Camera pan, tilt, zoom-in and zoom-out rates shall be sufficiently controlled such that recorded objects shall be clearly viewed during video tape playback. In addition, all other camera and recording system controls, such as lens focus and aperture, video level, pedestal, chroma, white balance and electrical focus shall be properly controlled or adjusted to maximize picture quality.
  - 3. Viewer Orientation Techniques: The audio and video portions of the recording shall maintain viewer orientation.

END OF SECTION

## SECTION 01400

### QUALITY CONTROL

#### PART 1 GENERAL

##### 1.01 QUALITY CONTROL

- A. This section discusses the requirements for CONTRACTOR-performed quality control testing. The CONTRACTOR shall rely upon his quality control testing to control his operations and demonstrate compliance with these Specifications.
- B. Test procedures defined in this section apply to all tests required in these Specifications.
- C. CONTRACTOR'S Minimum Testing and Inspection Responsibilities:
  - 1. CONTRACTOR is responsible for monitoring all aspects and components of the work.
  - 2. CONTRACTOR shall provide mix designs for structural concrete and grout.
  - 3. CONTRACTOR shall perform additional tests as needed to control his operation and to ensure compliance with the specifications.
  - 4. CONTRACTOR will prepare and/or obtain test specimens, including cylinders for all conventional concrete materials, grout for embedded materials, and grout for anchors, during placement.
  - 5. CONTRACTOR will perform field testing of in-place earthwork materials.
- D. Unless otherwise indicated, results of all completed tests by ENGINEER will be available to CONTRACTOR at OWNER'S site office by the end of the next working day following completion of the tests.
- E. Final acceptance of the work, including all materials, placement, and compaction will be based on a review of the quality control and quality assurance tests, as well as on visual observation made by ENGINEER of CONTRACTOR'S work, including placement of materials, conditioning, compaction procedures, and any other work effort required to complete the project in compliance with these Contract Documents and the quality level required by the ENGINEER'S design.

##### 1.02 RELATED SECTIONS

- A. Section 02200: Earthwork
- B. Section 03300: Cast-in-Place Concrete
- C. Section 03600: Grout

##### 1.03 CONTRACTOR'S TESTING LABORATORY AND FIELD PERSONNEL

- A. CONTRACTOR shall use an independent testing laboratory to perform all tests for which he is responsible on aggregate, concrete, and earthwork materials. The CONTRACTOR shall provide the names of the independent testing laboratory, and laboratory and field personnel, along with a statement of its qualifications for review and approval. The laboratory and field personnel shall have at least 5 years of experience in soil, rock, and concrete testing, and shall be equipped to perform all of CONTRACTOR'S laboratory testing specified herein and in compliance with ASTM C 1077.
- B. Laboratory and field personnel cannot be changed without prior written approval of ENGINEER.

1.04 TESTING STANDARDS

- A. Earthwork quality assurance and quality control testing, excluding RCC aggregate:

- |  |             |
|--|-------------|
| 1. Compaction  | ASTM D 1557 |
| 2. Moisture Content, Oven Method   | ASTM D 2216 |
| 3. Specific Gravity  | ASTM D 854  |
| 4. Field Density, Sand Cone Method<br>(plus one-point compaction<br>and moisture content)      | ASTM D 1556 |
| 5. Field Density, Drive Cylinder<br>Method (plus one-point<br>compaction and moisture content) | ASTM D 2937 |
| 6. Particle Size Analysis  | ASTM D 422  |
| 7. Liquid Limit, Plastic Limit<br>and Plasticity Index   | ASTM D 4318 |
| 8. Moisture Content, Nuclear Gage<br>Method  | ASTM D 3017 |
| 9. Field Density, Nuclear Gage Method  | ASTM D 2922 |

- B. Conventional concrete quality assurance and quality control testing:

- |                            |             |
|----------------------------|-------------|
| 1. Sampling Fresh Concrete | ASTM C 172  |
| 2. Unit Weight             | ASTM C 138  |
| 3. Air Content             | ASTM C 231  |
| 4. Slump                   | ASTM C 143  |
| 5. Temperature             | Thermometer |

- |                               |             |
|-------------------------------|-------------|
| 6. Concrete Test Cylinders    | ASTM C 31   |
| 7. Capping Concrete Cylinders | ASTM C 617  |
| 8. Compressive Strength       | ASTM C 39   |
| 9. Split Tensile Strength     | ASTM C 496  |
| 10. Concrete Cores            | ASTM C 42   |
| 11. Laboratory Qualifications | ASTM C 1077 |

- C. The percent compaction requirements for earthwork will be evaluated as follows: The in- place density as compacted by the CONTRACTOR will be determined by the field density test using the sand-cone method, drive cylinder method, or the nuclear method. The maximum dry density of the fill at the location of the in-place density test will be estimated using a one-point compaction test and full-curve compaction tests (family of curves) of representative fill materials. Both the one-point compaction test and the full-curve compaction tests will be performed according ASTM D 1557. The one-point compaction data will be used by the ENGINEER in conjunction with the representative compaction curves to estimate the maximum dry density of the compacted fill at the location of the in-place density test. The percent compaction in-place will be calculated as the ratio (in percent) of the in-place dry density to the estimated maximum dry density of the compacted fill at the location of the in-place density test.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 ACCEPTANCE CRITERIA

- A. Acceptance criteria for several of the major items of work are outlined below. In addition, the Technical Specifications also contain acceptance criteria that will be used to evaluate CONTRACTOR'S work for compliance. Acceptance criteria apply to tests performed by the CONTRACTOR and the ENGINEER.
- B. Earthwork Materials
1. Acceptance of earthwork materials shall be based on the results of CONTRACTOR tests and ENGINEER check testing, in accordance with applicable paragraphs of Part 2 of Section 02200: Excavation, Backfill and Compaction.
- C. In-Place Earthwork
1. Acceptance of earthwork placement and compaction shall be based on the results of ENGINEER-performed tests and observations. Materials shall meet the minimum compaction requirements outlined in Part 3 of Section 02200: Excavation, Backfill and Compaction.
- D. Structural Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5 "Concrete Quality", and as specified herein.
2. A statistical analysis of compression test results will be performed according to the requirements of ACI 214. The standard deviation of the test results shall not exceed 550 psi, when ordered at equivalent water content as estimated by slump.
3. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.
4. When the standard deviation of the test results exceeds 550 psi, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 psi below, or the average of any three consecutive tests being below the specified compressive strength, is 1 in 100. The required average strength shall be calculated by Criterion No. 3 of ACI 214 using the actual standard deviation.
5. All concrete, which fails to meet the ACI requirements and these Specifications, is subject to removal and replacement at the cost of CONTRACTOR.

### 3.02 CONTRACTOR'S ACTIONS FOR FAILED QUALITY CONTROL TESTING

- A. Unless otherwise required by ENGINEER or provided for in these Specifications, all defective materials, equipment, and work shall be reworked, repaired, or removed and replaced as required by ENGINEER. All such actions necessary to correct defective materials, equipment, or work shall be performed by CONTRACTOR at no additional cost to OWNER. Actions required by CONTRACTOR shall be as outlined below or as described elsewhere in these Specifications.
- B. Excavation
  1. Any excavation work not performed in accordance with these Specifications or as required by ENGINEER shall be repaired, or re-performed to the satisfaction of ENGINEER.
  2. CONTRACTOR shall prepare a written plan, if requested by ENGINEER, summarizing the excavation problem and proposed corrective actions and submit this plan for review and comment by ENGINEER prior to undertaking any corrective actions to repair excavations.
- C. Dewatering
  1. Failure of the dewatering system to provide a dry excavation in accordance with the specifications shall require all work within the excavation to be stopped until dewatering requirements are met.
- D. Earthwork
  1. ENGINEER will inform CONTRACTOR when results of tests and observations made by the ENGINEER indicate the product quality, in-place density, or moisture content test of earthwork materials do not meet the requirements of these Specifications.

2. Materials not meeting the specified density and moisture content requirements shall be reworked. Materials not meeting product quality requirements of these Specifications shall be removed and replaced with acceptable materials. Reworking may include removal, rehandling, reconditioning, or combinations of these procedures. Required rehandling and reconditioning may include scarifying, disking, drying, and/or adding water to the fill.

END OF SECTION

CONCRETE PLACEMENT FORM

PROJECT \_\_\_\_\_

FEATURE \_\_\_\_\_

STATION \_\_\_\_\_

OFFSET \_\_\_\_\_

ELEVATION \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

DATE OF PLACEMENT \_\_\_\_\_

CHECKOUT ITEM	CONTRACTOR REP	ENGINEER REP	DATE	TIME
SUB-GRADE OVER				
EXCAVATION				
COMPACTION				
BEDDING DEPTH COMP.				
FINAL CROSS SECTION				
REINFORCING STEEL				
EMBEDDED PIPING				
EMBEDDED MISC.				
MECHANICAL				
EMBEDDED MISC. METAL				
EMBEDDED ELECTRICAL				
DRAIN PIPING				
LINE AND GRADE				
FORMING				
BLOCKOUTS				
WATERSTOP				
PLACEMENT EQUIPMENT				
PROTECTION FOR CONCRETE				
OTHER ITEM				
FINAL CLEANUP				
OK TO PLACE CONCRETE				

ALL OF THE ABOVE MUST BE INSPECTED AND APPROVED BEFORE ORDERING CONCRETE.

	MIX	MIX	MIX
CONCRETE ORDERED			
CONCRETE WASTED: SPILLAGE			
OUT OF SPEC			
OVER ORDER			
TOTAL WASTED			
TOTAL PLACED			
TRUCK #			
START			
COMPLETE			
TRUCK #			
START			
COMPLETE			

FINISHING COMPLETE TIME: \_\_\_\_\_

REMARKS \_\_\_\_\_

## SECTION 01510

### TEMPORARY UTILITIES

#### PART 1 GENERAL

##### 1.01 REQUIREMENTS INCLUDED

- A. The CONTRACTOR shall furnish, install and maintain temporary utilities required for construction and remove on completion of work.

##### 1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work

##### 1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and local codes and regulations and with utility company requirements.

#### PART 2 PRODUCTS

##### 2.01 MATERIALS, GENERAL

- A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

##### 2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Arrange with utility company, provide service required for power and lighting, and pay all costs for service and for power used in construction and testing.
- B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available as required for construction by the use of construction-type power cords.

##### 2.03 TEMPORARY VENTILATION

- A. Provide temporary ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work to meet specified OSHA requirements.
- B. Provide temporary ventilation, if necessary, to protect materials from damage due to temperature or humidity.

##### 2.04 TEMPORARY WATER

- A. Provide and pay for all required water for construction and consumptive purposes in accordance with local standards and requirements.

2.05 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean and maintain facilities and enclosures.

2.06 TEMPORARY PUMPS

- A. Provide temporary pumps for removal of water from the excavation and fill areas when required by the Work to maintain proper conditions for construction.

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain and operate systems to assure continuous service.
- B. Modify and extend systems as work progress requires.

3.02 REMOVAL

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.
- C. Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

## SECTION 01720

### PROJECT RECORD DOCUMENTS

#### PART 1 GENERAL

##### 1.01 REQUIREMENTS INCLUDED

A. CONTRACTOR shall maintain at the site for the OWNER one record copy of:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. ENGINEER's Field Orders or written instructions.
6. Approved Shop Drawings, Working Drawings and Samples.
7. Field Test records.
8. Construction photographs.
9. Detailed Progress Schedule.

##### 1.02 RELATED WORK

- A. Section 01050: Field Engineering and Surveying
- B. Section 01300: Submittals
- C. Section 01390: Pre- and Post-Construction Videography

##### 1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in CONTRACTOR's office apart from documents used for construction.
  1. Provide files and racks for storage of documents.
  2. Provide locked cabinet or secure storage space for storage of samples.

- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the ENGINEER.
- E. As a prerequisite for monthly progress payments, the CONTRACTOR is to exhibit and provide currently updated "Record Drawings" (two sets of blue prints) for review by the ENGINEER and OWNER.

#### 1.04 AUTOCAD UPDATE

- A. Provide AutoCAD update by standards for Record Drawings which will be designated by the ENGINEER.

#### 1.05 RECORDING

- A. Label each document "PROJECT RECORD" or "RECORD DRAWING" as applicable, with month and year in large bold letters.
- B. Record information concurrently with construction progress.
  - 1. Do not conceal any work until required information is recorded.
  - 2. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
  - 3. Mark new information that is important to the OWNER, but was not shown on Contract Drawings or Shop Drawings.
  - 4. Note related Change Order numbers where applicable.
  - 5. Organize record drawing sheets, as approved by ENGINEER, into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each sheet.
- C. Drawings; AutoCAD update to record actual construction (complete set):
  - 1. Elevations of various structure elements in relation to grade.
  - 2. All underground piping with elevations and dimensions, changes to piping locations, Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.
  - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
  - 4. Mechanical and electrical changes.

5. Major grading, roadway, and structural changes.
  6. All underground duct banks with elevations and dimensions, horizontal and vertical locations of underground duct banks, and manholes along duct banks.
  7. All underground cable elevations and horizontal locations of underground cables.
  8. Field changes of dimension and detail.
  9. Changes made by Field Order or by Change Order.
  10. Details not on original Contract Drawings.
- D. Specifications and Addenda; Provide one complete set and legibly mark each Section to record:
1. MANUFACTURER, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.
  2. Changes made by Field Order or by Change Order.
- E. Shop Drawings (after final review):
1. One complete set of record drawings.
- F. Certified site topographic survey (on reproducible mylar) for the constructed areas. Spot elevations shall be shown at a minimum 100-foot rectangular grid sufficient to show all important topographic features with a minimum 2-foot contour lines at a scale of 1-inch equals 100-feet per Section 01050 by a professional land surveyor. The above survey shall also be delivered in AutoCAD (Release 2008) to the ENGINEER.
- G. See requirements of 01050, 1.03C.

1.06 SUBMITTAL

- A. At CONTRACT Substantial Completion, deliver certified, digital, formatted disk and reproducible mylars with three (3) sets of blue prints of the Record Drawings to the ENGINEER for the OWNER.
- B. Submit one (1) set of specifications and addenda, and Shop Drawings, in accordance with paragraph 1.04(D) & (E), of this section, prior to Final Completion.
- C. Accompany submittal with transmittal letter in duplicate, containing:
  1. Date.
  2. PROJECT title and number.
  3. CONTRACTOR'S name and address.
  4. Title and number of each Record Document.

5. Signature of CONTRACTOR or his authorized representative.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the ENGINEER for the OWNER's records.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

## SECTION 02050

### DEMOLITION, MODIFICATIONS, AND REMOVAL

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required for demolition, removal and proper disposal of materials as required on the Drawings, specified herein, and in accordance with Federal, State, and local agencies.
- B. Demolition, modifications, and removal include, but are not limited to, four tainter gates, broken concrete rubble and riprap in downstream areas, concrete bank protection upstream and downstream of dam, concrete fill upstream of existing gate structure, wooden plank walkway, and chainlink fence.
- C. Demolition, modifications, and removal, which may be specified under other Sections, shall conform to the requirements of this Section.

##### 1.02 RELATED WORK

- A. Section 02110: Site Preparation.
- B. Section 02111: Erosion and Sediment Control.
- C. Section 02140: Dewatering.
- D. Section 02200: Earthwork.

##### 1.03 SUBMITTALS

- A. Submit, in accordance with Division 1, the proposed schedule indicating the intended sequence of operations for demolition of any existing structures prior to the start of work. Include in the schedule coordination and construction of temporary structures as required on the Drawings and as specified herein.
- B. Furnish a detailed sequence of demolition, modifications, and removal work to ensure uninterrupted construction operations.
- C. Before the start of demolition work, all modifications necessary to bypass the affected structures shall be completed. Actual work shall not begin until the ENGINEER has inspected, reviewed, and authorized, in writing, the start of the demolition work.
- D. The above procedure must be followed for each individual demolition operation.

##### 1.04 CONDITION OF STRUCTURES

- A. The OWNER and the ENGINEER assume no responsibility for the actual condition of any structures to be demolished, modified, or removed.

- B. Conditions existing at the time of inspection for bidding purposes will be maintained by the OWNER insofar as practicable. However, variations within a structure may occur prior to the start of work.

#### 1.05 DISPOSAL OF MATERIAL

- A. Materials damaged and not reusable shall become the CONTRACTOR's property and must be removed from the site.
- B. Concrete rubble and riprap shall be stockpiled as specified in PART 3.
- C. The storage or sale of removed items will not be allowed on the site.

#### 1.06 DAMAGE

- A. Promptly repair damage caused to adjacent structures by demolition operations as directed by the ENGINEER and at no cost to the OWNER. Repairs shall be made to a condition equal or better than that which existed prior to construction.

#### 1.07 UTILITIES

- A. Maintain existing utilities in service and protect against damage during demolition operations.

#### 1.08 DUST AND NOISE CONTROL

- A. Take all measures necessary to minimize the amount of dust and noise resulting from demolition activity.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. All materials or items of equipment required for the performance of the work of this Section shall be suitable for the intended purpose.

### PART 3 EXECUTION

#### 3.01 SEQUENCE OF WORK

- A. The sequence of demolition, modifications, removal, and disposal shall be in accordance with the schedule submitted in accordance with Paragraph 1.03 above.

#### 3.02 DEMOLITION

- A. Demolition shall be performed to the limits shown on the Drawings.
- B. Remove all necessary structures as indicated on the Drawings or as required and prepare adjoining areas for construction of the proposed work.
- C. Except where otherwise designated, all demolition debris shall become the property of the CONTRACTOR and shall be removed from the site and disposed off the site in conformance with all applicable laws and regulations. Demolition debris shall not be used for fill or backfill.

- D. Blasting or the use of explosives shall not be allowed for demolition work.
- E. Remove from the site all debris resulting from the demolition operations as it accumulates. Upon completion of the work, all materials, equipment, waste and debris of every sort shall be removed and the premises shall be left clean, neat and orderly.

3.03 CONCRETE RUBBLE AND RIPRAP

- A. Remove and stockpile concrete rubble and riprap blocks for re-use by the OWNER at the locations indicated on the Drawings. Existing Concrete Rubble and Riprap will not be re-used on this project.

END OF SECTION

SECTION 02110  
SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, and equipment required and perform site preparation as shown on the Drawings and as specified herein.
- B. Obtain all permits required for site preparation work prior to proceeding with the work, including clearing and tree removal (if necessary).
- C. CONTRACTOR shall only clear and grub areas that have erosion and sediment control measures installed and that are capable of handling sediment runoff from disturbed areas. CONTRACTOR shall minimize the amount of clearing and grubbing during installation of the erosion and sediment control measures.
- D. Construction staging and site access shall be limited to the west bank of the slough as shown on the Drawings.
- E. Clear working area of trees and shrubs within the limits of construction shown on the Drawings and as approved by the ENGINEER, except for those trees and shrubs designated to be protected. The area of clearing includes:
  - 1. Graded Filter Area downstream of dam.
  - 2. Staging areas, stockpiles areas, waste areas, and other areas as required for completion of the work, subject to the approval of the ENGINEER.
  - 3. Temporary access and haul roads as needed.

1.02 RELATED WORK

- A. Section 02050: Demolition, Modifications, and Removal
- B. Section 02111: Erosion and Sediment Control
- C. Section 02200: Earthwork
- D. Section 02901: Reclamation of Disturbed Areas

1.03 SUBMITTALS

- A. Submit copies of all permits required prior to clearing work.
- B. CONTRACTOR shall supply actual limits of construction and actual limits of clearing surveys certified by a Professional Land Surveyor in accordance with Section 01050.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 SURVEY

- A. The CONTRACTOR shall stake the limits of construction and clearing and/or grubbing necessary to complete all work associated with this Contract.

### 3.02 CLEARING

- A. Cut and remove timber, trees, stumps, brush, shrubs, roots, grass, weeds, rubbish, and any other objectionable material resting on or protruding through the surface of the ground at the designated areas shown on the Drawings.
- B. Trees, wetlands, and other vegetation designated on the Drawings or directed by the ENGINEER to remain shall be preserved and protected as specified.
- C. The limits of site construction are indicated on the Drawings as a broad boundary around the work area. The limits of site disturbance shall be no more than 10 feet outside the required work areas except as otherwise approved by the ENGINEER.

### 3.03 GRUBBING, VEGETATION, AND TOPSOIL REMOVAL

- A. Grub and remove all stumps, roots, matted roots, brush, timber, logs, concrete rubble, and all other debris encountered to a minimum of 18 inches below subgrade elevation, or as directed by ENGINEER.
- B. Remove all topsoil and vegetation within the cut and fill sections of the limits of construction to a maximum of 12 inches, or as directed by the ENGINEER. Topsoil shall be stockpiled separately from other fill material.
- C. All grubbing holes and depressions excavated below the original ground surface outside the outline of the new slopes and spillway area shall be backfilled with common fill and compacted to a density conforming to the surrounding ground surface.

### 3.04 DISPOSAL

- A. The CONTRACTOR shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris to an approved facility.
- B. On-site disposal of cleared and grubbed materials by open-air burning will not be allowed.
- C. Topsoil meeting the requirements for site restoration may be stockpiled in locations approved by the ENGINEER for use in site restoration. All other topsoil material shall be disposed of off-site in conformance with all applicable laws and regulations.

### 3.05 PROTECTION

- A. Trees, wetlands, and other vegetation directed by the ENGINEER to remain shall be protected from damage by all construction operations by erecting suitable barriers, guards, and enclosures, or by other approved means. Clearing operations shall be conducted in a manner to prevent falling trees from damaging trees and vegetation designated to remain and to the work being constructed and so as to provide for the safety of employees and others.
- B. Protection shall be maintained until all work in the vicinity of the work being protected has been completed.
- C. Heavy equipment operation or stockpiling of materials shall not be permitted within the branch spread of existing trees.
- D. Any damage to existing tree crowns, trunks, or root systems shall be repaired immediately. Roots exposed and/or damaged during the work shall immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces shall be treated with acceptable tree wound paint, and topsoil spread over the exposed root area.

- E. When work is completed, all dead and downed trees shall be removed. Live trees shall be trimmed of all dead and diseased limbs and branches. All cuts shall be cleanly made at their juncture with the trunk or preceding branch without injury to the trunk or remaining branches. Cuts over 1 inch in diameter shall be treated with acceptable tree wound paint.
- F. Construction activities shall be restricted to those areas within the limits of construction designated on the Drawings, within public rights-of-way, and within easements provided by the OWNER. Adjacent properties and improvements thereon, public or private, which become damaged by construction operations, shall be promptly restored to their original condition, to the full satisfaction of the OWNER.

END OF SECTION

## SECTION 02111

### EROSION AND SEDIMENT CONTROL

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, equipment and materials required to complete all work associated with providing erosion and sediment control and other related and incidental work as required to complete the work on the Drawings and specified herein.
- B. All work under this Contract shall be performed in conformance with and subject to the requirements of the State of Florida Department of Environmental Protection (FDEP), Stormwater Program NPDES General Permit and all other applicable permits.
- C. Prepare Notice of Intent (NOI) Form, Stormwater Pollution Prevention Plan (SWPPP) including Sediment and Erosion Control Plans, and all other information required for permit submittal and approval. This plan and other required information shall be prepared by a licensed professional engineer, registered in the State of Florida.
- D. Due to the nature of the work required by this Contract, it is anticipated that the location and nature of the erosion and sediment control measures will be adjusted on multiple occasions to reflect the current phase of construction. Erosion and sediment control measures shall be established prior to or concurrent with the site preparation operations in a given area. Where this is not feasible, the erosion and sediment control measures shall be established immediately following completion of these operations.
- E. Refer to Section 01110, Environmental Protection Procedures, for further requirements.
- F. The construction schedule adopted by the CONTRACTOR will impact the placement and need for specific measures required for the control of erosion. The CONTRACTOR shall develop and implement such additional techniques as may be required to minimize erosion and off-site transport of sedimentation. The location and extent of erosion and sediment control measures shall be revised at each phase of construction that results in a change in either the quantity or direction of surface runoff from constructed areas.

##### 1.02 RELATED WORK

- A. Section 01121: Diversion and Care of Stream
- B. Section 02110: Site Preparation
- C. Section 02140: Dewatering
- D. Section 02200: Earthwork
- E. Section 02901: Reclamation of Disturbed Areas

### 1.03 SUBMITTALS

- A. Submit a copy of the approved FDEP NPDES General Permit prior to initiating any Contract Work.
- B. Submit shop drawings that clearly show erosion and sediment control measures to be used for each stage of construction for the dam site, areas of excavation, temporary and permanent haul roads, and access roads. Include installation and maintenance schedule for all erosion and sediment control measures and temporary seeding. Submittal shall be in accordance with Division 1.

### 1.04 REFERENCE DOCUMENTS

- A. Florida State Building Code
- B. State of Florida Erosion and Sediment Control Manual

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Crushed stone for sediment filtration devices, access ways and staging areas shall conform to Florida Department of Transportation Specifications.
- B. Sediment Fence
  - 1. Sediment fence shall be a prefabricated commercial product made of a woven, polypropylene, ultraviolet resistant material such as “Envirofence” by Mirafi Inc., Charlotte, NC or equal.
- C. 1/4-in woven wire mesh for filter boxes shall be galvanized steel or hardware cloth.
- D. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.
- E. Latex acrylic copolymer, or organic tackifier shall be a commercial product specifically manufactured for use as straw mulch tackifier.
- F. An asphalt tackifier shall only be used when temperatures are too low to allow the use of a latex acrylic copolymer and only with prior written approval from the ENGINEER.
- G. Erosion control blanket shall be installed in all seeded drainage swales and ditches as shown on the Drawings or as directed by the ENGINEER. Erosion control blanket shall be 100 percent agricultural straw matrix stitch bonded with degradable thread between two photodegradable polypropylene nettings, such as Model S150 Double Net Short-Term Blanket (10 months) by North American Green, Evansville, IN or equal.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install the silt fence, lined diversions, sediment basins, sediment traps and other erosion and sediment control devices in accordance with the drawings, specifications, and the CONTRACTOR'S approved erosion and sediment control plan.
- B. Maintain erosion and sediment control devices at all times during construction. Maintenance shall include repairing damaged devices, cleaning sediment from basins and traps, and/or installing additional devices if needed.
- C. Construct diversions as required for collection and control of runoff. Place lining material in diversions adequate to limit erosion and sediment transport.
- D. Construct sediment basins at the locations indicated in the CONTRACTOR'S erosion and sediment control plan.
- E. Maintain sediment basins at all times during construction. Remove accumulated sediment as required and dispose of in accordance with applicable regulations.

### 3.02 REMOVAL

- A. Upon the approval of the ENGINEER, remove silt, silt fence or silt barriers, diversions, sediment basins, sediment traps and other erosion and sediment control devices at the end of construction.
- B. Dispose of silt, silt fence, and other waste sediment control materials in a legal off-site disposal area in accordance with applicable regulations.
- C. Reclaim the sediment basins as required by Section 02901: Reclamation of Disturbed Areas.

### 3.03 PERFORMANCE

- A. The CONTRACTOR shall demonstrate as a prerequisite for monthly progress payments, compliance with all requirements specified in this Section to the ENGINEER. If the CONTRACTOR fails to demonstrate compliance with this Section, the ENGINEER may withhold approval of progress payment estimates until such time as the CONTRACTOR demonstrates to the ENGINEER full compliance with the approved stormwater permit and this Section.
- B. Should any of the temporary erosion and sediment control measures employed by the CONTRACTOR fail to produce results which comply with the requirements of the State of Florida, CONTRACTOR shall immediately take whatever steps are necessary to correct the deficiency at his own expense. Any fines resulting from inadequate sediment and erosion control shall be the responsibility of the CONTRACTOR.

END OF SECTION

## SECTION 02140

### DEWATERING

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Design dewatering systems for the control, collection, and disposal of groundwater or surface water for the proper construction of all contract work, including collection and diversion of surface runoff.
- B. Furnish all labor, materials, equipment and incidentals required to install, operate, monitor, and maintain all pumps, piping, drains, well points, wells, and other facilities for the control, collection, and disposal of groundwater or surface water for the proper construction of all Work, including collection and diversion of surface runoff.
- C. Maintain prepared foundations and all other parts of the work free from seepage or standing water as required for constructing each part of the work.
- D. Maintain stability and prevent failure of the existing dam.
- E. Comply with all applicable environmental protection laws and requirements in operation of the dewatering system and disposal of collected water in accordance with Section 02111: Erosion and Sediment Control.
- F. Remove all components of the dewatering systems when no longer required.

##### 1.02 RELATED WORK

- A. Section 01121: Diversion and Care of Stream
- B. Section 02111: Erosion and Sediment Control
- C. Section 02200: Earthwork

##### 1.03 DATA AVAILABLE

- A. Logs of test borings performed by others are available as indicated in Section 00200.

##### 1.04 SUBMITTALS

- A. The CONTRACTOR shall submit a dewatering plan to the ENGINEER and LC Environmental Inspector for review and approval at least 15 calendar days prior to the pre-construction meeting. The dewatering plan shall be prepared by a qualified dewatering specialist experienced in design, installation and operation of dewatering systems. The dewatering specialist shall be a professional engineer licensed in the State of Florida with experience in the design of dewatering systems of similar-type systems in lacustrine environments. The dewatering specialist shall maintain professional liability insurance for errors and omissions for his/her design. Insurance requirements are to be per the contract documents.

The plan shall include details regarding the anticipated types and locations of various dewatering facilities and calculations, if necessary, required to substantiate the designs. The plan shall demonstrate full integration with the Stormwater Pollution Prevention Plan (SWPPP) and identify all items of work including such items as supplemental drainage channels, sedimentation pond (if required), and silt barriers necessary for implementation of the CONTRACTOR'S activities and compliance with state and federal environmental and water quality regulations. The plan shall also include the CONTRACTOR'S method and procedures to fill openings and voids left by removal of the dewatering system.

- B. Review by the ENGINEER of the dewatering systems proposed by the CONTRACTOR will only be with respect to the basic principles the CONTRACTOR intends to employ. Review by the ENGINEER does not relieve the CONTRACTOR of the full responsibility for the adequacy of the dewatering systems.

#### 1.05 DEFINITIONS

- A. Where the phrase “in-the-dry” is used in these Specifications, it shall be defined to mean an excavation subgrade that is stable with no ponded water, mud, or muck and shall be able to support construction equipment without rutting or disturbance and shall be suitable for the placement and compaction of fill material, pipe or concrete foundations.

#### PART 2 PRODUCTS (NOT USED)

#### PART 3 EXECUTION

##### 3.01 GENERAL

- A. The CONTRACTOR shall review the available topographic, subsurface, and hydrogeologic data for the project site. It shall be the CONTRACTOR'S responsibility to evaluate the subsurface conditions at the project site with respect to all required dewatering facilities.
- B. The CONTRACTOR shall, at all times during construction, provide ample means and devices to remove promptly and dispose of properly all water entering excavations and keep the bottoms of the excavations firm and free of standing water until the structures to be built therein are completed and/or the backfill to be placed therein has been placed. The dewatering operations shall be carried out in such a manner that no disturbance to the bearing soil or rock, or to soil or rock supporting any other work will result. Dewatering shall be performed in such a manner as to control discharge water and not cause siltation or other negative environmental impacts by use of approved sedimentation basins or other erosion control structures per the approved Erosion and Sedimentation Control Plan. Refer to Section 02111: Erosion and Sediment Control.
- C. The dewatering system shall be operated continuously as necessary to prevent flotation of partially completed structures or other work.
- D. The CONTRACTOR shall take all necessary precautions to preclude accidental discharge of fuel, oil, etc. to prevent adverse effects on groundwater or surface water quality.

##### 3.02 DEWATERING REQUIREMENTS

- A. Design, furnish, install, maintain, and operate dewatering systems which shall prevent loss of fines, boiling, quick conditions, or softening of foundation strata and maintain stability of excavation slopes and bottom of excavation so that every phase of the work can be performed in the dry. The dewatering operations shall be such that the bottoms of all excavations shall be kept at all times firm, and in all respects acceptable to the ENGINEER. The dewatering system shall be designed and operated in a manner to ensure the stability and prevent failure of the existing dam during construction.

### 3.03 INSTALLATION AND OPERATION

- A. The location of every element of the dewatering systems shall be such that interference with excavation and construction activity is minimized.
- B. Unless otherwise approved by the ENGINEER in writing, prior to any excavation below the hydrostatic groundwater level, the dewatering system shall be placed into operation to lower the water levels as required and then shall be operated continuously 24 hours per day, 7 days per week until all facilities and structures affected by the dewatering have been satisfactorily constructed, including placement of fill materials to an elevation above the hydrostatic groundwater level. The CONTRACTOR shall maintain the water levels low enough to fulfill the requirements of this section and shall not allow the water level to rise until the constructed facilities are sufficiently complete that the water can be allowed to rise without damaging the facilities, their foundations, or surrounding areas and structures.
- C. When the dewatering system does not meet the specified requirements, and as a consequence loosening or disturbance of the foundations strata, instability of the slopes, or damage to the foundations or structures occur, the CONTRACTOR shall supply all materials, labor, and perform all work required for restoration of foundation soil, fill soil, slopes, foundations, or structures, to the satisfaction of the ENGINEER, at no cost to the OWNER.

### 3.04 REMOVAL

- A. All elements of the dewatering system(s) shall be removed from the site at the completion of the dewatering work.
- B. All voids left as a result of the dewatering system shall be grouted as approved by the ENGINEER to assure complete filling of openings and voids, including voids in gravel drains.
- C. The CONTRACTOR shall provide record drawings of any dewatering elements left in place.

END OF SECTION

## SECTION 02200

### EARTHWORK

#### PART 1 GENERAL

##### 1.01 STATUTORY REQUIREMENTS

- A. All excavation shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P), State of Florida "Trench Safety Act" (Part IV, Chapter 553 of the Florida Statutes) and local requirements. Where conflict between OSHA, State and local regulations exists, the most stringent requirements shall apply.

##### 1.02 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals necessary to perform all excavation work and grading; place and compact backfill and fill; and dispose of unsuitable waste and surplus materials as shown on the Drawings and as specified herein.
- B. Perform all regrading of upstream and downstream areas as shown on the drawings.
- C. Protect existing structures, facilities, and instrumentation and any such facilities under construction during excavation. Damage to structures, facilities, and instrumentation resulting from the CONTRACTOR'S excavation activities shall be repaired by the CONTRACTOR at no cost to the OWNER and to the satisfaction of the ENGINEER.
- D. Furnish and place graded filter and riprap materials in downstream areas as shown on the Drawings.

##### 1.03 RELATED WORK

- A. Section 01400: Quality Control
- B. Section 02050: Demolition and Modification
- C. Section 02110: Site Preparation
- D. Section 02111: Erosion and Sediment Control
- E. Section 02140: Dewatering
- F. Section 02901: Reclamation of Disturbed Areas

##### 1.04 SUBMITTALS

- A. Furnish the ENGINEER quality control testing results and representative samples weighing approximately 50 pounds each, of structural fill, select fill, and graded filter materials contained in sealed 5-gallon containers, at least 20 calendar days prior to the date of anticipated use of such material for approval, in accordance with Section 01400 and as required by the Engineer.

- B. Submit quality control material conformance test results on soil materials as specified in Paragraph 2.02.

#### 1.05 REFERENCE STANDARDS

##### A. American Society for Testing and Materials (ASTM)

1. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>))
3. ASTM D1140 - Standard Test Method for Amount of Material in Soils Finer than the Number 200 (75 micrometer) Sieve
4. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
5. ASTM D2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
6. ASTM D2487 - Standard Test Method for Classification of Soils for Engineering Purposes
7. ASTM D2488 - Practice for Description and Identification of Soils (Visual-Manual Procedure)
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Method (Shallow Depth)
9. ASTM D2937 - Standard Test Method for Density of Soil in Place by Drive Cylinder Method
10. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Method (Shallow Depth)
11. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.06 QUALITY CONTROL

- A. The CONTRACTOR shall engage a Quality Control Laboratory (QCL) to perform conformance tests and to perform quality control testing for field density, water content, and gradation during fill placement to confirm that in-place materials meet the product requirements of these specifications. Quality control tests for earthwork materials shall be performed by CONTRACTOR in accordance with Section 01400.
- C. Prior to and during the placement of backfill and fill, coordinate with the soils testing laboratory to perform in-place soil density tests to verify that the backfill/fill material has been compacted in

accordance with the compaction requirements specified elsewhere. The ENGINEER may designate areas to be tested.

- D. The percent compaction requirements for earthwork will be evaluated as follows: The in-place density as compacted by the CONTRACTOR will be determined by the field density test using the sand-cone method, drive cylinder method, or the nuclear method. The maximum dry density of the fill at the location of the in-place density test will be estimated using a one-point compaction test and full-curve compaction tests (family of curves) of representative fill materials. Both the one-point compaction test and the full-curve compaction tests will be performed according to ASTM 1557. The one-point compaction data will be used by the ENGINEER in conjunction with the representative compaction curves to estimate the maximum dry density of the compacted fill at the location of the in-place density test. The percent compaction in-place will be calculated as the ratio (in percent) of the in-place dry density to the estimated maximum dry density of the compacted fill at the location of the in-place density test.
- E. The CONTRACTOR is solely responsible for Quality Control.

## 1.07 DEFINITIONS

- A. Where the phrase “in-the-dry” is used in these Specifications, it shall be defined to mean an excavation subgrade that is stable with no ponded water, mud, or muck and shall be able to support construction equipment without rutting or disturbance and shall be suitable for the placement and compaction of fill material, pipe or concrete foundations.
- B. Suitable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inch in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse.
- C. Unsuitable Material: Material that does not comply with the requirements of suitable material or cannot be compacted to specified or indicated density.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. CONTRACTOR shall be responsible for furnishing materials that meet the specification and for importing materials required to complete construction.
- B. Structural Fill:
  - 1. Structural fill shall be used below spread footing foundations, slab-on-grade floors, pavements, and other structures not founded on undisturbed earth.
  - 2. Structural fill material shall be free of organic, deleterious and/or compressible material. Structural fill shall have a liquid limit less than 40 percent and plasticity index less than 10 percent, and a dry density of greater than 100 pcf and shall conform to the following gradation limits:

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
3-inch	100
No. 4	70 to 100
No. 40	5 to 100

Structural fill shall be compacted to 95% of the maximum dry density and moisture content within 2% of optimum moisture content as determined by ASTM 1557.

C. Common Fill:

1. Common fill shall be durable soil and rock material free of debris, organic matter, or other deleterious materials. Common fill shall be free from stones exceeding 6 inches in the largest dimension and shall have no more than 20% passing the U.S. Standard No. 200 sieve. Common fill shall not contain other extraneous materials such as broken concrete or masonry, rubber, stumps, glass, metals, plastics, paper, or other refuse, organic materials, loam, wood, topsoil, highly micaceous silt or other deleterious material, which will deteriorate in time or which cannot be properly compacted. The maximum liquid limit and plasticity index of the material passing the U.S. Standard No. 40 sieve shall be 40 and 10 percent, respectively.
2. Crushed stone may be used in a layer not to exceed 6 inches at no additional cost to the Owner and should be considered by the Contractor where weather conditions impact the drying of excavated subgrade.
3. Common fill shall be dried or wetted by the Contractor to have a moisture content of plus or minus 3 percent of the optimum moisture content as determined by ASTM 1557 for maximum compaction density and shall not be frozen or lumpy.
4. Excavated material falling within the above specification after preparation as specified may be used for backfill. All material which, in the opinion of the Engineer, is not suitable for reuse after preparation as specified shall be disposed of by the Contractor as excess excavation.
5. Should the Contractor not prepare excavated material to qualify as common fill for backfill, e.g., inadequate dewatering or drying, he/she shall remove the unqualified material from the site and provide imported common fill at no additional cost to the Owner.

D. Select Fill

1. Select common fill shall be as specified above for common fill except that the material shall contain no stones larger than 2 inches in largest dimension.

E. Graded Filter Materials

1. Filter sand shall be a naturally occurring strong, durable, silica sand material in conformance with ASTM C 33 and graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
3/8-inch	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	5 to 30
No. 100	0 to 10

No. 200

0 to 3

2. Coarse graded stone shall be sound, durable, crushed sandy gravel consisting of a blend of approximately 50% by weight each of FDOT No.6 and No. 9 stone resulting in the following gradation:

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
1-inch	100
¾-inch	85 to 100
½-inch	60 to 85
3/8-inch	50 to 75
No. 4	30 to 55
No. 8	5 to 20
No. 16	0 to 5

- F. Riprap bedding materials shall consist of sound, durable non-limestone rock from off-site commercial quarries, as approved by the ENGINEER, and conforming to FDOT Section 530, bedding stone for riprap with the following gradation limits:

<u>Sieve Size</u>	<u>Percent Finer By Weight</u>
12-inch	100
10-inch	70 to 100
6-inch	60 to 80
3-inch	30 to 50
1-inch	0 to 15

- G. Riprap shall be sound durable non-limestone rock that meets the requirements of FDOT Standard Specification Section 530 for Bank and Shore Protection (530-2.2.1) except the bulk specific gravity shall be at least 2.6 and the maximum stone diameter ( $D_{100}$ ) shall be 24 inches with a minimum blanket thickness of 2.5 feet.

H. Grout for Riprap

1. The grout for the riprap shall be a fine aggregate concrete consisting of a mixture of Portland cement, fine aggregate, and water proportioned and mixed as to provide a pumpable slurry. Admixtures and/or pozzolan may be used with the approval of the Engineer.
2. Portland cement shall conform to ASTM C150, Type I or Type II.
  3. Fine aggregate shall conform to ASTM C33, except as to grading. Aggregate grading shall be reasonably consistent and shall be well graded from the maximum size which can be conveniently handled with available pumping equipment.
  4. Water for mixing shall be clean and free from adverse amounts of oil, acid, salt, alkali, organic matter or deleterious substances.
5. Pozzolan, if used, shall conform to ASTM C618, Type N, F, or C.
6. Admixtures – A water reducer conforming to ASTM C494 to reduce segregation, increase workability and pumpability, improve strength and increase water tightness. If an air-entraining agent is used, it shall not exceed seven (7) percent of the volume of the grout.

7. Materials shall be proportioned to produce a hardened concrete with a minimum compressive strength of 2,500 psi at 28 days based on specimens molded and tested in accordance with ASTM C31 and C39.

## 2.02 CONFORMANCE TESTING

Periodic conformance testing shall be conducted by the CONTRACTOR's Quality Control Laboratory on structural fill, select fill, and graded filter materials prior to their use on the project. The following tests shall be conducted at the indicated frequencies:

<u>Test</u>	<u>Method</u>	<u>Frequency</u>
Grain Size	ASTM D422	Every 1,000 cy or change in material
Atterberg Limits	ASTM D4318	Every 1,000 cy or change in material
Moisture/Density	ASTM 1557	Every 1,000 cy or change in material
Natural Moisture	ASTM D2216	Every 1,000 cy or change in material

Results of the tests shall be submitted to the ENGINEER within 24 hours of test completion and prior to material use on the project. The ENGINEER reserves the right to reject material based on the results of these conformance tests and/or independent quality assurance testing conducted by the ENGINEER. Rejected materials shall be removed from the site at no cost to the OWNER.

## PART 3 EXECUTION

### 3.01 GENERAL FILLING AND BACKFILLING PROCEDURES

- A. Fill and backfill materials shall be placed in horizontal lifts to suit the specified compaction requirements to the lines and grades required, making allowances for settlement and placement of cover materials (i.e. topsoil, sod, etc). Soft spots or uncompacted areas shall be corrected.
- B. Fill and backfill materials shall not be placed on frozen surfaces, or surfaces covered by snow or ice. Fill and backfill material shall be free of snow, ice, and frozen earth.
- C. Compaction in open areas may be accomplished by any of the following methods: compaction equipment, fully loaded ten-wheel trucks, front-end loaders weighing at least 30,000 lbs. or heavy vibratory rollers operated at about 3 feet per second (walking pace),.. Compaction in confined areas (including areas within a 45 degree angle extending upward and outward from the base of a wall) and in areas where the use of large equipment is impractical, shall be accomplished by hand-operated vibratory equipment or mechanical tampers. Lift thickness shall not exceed 6 inches (measured before compaction) when hand-operated equipment is used.

- D. Fill and backfill shall not be placed and compacted when the materials are too wet to properly compact (i.e. the in-place moisture content of the soil at that time is more than two percentage points above the optimum moisture content of that soil as determined by the laboratory test of the moisture-density relation appropriate to the specified level of compaction).

### 3.02 FILL AND BACKFILL PROCEDURES

- A. Select fill and structural fill shall be placed in horizontal lifts and compacted in accordance with requirements herein. Select fill and structural fill shall be placed in even lifts having a maximum thickness (measured before compaction) of 8 inches.
- B. Common fill may be used in areas beyond those designated for select fill unless shown or specified otherwise. Common fill shall be placed in even lifts having a maximum thickness (measured before compaction) of 12 inches.

### 3.03 COMPACTION REQUIREMENTS

- A. In all cases, unless otherwise noted herein, the top 24 inches of fill shall be compacted to a minimum of 95% modified Proctor (ASTM 1557) at or near its optimum moisture content (less than or equal to plus 2 percent).
- B. The top 24 inches of subgrade below the Riprap/graded filter sand shall be compacted to a minimum of 95% modified Proctor (ASTM 1557) at or near its optimum moisture content (less than or equal to plus 2 percent).
- C. Slopes: Compact the top 6 inches of existing subgrade and each layer of fill or backfill to a minimum of 92.0% modified Proctor (ASTM 1557) at or near its optimum moisture content (less than or equal to plus 2 percent).
- D. Lawn, planted, and unimproved areas: Compact the top 6 inches of existing subgrade and each layer of fill or backfill to a minimum of 82.0% modified Proctor (ASTM 1557) at or near its optimum moisture content to the finished grade elevation.
- E. Roads, paved areas and roadway embankments: Compact the top 12 inches of existing subgrade and each layer of fill or backfill to a minimum of 95.0% modified Proctor (ASTM 1557) at or near its optimum moisture content (less than or equal to plus 2 percent).

### 3.04 MISCELLANEOUS EXCAVATION

- A. The CONTRACTOR shall perform all miscellaneous excavation. The CONTRACTOR shall make all excavations necessary to permit the placing of loam and plants, for constructing roadways and any other miscellaneous earth excavation required under this Contract.

### 3.05 DISPOSAL OF UNSUITABLE, WASTE AND/OR SURPLUS EXCAVATED MATERIAL

- A. Unsuitable, waste and surplus excavated material shall be removed and disposed of off-site in accordance with local and State of Florida Regulations. Materials may be temporarily stockpiled in an area within the limits of construction that does not disrupt construction activities, create any nuisances or safety hazards, or otherwise restrict access to the site of the Work.

### 3.06 GRADING

- A. Grading shall be performed to the lines and grades shown on the Drawings. All objectionable material encountered within the limits indicated shall be removed and disposed of. Subgrade shall be completely and continuously drained and de-watered throughout the grading process. Install temporary drains, drainage ditches, etc, to intercept or divert surface water, which may affect the execution or condition of grading work.
- B. If at the time of grading it is not possible to place any material in its proper section of the Work, it shall be stockpiled in approved areas for later use. No extra payment will be made for the stockpiling or double handling of excavated material.
- C. In cut areas, all loose or protruding rocks in slopes shall be removed to line or finished grade of the slope. All cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings unless otherwise directed by the ENGINEER.

END OF SECTION

## SECTION 02262

### STEEL SHEET PILING

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Summary of Work: The CONTRACTOR shall furnish all labor, materials, and equipment necessary to install all permanent sheet piling for the structure to minimum tip elevation as indicated on the Drawings and specified herein.
- B. Pre-drilling of sheetpiles may be required for permanent and temporary sheetpiles to control vibrations adjacent to existing dam structure and clear obstructions (if any) to reach minimum tip elevation.
- C. Survey monitoring points (3 minimum) shall be established on the dam prior to commencement of permanent or temporary sheet pile driving.
- D. Survey monitoring shall be conducted during all permanent or temporary sheet piling installation and removal and the results submitted daily.

##### 1.02 APPLICABLE PUBLICATIONS AND RELATED WORK:

- A. American Society for Testing and Materials (ASTM):
  - 1. A36 - Standard Specification for Carbon Structural Steel
  - 2. A690 - Standard Specification for Steel Sheet Piling
  - 3. A563 - Standard Specification for Carbon and Alloy Steel Nuts
  - 4. A668 - Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use
- B. American Welding Society (AWS)
  - 1. AWS D1.1 - Structural Welding Code
- C. Related Work
  - 1. Section 02140: Dewatering
  - 2. Section 02200: Earthwork

##### 1.03 DEFINITIONS (Not Used)

#### 1.04 SUBMITTALS

- A. The CONTRACTOR shall make submittals for Steel Sheet Piling in accordance with Division 1 and the following provisions. The CONTRACTOR shall be responsible for coordination of materials, equipment, and installation regardless if the submittals are made together or separately.
1. Submit a complete description of sheet piling driving equipment including hammers, extractors, protection caps, pre-drilling equipment (if required) and other installation appurtenances prior to commencement of work.
  2. Submit Detail drawings for sheet piling including fabricated sections showing complete piling dimensions and details, method of construction, driving sequence and location of installed piling. Detail drawings shall include details and dimensions of templates and other temporary guide structures for installing piling. Detail drawings shall provide details of the method of handling piling to prevent permanent deflection, distortion or damage to piling interlocks.
  3. Submit a vibration control plan indicating anticipated vibrations due to pile driving activities, proposed methods to reduce/control vibrations, and proposed methods for monitoring vibrations on existing structure to assure vibrations do not exceed the maximum tolerable vibration or settlements to do exceed the limiting value and cause damage to existing dam. Plan shall also show proposed locations of survey monitoring points (3 minimum) on dam.
  4. Submit certification that surface preparation and protective coatings have been applied in conformance with specifications.
- B. During pile driving, the CONTRACTOR shall submit records to the ENGINEER each day including the following for each sheet pile:
1. Name of structure and pile number
  2. Driven pile length
  3. Pile length after cut off
  4. Pile cut off and tip elevations
  5. Ground surface elevation during driving
  6. Final driving resistance and pressure gauge readings or hammer stroke
  7. Date and time of day pile is driven
  8. Heaving or re-driving data
  9. Remarks concerning pile-driving operations
  10. Vibration and settlement monitoring data for permanent sheet pile installation and temporary sheet pile installation and removal.

#### 1.05 QUALIFICATIONS

- A. Experience Requirement:
1. The CONTRACTOR shall have a minimum of five (5) years experience installing steel sheet piles.

## 1.06 RESPONSIBILITIES

- A. The CONTRACTOR shall be responsible for layout of the piles to the location shown on the Drawings. The CONTRACTOR shall establish monitoring devices and benchmarks as required to monitor the existing structure during sheet pile driving. The CONTRACTOR shall be responsible to establish elevation reference to mark each pile along its entire length at one-foot intervals and along at least the last foot of driving at one-inch increments, so as to permit determination of the pile tip elevation and corresponding driving resistances during driving.

## 1.07 CERTIFICATIONS AND TESTING: Not Used

## 1.08 INSPECTION COORDINATION

- A. The CONTRACTOR shall provide access to the WORK for the ENGINEER as requested for inspection. The CONTRACTOR shall provide 48-hour notice of its intention to begin new WORK activities.

## 1.09 WARRANTY

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 PERMANENT STEEL SHEET PILES

- A. The CONTRACTOR shall provide steel sheet pile in accordance with the following:
  - 1. Sheet piles shall be Z-Sections having the following minimum properties:
    - a. Section Modulus of 30.2 in<sup>3</sup>/ft
    - b. Web/Flange thickness of 0.4 insuch as PZ-27 or approved equal. Contractor may select a heavier sheet pile section, if deemed necessary, to resist driving stresses associated with Contractor's means and methods.
  - 2. Sheet piles shall be manufactured of hot-rolled steel conforming to ASTM A690.
  - 3. Sheet piles shall not have a camber or sweep in excess of the permitted mill tolerance.
  - 4. Sheet piles shall be stored on platforms, skids or other supports at the site and support to prevent excessive deflection.
  - 5. Sheet pile points shall be reinforced with protector as manufactured by Associated Pile and Fitting Corporation or approved equal. Points shall be welded to the piles in accordance with the manufacturer's recommendations and conforming to ASW D1.1.

6. Metal plates, shapes, bolts, nuts, rivets, and other appurtenant fabrication and installation materials shall conform to MANUFACTURER's standards and to the requirements specified in the respective sheet piling standards.
- B. The CONTRACTOR shall drive steel sheet piles to the specified elevation.
- C. The CONTRACTOR shall provide equipment for driving steel sheet piles as required to complete the WORK and as specified below:
  1. The sheet piles shall be driven with an approved vibratory hammer.
  2. The pile driving hammer shall be operated at all times at the speeds and conditions recommended by the hammer manufacturer.

## 2.02 MONITORING EQUIPMENT

- A. Provide survey monitoring points on existing dam consisting of nail or similar fixed mark by which to measure vertical movement to an accuracy of 1/16 - inch.
- B. Provide portable seismographs for monitoring the velocities of ground vibrations resulting from pile driving. Provide seismographs which have been calibrated within the previous 6 months to a standard that is traceable to the National Bureau of Standards. Required characteristics of seismographs are listed below:
  1. Measure the three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.
  2. Measure and display the maximum peak particle velocity component.
  3. Have a flat velocity frequency response with a minimum broad band of 6 Hz to 150 Hz with a tolerance equal to or better than plus or minus 10 percent.
  4. Self-triggering wave-form capture mode that provides the following information: plot of wave forms, peak particle velocities, frequencies of peaks.
  5. Continuous monitoring mode must be capable of recording single-component peak particle velocities, and frequency of peaks with an interval of 1 minute or less.

## PART 3 EXECUTION

### 3.01 DRIVEN SHEET PILES

The CONTRACTOR shall provide pile driving equipment and drive steel sheet piles in accordance with the following:

- A. Templates: A template shall be provided for each location and be constructed to locate the relative position of the proposed piling layout.

B. Equipment for Driving Steel Sheet Piles:

1. All pile-driving equipment shall be subject to the ENGINEER's approval after inspection at the job site.
2. At any time during the progress of the work, equipment, which in the ENGINEER's opinion, is in poor operating condition will not be approved for pile installation.

C. Driving Procedure:

1. Sheet piles shall not be driven until inspected and approved for driving.
2. No piles shall be driven within 100 feet of concrete less than seven days old, unless authorized by the ENGINEER.
3. Drive piles in contact with surrounding soil and leave all permanent piles in place.
4. Pilings shall be driven with the proper size hammer and by approved methods to ensure no damage to the piles or existing structures and proper interlocking over their entire lengths. Driving hammers shall be maintained in proper alignment during driving operations by the use of leads or guides attached to the hammer. Caution shall be taken in the sustained use of vibratory hammers when a hard driving condition is encountered to avoid interlock melt or other damage.
5. Pilings damaged during driving or those driven out of interlock shall be removed and replaced at the CONTRACTOR's expense.
6. Adequate precautions shall be taken to ensure that pilings are driven plumb. If the forward or leading edge of the piling wall is found to be out of plumb, the piling being driven shall be removed and redriven to the required depth. If approved, other corrective measures may be employed to ensure that succeeding pilings are plumb.
7. Pilings shall be driven alternately, in increments of depth, to the required elevation. No piling shall be driven lower than design bearing elevation. If the piling next to the one being driven tends to follow below final elevation, it may be pinned to the next adjacent piling. If obstructions restrict driving a piling to the specified elevation, the obstructions shall be removed or penetrated. Heavier sheetpile sections shall be used to penetrate obstructions at no extra cost to the owner. If the CONTRACTOR demonstrates that removal or penetration is impractical, the CONTRACTOR shall make changes in the design alignment of the piling structure as directed to ensure the adequacy and stability of the structure. Pilings shall be driven to the depths shown and shall extend up to the elevation indicated for the tops of the piles.

D. Bearing Elevation

1. The permanent sheet piles shall be driven to the bearing elevation indicated.

E. Cutoff:

1. Permanent piles shall be cut off perpendicular to the vertical axis of the pile and to within one half inch of the cutoff elevation indicated.
2. Remove the cutoff portion of the pile from the site.
3. If excavation is required to achieve pile cutoff, remove the excess excavated materials as directed by the ENGINEER.
4. Splicing shall not be permitted without approval of the ENGINEER.

F. Installation Tolerance

1. Tolerances in Driving: All permanent piles shall be driven with a variation of not more than one quarter inch per foot of pile length from the vertical for plumb piles. Top of pile shall be within three inches of the location indicated. Manipulation of piles to force them into position will not be permitted. All piles will be checked for heave. Piles found to have heaved shall be redriven to the required point elevation.

G. Monitoring Existing Structure: The Contractor shall monitor potential vibrations and vertical movement to reduce the potential for damage to the existing dam structure during driving of both permanent and temporary sheet piles.

The Contractor is solely responsible to determine the maximum vibration or settlement tolerable. However, in no case shall the following be exceeded:

1. Peak particle velocity (PPV) limits on existing dam or at ground surface at the dam or existing adjacent residential or other structures:

<u>Frequency (Hz)</u>	<u>Maximum PPV (in./sec.)</u>
Over 40	2.0
30 to 40	1.5
20 to 30	1.0
Less than 20	0.5

2. Limiting Value (LV) for each survey monitoring point is ½ inch of vertical movement. If half the limiting value is measured at any monitoring point, the Contractor shall immediately develop a corrective action plan to modify installation procedures and reduce the potential for further settlement.

H. Predrilling and jetting: Predrilling or jetting will be permitted to a depth of 5 feet above the minimum tip elevation with written approval from the ENGINEER.

I. Rejected Piles in Permanent Works:

1. The ENGINEER will determine the acceptability of all piles driven and may reject those piles that do not conform to the specifications.
2. Perform one of the following, as directed by the ENGINEER, for those piles that have been rejected.
  - a. Leave the piles in place, cut off as directed and drive one or more new piles in locations designated by the ENGINEER
  - b. Withdraw the pile and drive a new pile.

END OF SECTION

## SECTION 02710

### PVC DRAIN PIPES

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnishing and installing a 4-inch-diameter weephole through concrete bank protection as shown on the Contract Drawings.

##### 1.02 RELATED WORK

- A. Section 02140: Dewatering
- B. Section 02200: Earthwork

##### 1.03 REFERENCES

- A. ASTM D 1785-94 - Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80, and 120.
- B. ASTM D 3034-93 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

##### 1.04 SUBMITTALS

- A. The CONTRACTOR shall submit the following in accordance with Division 1:
  - 1. Planned layout for perforated and solid PVC weephole pipe and fittings.
  - 3. Product shop drawing, specifications sheets and test results demonstrating that the PVC pipe, filter/drain stone, and all other incidental materials comply with the requirements of these specifications for each drain.
  - 4. Manufacturer's data and specifications for all perforated and solid PVC pipe and fittings, for all installations, at least 30 days prior to delivery of materials to the site.

#### PART 2 PRODUCTS

##### 2.01 PVC PIPE

- A. Perforated PVC pipe for the drain shall be 4-inch-nominal diameter, unplasticized PVC (polyvinyl chloride) Plastic Gravity Sewer Pipe with integral wall bell and spigot joints, SDR 26 (Standard Dimension Ratio), and meeting the requirements of ASTM Designation D303493. The perforations shall be 1/4-inch-diameter holes located at quarter points around the pipe/tee. The minimum spacing of holes shall be 3 inches along the pipe/tee. All fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal, and have bell and/or spigot configurations identical to that of the pipe. Perforations may be field drilled.

2.02 Coarse Graded Filter Stone

- A. Coarse Graded Stone shall be in conformance with applicable provisions of Section 02200.

2.03 Filter Sand

- B. Filter Sand shall be in conformance with applicable provisions of Section 02200.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify all lines, levels, and measurements before installing weephole pipes.

3.02 PREPARATION

- A. Do not construct drain pipes until the excavation and the materials under the pipe are properly prepared.

END OF SECTION

## SECTION 02830

### CHAIN LINK FENCE

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals necessary and install the chain link fence, and gate, as shown on the Drawings and as specified herein.
- B. Furnish all labor, materials, equipment and incidentals necessary to remove and relocate existing chain link fencing and provide new fencing as shown on the Drawings and as specified herein.

##### 1.02 RELATED WORK

- A. Section 02200: Earthwork.

##### 1.03 SUBMITTALS

- A. Submit to the Engineer as provided Division 1, shop drawings showing layout and details of construction and erection of fence and accessories required.
- B. Submit to Engineer Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.

##### 1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - 2. ASTM A121 - Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
  - 3. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 4. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 5. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
  - 6. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

B. Federal Specification

1. Federal Specification RR-F-191/1D - Fencing, Wire and Post, Metal (Chain-Link Fence Fabric).
2. Federal Specification RR-F-191/2D - Fencing, Wire and Post, Metal (Chain-Link Fence Gates).
3. Federal Specification RR-F-191/3D - Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces).
4. Federal Specification RR-F-191/4D - Fencing, Wire and Post, Metal (Chain-Link Fence Accessories).
5. Federal Specification RR-F-191K/GEN - Fencing, Wire and Post Metal (and Gates, Chain-Link Fence Fabric and Accessories).

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company operating in the United States having U.S. manufacturing facility/facilities specializing in manufacturing chain link fence products with at least 5 years experience.
- B. Fence contractor: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and have at least 5 years experience.
- C. Tolerances: Current published edition of ASTM specifications tolerances apply.

1.06 DELIVERY STORAGE AND HANDLING

- A. Store products off the ground in manufacturer's unopened packaging until ready for installation

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. Chain link fencing and accessories shall conform to Federal Specification RR-F-191K/GEN and its associated detail specifications noted below.
2. Where called for on the drawings fence, posts, etc. shall have black PVC coating. Coating shall be manufacturer's standard and shall be fully warranted for a 12-month warranty period.

B. Posts, Rails and Braces

1. Posts, rails and braces shall conform to Federal Specification RR-F-191/3D and be fabricated of Class I (round steel sections), Grade A (hot-dipped galvanized), seamless steel pipe, in accordance with ASTM A53 (Schedule 40), and be of the following sizes:
  - a. Corner and Terminal Posts: SP4 (2.875 in. O.D.)
  - b. Line Posts: SP4 (2.375 in. O.D.)
  - c. Gate Posts: SP5 (4.000 in. O.D.)
  - d. Rails and Braces: SP1 (1.66-in O.D.)
2. Spacing of posts shall not exceed 10-ft.

C. Fabric

1. Zinc-coated fabric shall be galvanized after weaving with a minimum 1.2 ounces of zinc per square foot of surface area and conform to ASTM A392, Class 1. Fabric to be 9-gauge wire woven in a 2" diamond mesh. Top selvage to be twisted and barbed, bottom selvage to be knuckled unless otherwise specified.

D. Gates

1. Gates and hardware shall conform to Federal Specification RR-F-191/2D.
  - a. Gates shall be constructed of Class I, Grade A seamless steel pipe, size SP1, plus additional intermediate members when required and meeting the requirements of RR-F-191/3D.
  - b. Gate frames shall be of welded construction or shall be assembled using fittings. When fittings are used as the construction method for gate frames, the frames shall be fitted with 3/8-in minimum diameter adjustable length truss rods, meeting the requirements of Federal Specification RR-F-191/4D. When frames are welded, all welding shall be done prior to galvanizing and application of PVC coating.
  - c. Gate fabric shall be of the type, mesh, gauge, color and salvage as that specified above for fence fabric. Install fabric with stretcher bars at vertical edges and tie wires at top and bottom edges. Attach stretcher bars to gate frames at not more than 12-in O.C.
  - d. On gates over 8-ft in height or 10-ft in width, provide additional horizontal and/or vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories.

## 2. Gate Hardware

- a. Hinges, latches, stops and keepers shall be hot-dipped galvanized in accordance with ASTM A153.
- b. Hinges shall be pressed steel or malleable iron, sized to suit gate, non-lift-off type and offset to permit 180 degree gate opening. Provide one pair of hinges for each leaf (up to 12-ft high).
- c. Latch shall be forked type to permit operation from either side of gate. Provide padlock eye as integral part of latch.
- d. Keeper shall automatically engage the gate leaf and hold it in the open position until manually released.
- e. Stop, consisting of drop rod, shall be provided to hold the inactive leaf. Steel sleeves shall be provided to engage the drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.

## E. Accessories

1. Accessories shall conform to Federal Specification RR-F-191/4D, shall be hot-dipped galvanized in accordance with ASTM A123 or A153. In addition to wire ties and clips, brace bands, tension bands and bars, tension wire and truss rods (all of which are described hereinbefore), accessories shall include the following:

- a. Caps for all exposed ends of posts.
- b. Top rail and brace ends or other suitable means of connection.
- c. Top rail sleeves to allow for expansion and contraction of the top rail.
- d. Bottom tension wire shall be 7 gauge galvanized steel wire. Fabric shall be attached to tension wire with 11 gauge galvanized steel hog rings, with a minimum zinc coating of 0.08 ounces per square foot of wire surface, spaced no more than 24-in on center.
- e. Barb wire and razor wire to meet ASTM, and Federal Specification requirements.  
Barbed Wire: ASTM A121 metallic coated steel, Type Z zinc coating strand wire, 2-1/2 gage (0.099 inches) steel wire, 4 barb points, 14 gage (0.080 inches) spaced on 5 inch centers.

Razor Ribbon: 430 stainless steel, 0.6 mm thick by 25 mm wide, 18-inch diameter helical coil, die stamped to produce 4 barbed points at 10 mm on center, cold rolled around a galvanized steel core wire. Aluminum ties not acceptable.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Set all posts to depth of 3.5-ft unless otherwise shown on the Drawings. After setting and plumbing posts, fill holes with concrete conforming to ASTM C95, having a minimum compressive strength of 2,500 psi at 28 days. Crown top surface of concrete to shed water.
- B. Brace all terminal posts horizontally with sections used for top rail. The top rail shall extend through all line posts to form a continuous brace from end to end of each stretch of fence, be securely fastened at the end of each run and have joints made with expansion sleeve couplings not less than 6-in long.
- C. Existing fencing to be removed and reinstalled as required for construction and as designated on the Drawings. Carefully dismantle and protect fabric, posts, rails, stretcher bars, and accessories. Install in new locations as shown on the Drawings using the installation techniques specified above. Replace damaged components with new materials conforming to the requirements specified above for new fencing.
- D. The area of installation shall be left free of debris caused by the installation of the fence.

END OF SECTION

## SECTION 02901

### RECLAMATION OF DISTURBED AREAS

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Reclaiming all disturbed areas within the limits of construction as required by the ENGINEER shall include regrading, re-excavation of topsoil from stockpiles, hauling, placing, and spreading topsoil from stockpiles over areas as required by the ENGINEER; placing seed, fertilizer, lime, mulch, and matting reinforcement as required in these specifications.
- B. Reclaim areas disturbed for temporary access roads.
- C. Reclaim laydown areas.
- D. Reclaim all areas disturbed as a result of the installation of the erosion and sediment control measures.

##### 1.02 SUBMITTAL

- A. Submit the following in accordance with Division 1.
  - 1. Material Product data for seed, fertilizer, lime, mulch, and matting reinforcement.
  - 2. Manufacturer's or Supplier's certification that all materials meet the requirements of the specifications herein.
  - 3. The composition and germination certification and test results for grass seed.

##### 1.03 PROTECTION

- A. Areas outside the approved limits of construction shall be protected from damage by the CONTRACTOR. Any disturbance of vegetation or native ground outside of the limits of construction approved by the ENGINEER shall be reclaimed by the CONTRACTOR at no additional expense to the OWNER. The CONTRACTOR shall also pay the cost of any fines incurred by the OWNER due to work being performed outside the construction limits.

##### 1.04 RELATED REQUIREMENTS

- A. Section 02110: Site Preparation
- B. Section 02111: Erosion and Sediment Control

## PART 2 PRODUCTS

### 2.01 VEGETATION

- A. The CONTRACTOR shall furnish materials to re-establish vegetation in accordance with FDOT Standard Specifications Section 981 (Turf Materials), Section 982 (Fertilizer), Section 983 (Water), and Section 987 (Prepared Soil Layer Materials).
- B. The CONTRACTOR shall furnish all pumps, pipes, hoses, connections, and hauling or delivery systems necessary to complete the landscaping work.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Reclaim areas where construction work has been completed as soon as possible after completion of the work. Temporary grading and seeding may be required to satisfy the requirements of the State of Florida erosion and sediment control laws and regulations.
- B. Grade all areas to drain. The maximum slope steepness shall be 3H:1V unless otherwise shown on the drawings or approved in writing by the ENGINEER.
- C. Remove all CONTRACTOR's equipment, debris, office, temporary fences or gates, and all other CONTRACTOR's properties.
- D. Eliminate uneven areas and low spots. Remove debris, roots, branches and stones in excess of 3 inches in size.
- E. Scarify subgrade soil to a depth of 4 inches where topsoil is required, as shown on the Drawings. Scarify all other areas to receive seed that have been disturbed by equipment used for hauling and has compacted the subgrade soil.
- F. Establishment and maintenance of vegetation shall be in accordance with FDOT Standard Specifications, Section 570 (Performance Turf).

### 3.02 MAINTENANCE

- A. The CONTRACTOR shall be responsible for maintaining all seeded areas through the end of his warranty period. Maintenance shall include but not be limited to, annual fertilization, mowing, repair of seeded areas, irrigation, and weed control. The CONTRACTOR shall provide, at his own expense, protection for all seeded areas against trespassing and damage at all times until acceptance of the work. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the CONTRACTOR's expense.
- B. Annual fertilization shall consist of an application of 500#/acre of 10-10-10 commercial grade fertilizer, or its equivalent and 60#/acre of nitrogen in early fall, or other analysis as may be determined by soil test. Annual fertilization shall be in addition to top dressing and shall be performed by the CONTRACTOR each fall season after planting until the work is substantially complete.

- C. Mowing shall be scheduled so as to maintain a stand height between 4 to 6 inches or as directed by the ENGINEER. All seeded areas shall be mowed at least two times by the CONTRACTOR before final acceptance.
- D. All seeded areas shall be inspected on a regular basis and any necessary repairs or reseedings made within the planting season, if possible. If the stand should be over 60% damaged, it shall be re-established following the original seeding recommendations.
- E. Weed growth shall be maintained mechanically and/or with herbicides. When chemicals are used, the CONTRACTOR shall follow the current Florida weed control recommendations and adhere strictly to the instructions on the label of the herbicide. No herbicide shall be used without prior approval of the ENGINEER.

### 3.03 CLEANUP

- A. The CONTRACTOR shall remove from the site all subsoil excavated from his work and all other debris including, but not limited to, branches, paper, and rubbish in all landscape areas, and remove temporary barricades as the work proceeds.
- B. All areas shall be kept in a neat, orderly condition at all times. Prior to final acceptance, the CONTRACTOR shall clean up the entire landscaped area to the satisfaction of the ENGINEER.

END OF SECTION

## SECTION 02905

### MISCELLANEOUS WORK AND CLEANUP

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Drawings.
- B. When applicable the CONTRACTOR shall perform the work in accordance with other sections of this Specification. When no applicable specification exists, the CONTRACTOR shall perform the work in accordance with the best modern practice and/or as directed by the ENGINEER.
- C. The work of this Section includes, but is not limited to, the following:
  - 1. Construction and maintenance of a temporary access, roads and any necessary drainage, erosion, or sedimentation control structures or measures.
  - 2. Crossing and relocating existing utilities.
  - 3. Provide security at the project entrance.
  - 4. Restoring of existing roadways and pavements.
  - 5. Cleaning up.
  - 6. Incidental work.
  - 7. Job photographs and video. (Pre-construction & Progress photographs)
  - 8. Protection and/or removal and reinstallation of signs and lampposts.
  - 9. Protection and bracing of utility poles.
  - 10. Restoring easement and right-of-ways.
  - 11. Temporary facilities.
  - 12. Construction Schedules.
  - 13. Construction Signage
  - 14. Record Documents. (Shop Drawings, Specifications, O&M Manuals, Warranties and Record Drawings)

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. Materials required for this Section shall be the same quality of materials that are to be restored. Where possible, the CONTRACTOR may re-use existing materials that are removed.

## PART 3 EXECUTION

### 3.01 CROSSING AND RELOCATING EXISTING UTILITIES

- A. This Item includes work required in crossing culverts, water courses, including brooks and drainage ditches, storm drains, gas mains, water mains, electric, telephone, gas and water services and other utilities. This work shall include but is not limited to the following: bracing, hand excavation and backfill and any other work required for crossing the utility or obstruction not included for payment in other items of this specification.
- B. In locations where existing utilities cannot be crossed without interfering with the construction of the work as shown on the Drawings, the CONTRACTOR shall remove and relocate the utility as directed by the ENGINEER or cooperate with the Utility Companies concerned if they relocate their own utility.
- C. At pipe crossings and where designated by the ENGINEER, the CONTRACTOR shall furnish and place screened gravel bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid-diameter of the pipe crossed.

### 3.02 RESTORING OF ROADWAYS/CURBING

- A. Existing roadways/curbing disturbed by the construction shall be replaced. All paved surfaces disturbed within the limits of the project site including parking areas and roads shall be repaved to the limits and thicknesses existing prior to construction. Repaving shall include repairing all holes, ruts, etc. to create an even surface, cleaning surface prior to paving and application of a minimum 1-inch-thick asphaltic topping.

### 3.03 CLEANING UP

- A. The CONTRACTOR shall remove all construction material, excess excavation, buildings, equipment, and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition.

### 3.04 INCIDENTAL WORK

- A. Do all incidental work not otherwise specified, but obviously necessary to the proper completion of the Contract as specified and as shown on the Drawings.

### 3.05 TEMPORARY FACILITIES

- A. The CONTRACTOR shall furnish, install, maintain and remove all temporary facilities required for construction or called for in the specifications.

### 3.06 PROVIDE CONSTRUCTION SCHEDULE, CONSTRUCTION PHOTOGRAPHS, PRE-CONSTRUCTION PHOTOGRAPHY AND PROJECT RECORD DOCUMENTS AS REQUIRED IN DIVISION 1.

### 3.07 PROVIDE WARRANTIES AS REQUIRED.

END OF SECTION

## SECTION 03100

### CONCRETE FORMWORK

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and design, install and remove formwork for cast-in-place concrete complete as shown on the Drawings and as specified herein.
- B. Secure to forms or set for embedment all miscellaneous metal items, sleeves, reglets, anchor bolts, inserts, waterstops, fiberglass reinforced plastic components, hatches and other items furnished under other Sections and required to be cast into concrete.

##### 1.02 RELATED WORK

- A. Concrete reinforcement is included in Section 03200.
- B. Cast-in-place concrete is included in Section 03300.
- C. Grout is included in Section 03600.

##### 1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
  - 1. Form release agent
  - 2. Form ties
  - 3. Formwork and shoring design calculations; fabrication and erection documents for formwork; and shoring, stripping criteria and reshoring procedures. These items shall be signed and sealed by the Registered Design Professional (RDP) specified under Paragraph 1.06B for review and approval. The submittal shall include drawings that clearly indicate the construction loads (location, direction and magnitude) delivered to the structure due to the formwork, shoring, stripping and reshoring and other construction activities.
- B. Review will be for appearance, performance and strength of the completed structure only. Approval by the Engineer will not relieve the Contractor of responsibility for the strength, safety or correctness of methods used, the adequacy of equipment, or from carrying out the work as shown on the Drawings and as specified herein.
- C. Sample Substrate

1. Demonstrate to the Engineer on a designated area of the concrete substructure exterior surface that the form release agent will not impair the bond of paint, sealant, waterproofing, dampproofing, or other coatings and will not affect the forming materials.

D. Certificates

1. Submit completed PE Certification Form for design of formwork in accordance with Section 01300. The PE Certification Form shall be completed and stamped by a professional engineer registered in the State of Florida.
2. Certify that form release agent complies with Federal, State and local VOC limitations.

1.04 REFERENCE STANDARDS

A. American Concrete Institute (ACI)

1. ACI 301 - Specifications for Structural Concrete
2. ACI 318 - Building Code Requirements for Structural Concrete
3. ACI 347 - Guide to Formwork for Concrete

B. APA - The Engineered Wood Association (APA)

1. Material grades and designations as specified

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 SYSTEM DESCRIPTION

A. Definitions:

1. Architectural concrete is defined as concrete for the following exposed reinforced concrete surfaces where architectural concrete is indicated on the Drawings:
  - a. Exterior: walls to 6-in below finish grade, beams, columns and underside of slabs.
  - b. Interior: walls, beams, columns and underside of slabs visible in the finished structures.
2. Structural concrete is defined as concrete that is not architectural concrete.

B. Structural design responsibility: Contractor shall provide all forms and shoring designed by a professional engineer registered in the State of Florida. Design and erect formwork in accordance with the requirements of ACI 301, ACI 318 and ACI 347. Comply with all applicable regulations and codes. Consider any special requirements due to the use of plasticized and/or retarded set concrete.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. The usage of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configurations desired.

### 2.02 MATERIALS

#### A. Forms, General

- 1. Make forms for cast-in-place concrete of wood, steel or other approved materials, except as specified in Paragraphs 2.02B and 2.02C.2. Construct wood forms of sound lumber or plywood free from knotholes and loose knots. Construct steel forms to produce surfaces equivalent in smoothness and appearance to those produced by new plywood panels. Design and construct all forms to provide a flat, uniform concrete surface requiring no grinding, repairs, or finishing.

#### B. Forms for Exposed Structural Concrete

- 1. Make forms for all exposed and non-submerged exterior and interior concrete of new and unused Plyform exterior grade plywood panels manufactured in compliance with the APA and bearing the APA trademark. Provide B grade or better veneer on all faces to be in contact with concrete. Design and construct all forms to provide a flat, uniform concrete surface requiring no grinding, repairs, or finishing.
- 2. Provide rigid forms that will not deflect, move, or leak. Design forms to withstand the high hydraulic pressures resulting from rapid filling of the forms and heavy high frequency vibration of the concrete. Limit deflection to 1/400 of each component span. Lay out form joints in a uniform pattern.
- 3. Dress and match boards. Sand plywood smooth and fit adjacent panels with tight joints. Tape, gasket, plug, and/or caulk all joints and gaps in forms to provide watertight joints that will withstand placing pressures without exceeding specified deflection limit or creating surface patterns.
- 4. Provide 3/4-inch chamfer on all exposed corners unless otherwise indicated.

- C. Provide rustications as indicated. Mill and plane smooth moldings for chamfers and rustications. Provide rustications and chamfer strips of nonabsorbent material, compatible with the form surface and fully sealed on all sides to prevent the loss of paste or water between the two surfaces.

- D. Form Release Agent. Coat all form surfaces in contact with concrete with an effective, non-staining, non-residual, water based, bond-breaking form coating unless otherwise indicated or specified. Form release agent shall not impair the bond of coatings.

#### E. Form Ties

- 1. Coil and Wire Ties: Provide ties manufactured so that, after removal of the projecting part, no metal remains within 1-1/2-in of the face of the concrete. The part of the tie to

be removed shall be at least 1/2-in diameter or be provided with a plastic or wooden cone at least 1/2-in diameter and 1-1/2-in long. Provide cone washer type form ties in concrete exposed to view.

2. Flat Bar Ties for Panel Forms: Provide ties that have plastic or rubber inserts with a minimum depth of 1-1/2-in and manufactured to permit patching of the tie hole.
3. Do not use common wire for form ties.
4. Alternate form ties consisting of tapered through-bolts at least 1-in in diameter at smallest end or through-bolts that utilize a removable tapered sleeve of the same minimum size may be used. Install in forms so that large end is, where applicable, on the liquid or backfilled side of the wall. Clean, fill and seal form tie hole with non-shrink cement grout to provide watertight form tie holes and make all repairs needed to make watertight.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Provide forms for all cast-in-place concrete including sides of footings. Construct and place forms to provide concrete of the shape, lines, dimensions and appearance indicated.
- B. Provide removable panels at the bottom of forms for walls and columns to allow cleaning, inspection and joint surface preparation. Provide closable intermediate inspection ports in forms for walls. Provide tremies and hoppers for placing concrete and to allow concrete sampling, prevent segregation and prevent the accumulation of hardened concrete on the forms and reinforcement above the fresh concrete.
- C. Place molding, bevels, or other types of chamfer strips to produce blockouts, rustications, or chamfers as indicated on the Drawings or as specified herein. Provide chamfer strips at horizontal and vertical projecting corners to produce a 3/4-in chamfer. Provide rectangular moldings at locations requiring sealants where shown on the Drawings or specified herein.
- D. Provide rigid forms to withstand construction loads and vibration and meeting specified deflection limits and tolerances. Construct forms so that the concrete will not be damaged by form removal.
- E. Accessories which remain embedded in the concrete after formwork removal will be subject to the approval of the Engineer. Permanent embedments shall have sufficient concrete cover or be of suitable materials for the exposure condition as approved by the Engineer. Remove unsatisfactory embedded items at no additional cost to the Owner.

#### 3.02 FORM TOLERANCES

- A. Design, construct and surface forms in accordance with ACI 347 and meet the following additional requirements for the specified finishes.
- B. Forms for Exposed Structural Concrete: Edges of all form panels in contact with concrete flush within 1/8-in and forms for plane surfaces plane within 1/8-in in 4-ft. Maximum deviation of the finished surface at any point not to exceed 1/4-in from the intended surface

indicated. Arrange form panels symmetrically and orderly to minimize the number of seams. Provide tight forms to prevent the passage of mortar, water, and grout.

- C. Formed Surface Not Exposed to View or Buried: Class "C" Surface per ACI 347.
- D. Formed Surface Including Mass Concrete, Pipe Encasement, and Other Similar Installations: No minimum requirements for surface irregularities and surface alignment. The overall dimensions of the concrete shall be plus or minus 1-in from the intended surface indicated.

### 3.03 FORM PREPARATION

- A. Clean, repair, remove projecting nails and fill holes, and smooth protrusions on all form surfaces to be in contact with concrete before reuse. Do not reuse forms for exposed concrete unless a "like new" condition of the form is maintained that will produce surfaces equivalent in smoothness and appearance to those produced by new plywood panels.
- B. Coat wood forms in contact with concrete using form release agent prior to form installation.
- C. Clean steel forms by sandblasting or other method to remove mill scale and other ferrous deposits from the contact surface of all forms. Coat steel forms in contact with concrete using form release agent prior to form installation.

### 3.04 REMOVAL OF FORMS

- A. Be responsible for all damage resulting from removal of forms and make repairs at no additional cost to the Owner. Leave in place forms and shoring for horizontal structural members in accordance with ACI 301 and ACI 347. Conform to the requirements for form removal specified in Section 03300.

### 3.05 INSPECTION

- A. Notify the Engineer when the forms are complete and ready for inspection, at least six working hours prior to the proposed concrete placement. The Engineer may inspect the forms to ensure overall conformance with the contract documents.
- B. Failure of the forms to comply with the requirements specified, or to produce concrete complying with requirements specified shall be grounds for rejection of that portion of the concrete work. Repair or replace rejected work as directed by the Engineer at no additional cost to the Owner. Such repair or replacement shall be subject to the requirements of these Specifications and approval of the Engineer.

END OF SECTION

## SECTION 03200

### CONCRETE REINFORCEMENT

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all concrete reinforcement complete as shown on the Drawings and as specified herein, including dowels embedded into concrete for masonry.

##### 1.02 RELATED WORK

- A. Concrete formwork is included in Section 03100.
- B. Cast-in-place concrete is included in Section 03300.
- C. Grout is included in Section 03600.

##### 1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
  - 1. Reinforcing steel. Drawings for fabrication, bending, and placement of concrete reinforcement shall conform to the recommendations of ACI 315 for placement drawings and as specified herein.
    - a. Placement drawings. For walls, show elevations from the outside, looking towards the structure, at a minimum scale of 1/4-in to one foot. For slabs, show top and bottom reinforcement on separate plan views, as needed for clarity. For beams and columns, show schedules with sections and/or elevations and stirrup/tie spacing. Show additional reinforcement around openings, at corners and at other locations indicated, diagrams of bent bars, arrangements and assemblies, all as required for the fabrication and placement of concrete reinforcement. Reference bars to the same identification marks shown on the bar bending details. Identify bars to have special coatings and/or to be of special steel or special yield strength.
    - b. Bar bending details. Reference bars to the same identification marks shown on the placement drawings. Identify bars to have special coatings and/or to be of special steel or special yield strength.
- B. Submit, in accordance with Section 01300, Test Reports of each of the following items.
  - 1. Certified copy of mill test on each heat of each steel proposed for use showing the physical properties of the steel and the chemical analysis.
  - 2. Welder's certification in accordance with AWS D1.4 when welding of reinforcement is indicated, specified, or approved.

## 1.04 REFERENCE STANDARDS

### A. American Society for Testing and Materials (ASTM)

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184 - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
3. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
4. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
5. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
6. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
7. ASTM A704 - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.

### B. American Concrete Institute (ACI)

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 315 - Details and Detailing of Concrete Reinforcement.
3. ACI 318 - Building Code Requirements for Structural Concrete.
4. SP-66 (ACI 315) ACI Detailing Manual.

### C. Concrete Reinforcing Steel Institute (CRSI)

1. Manual of Standard Practice

### D. American Welding Society (AWS)

1. AWS D1.4 Structural Welding Code - Reinforcing Steel

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

## 1.05 QUALITY ASSURANCE

1.06 DELIVERY, HANDLING AND STORAGE

- A. Provide reinforcement free from mill scale, rust, mud, dirt, grease, oil, ice, or other foreign matter.
- B. Ship and store reinforcement with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted placement drawings. Tags for ASTM A706 reinforcing and for ASTM A615 reinforcing meeting the requirements of Paragraph 2.01C.1 shall indicate that the reinforcing is weldable.
- C. Store reinforcement off the ground, protect from moisture and keep free from rust, mud, dirt, grease, oil, ice, or other injurious contaminants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide new materials of domestic manufacture complying with the following material specifications.
- B. Deformed Concrete Reinforcing Bars: ASTM A615, Grade 60 deformed bars.
- C. Welded Steel Wire Fabric: ASTM A185. Provide in flat sheets.
- D. Welded Deformed Steel Wire Fabric: ASTM A497.
- E. Welded Plain Bar Mats: ASTM A704 and ASTM A615 Grade 60 plain bars.
- F. Fabricated Deformed Steel Bar Mats: ASTM A184 and ASTM A615 Grade 60 deformed bars.
- G. Reinforcing Steel Accessories
  - 1. Plastic Protected Wire Bar Supports: CRSI Bar Supports, Class 1 - Maximum Protection.
  - 2. Stainless Steel Protected Wire Bar Supports: CRSI Bar Supports, Class 2 - Moderate Protection with legs made wholly from stainless steel wire.
  - 3. Precast Concrete Bar Supports: CRSI Bar Supports, Precast Concrete Bar Supports. Precast concrete blocks that have equal or greater strength than the surrounding concrete.
- H. Tie Wire
  - 1. Tie Wires for Reinforcement: 16-gauge or heavier black annealed wire.

2.02 FABRICATION

- A. Comply with the CRSI Manual of Standard Practice.
- B. Bend bars cold. Do not straighten or rebend bars.

- C. Bend bars around a revolving collar having a diameter not less than that recommended by the CRSI or ACI 318.
- D. Saw cut bar ends that are to be butt spliced, placed through limited diameter holes in metal, or threaded. Terminate saw cut ends in flat surfaces within 1-1/2 degrees of a right angle to the axis of the bar.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Comply with the CRSI Manual of Standard Practice for surface condition, bending, spacing and tolerances of placement for reinforcement. Provide the amount of reinforcing indicated at the spacing and clearances indicated on the Drawings.
- B. Determine clear concrete cover based on exposure to the environment. Unless indicated otherwise on the Drawings, provide the following minimum clear concrete cover over reinforcement:
  - 1. Concrete cast against and permanently exposed to earth: 3-in
  - 2. Concrete exposed to soil, water, and/or weather:
    - a. Slabs (top and bottom cover), walls: 2-in
    - b. Beams and columns (ties, spirals and stirrups): 2-in
  - 3. Concrete not exposed to soil, water, or weather:
    - a. Slabs (top and bottom cover), walls, joists, shells and folded plate members: 1-in
    - b. Beams and columns (ties, spirals and stirrups): 1-1/2-in
- C. Coat uncoated reinforcement which will be exposed for more than 60 days after placement with a heavy coat of neat cement slurry.
- D. Do not weld reinforcing steel bars either during fabrication or erection unless indicated on the Drawings or as specified herein, or unless prior written approval has been obtained from the Engineer. Remove immediately all bars that have been welded, including tack welds, without such approval. Comply with AWS D1.4 when welding of reinforcement is shown on the Drawings, specified, or approved.
- E. Reinforcing steel interfering with the location of other reinforcing steel, piping, conduits or embedded items may be moved within the specified tolerances or one bar diameter, whichever is greater. Obtain the approval of the Engineer if greater displacement of bars to avoid interference is needed. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the Engineer.
- F. Secure, support and tie reinforcing steel to prevent movement during concrete placement. Secure dowels in place before placing concrete.
- G. Do not field bend reinforcing unless indicated or specifically authorized in writing by the Engineer. Cold-bend bars indicated or authorized to be field bent around the standard diameter

spool specified in the CRSI. Do not heat bars. Closely inspect the reinforcing steel for breaks. Replace, repair by cutting out damaged bars and splicing new bars using coupling sleeves filled with ferrous material, or otherwise repair damaged reinforcing bars as directed by the Engineer at no additional cost to the Owner. Do not bend reinforcement after it is embedded in concrete unless indicated on the Drawings.

### 3.02 REINFORCEMENT AROUND OPENINGS

- A. Provide additional reinforcing steel on each side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by the opening unless indicated otherwise on the Drawings. Extend each end of each bar beyond the edge of the opening or penetration by the tension development length for that bar size.

### 3.03 SPLICING OF REINFORCEMENT

- A. Provide splices as shown on the Drawings and as specified herein.
- B. Provide tension lap splices in compliance with ACI 318. Stagger splices in adjacent bars where possible. Provide Class B tension lap splices at all locations unless otherwise indicated.

### 3.04 ACCESSORIES

- A. Determine, provide and install accessories such as chairs, chair bars and the like to support the reinforcement providing the spacing and clearances indicated on the Drawings and prevent its displacement during the erection of the reinforcement and the placement of concrete.
- B. Use precast concrete blocks where the reinforcing steel is to be supported over soil.
- C. Use plastic protected bar supports or steel supports with plastic tips where the reinforcing steel is to be supported on forms for a concrete surface that will be exposed to weather, high humidity, or liquid (including bottom of slabs over liquid containing areas). Use stainless steel protected bar supports in walls, beams and elevated slabs. Use stainless steel supports or plastic tipped metal supports in all other locations unless otherwise noted on the Drawings or specified herein.
- D. Provide #5 minimum size support bars. Do not reposition upper bars in a bar mat for use as support bars.
- E. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if approved by the Engineer.

### 3.05 INSPECTION

- A. Notify the Engineer when the reinforcing is complete and ready for inspection, at least six working hours prior to the proposed concrete placement. Do not cover reinforcing steel with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been inspected by the Engineer and the Engineer's release to proceed with the concreting has been obtained. Keep forms open until the Engineer has completed inspection of the reinforcement.

END OF SECTION

## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required and install cast-in-place concrete complete as shown on the Drawings and as specified herein.
- B. Furnish, as required to establish concrete mixes, all sampling and laboratory testing of products and materials performed by an independent testing laboratory engaged by and at the expense of the Contractor. Provide field sampling, testing, inspection and related laboratory tests.

##### 1.02 RELATED WORK

- A. Concrete formwork is included in Section 03100.
- B. Concrete reinforcement is included in Section 03200.
- C. Grout is included in Section 03600.

##### 1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, product data for:
  - 1. Sources of cement, aggregates, and batched concrete.
  - 2. Air-entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
  - 3. Water reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
  - 4. Sheet curing material. Product data including catalogue cut, technical data and conformity to ASTM standard.
  - 5. Material Safety Data Sheets (MSDS) for all concrete components and admixtures.
  - 6. High-range water-reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range and conformity to ASTM standards. Identify proposed locations of use.
  - 7. Liquid membrane forming curing compound. Product data including catalogue cut, technical data, storage requirements, product life, application rate and conformity to ASTM standards. Identify proposed locations of use.

## B. Test Reports

1. Aggregates: Conformance to ASTM standards, including sieve analysis, mechanical properties, deleterious substance content, and mortar bar expansion test results.
2. Cement: Conformance to ASTM standards, including chemical analysis and physical tests.
3. Concrete mixes: For each formulation of concrete proposed for use, submit constituent quantities per cubic yard, water cementitious ratio, air content, concrete slump, type and manufacturer of cement. Provide either Paragraph a. or b., below, for each mix proposed.
  - a. Standard deviation data for each proposed concrete mix based on statistical records.
  - b. Provide the following for each strength data point used in the calculation of the standard deviation for determination of the minimum required average strength:
    - 1) Date of sampling and name of testing laboratory.
    - 2) Name of concrete batch plant.
    - 3) Water cementitious ratio.
    - 4) Slump of batch.
    - 5) Air content of batch.
    - 6) Compressive strengths of all cylinders tested at that age in that batch.
    - 7) If available, temperature and unit weight of batch.
  - c. Provide data from projects not more strictly controlled than outlined in these specifications. Provide summary sheet showing all pertinent data and the computation of the standard deviation.
  - d. Water cementitious ratio curve for concrete mixes based on laboratory tests. Provide average cylinder strength test results at 7, 14, and 28 days for laboratory concrete mix designs.

## C. Certifications

1. Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.
2. Certify that the Contractor is not associated with the independent testing laboratory proposed for use by the Contractor nor does the Contractor or officers of the Contractor's organization have a beneficial interest in the laboratory.
3. Certificate of conformance for concrete production facilities from the NRMCA.

## D. Qualifications

### 1. Independent Testing Laboratory

- a. Name and address
- b. Names and positions of principal officers and the name, position, and qualifications of the responsible registered professional engineer in charge.
- c. Listing of technical services to be provided. Indicate external technical services to be provided by other organizations.
- d. Names and qualifications of the supervising laboratory technicians.
- e. Statement of conformance provided by evaluation authority defined in ASTM C1077. Provide report prepared by evaluation authority when requested by the Engineer.
- f. Submit as required above for other organizations that will provide external technical services.

## 1.04 REFERENCE STANDARDS

### A. American Society for Testing and Materials (ASTM)

1. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
6. ASTM C138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
7. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete
8. ASTM C150 - Standard Specification for Portland Cement
9. ASTM C156 - Standard Test Method for Water Retention by Liquid Membrane-Forming Curing Compound for Concrete.
10. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
11. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

12. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
13. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
14. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
15. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
17. ASTM C1017 - Standard Specification for Chemical Admixtures for use in Producing Flowing Concrete.
18. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
19. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
20. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

B. American Concrete Institute (ACI).

1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
2. ACI 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
3. ACI 304.2R - Placing Concrete by Pumping Methods.
4. ACI 305R - Hot Weather Concreting.
5. ACI 306R - Cold Weather Concreting.
6. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
7. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.

C. National Ready Mixed Concrete Association (NRMCA)

1. Quality Control Manual, Section 3 - Certification of Ready Mixed Concrete Production Facilities.

D. Truck Mixer Manufacturers Bureau (TMMB)

1. TMMB 100 - Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards.

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Comply with ACI 318 and other stated specifications, codes and standards. Apply the most stringent requirements of other stated specifications, codes, standards, and this Section when conflicts exist.

B. Independent testing laboratory shall meet the requirements of ASTM E329 and ASTM C1077 and be acceptable to the Engineer. Laboratories affiliated with the Contractor or in which the Contractor or officers of the Contractor's organization have a beneficial interest are not acceptable.

C. Use only one source of cement and aggregates for the project. Provide concrete uniform in color and appearance.

D. At least ten working days before the first concrete placement hold a preconstruction meeting to review the requirements for concrete placement, waterstop placement, jointing, concrete curing, hot weather concreting, cold weather concreting and finishing. Review, with the attendance of the plasticizer manufacturer, the properties and techniques of batching and placing concrete containing high-range water-reducing admixture. Notify all parties involved, including the Engineer, of the meeting at least ten working days prior to its scheduled date. Prepare an agenda for the meeting. Take meeting minutes and distribute to all attendees.

E. If, during the progress of the work, it is impossible to secure concrete of the specified workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the specified properties. Make all changes so ordered at no additional cost to the Owner.

F. If, during the progress of the work, the materials from the sources originally accepted change in characteristics, make, at no additional cost to the Owner, new acceptance tests of materials and establish new concrete mixes with the assistance of an independent testing laboratory.

G. Provide all field testing and inspection services and related laboratory tests. Methods of testing shall comply with the latest applicable ASTM methods. The following items shall be tested to verify conformity with this Section.

1. Concrete placements - compressive strength (cylinders), compressive strength (cores), temperature, slump, and air content.

2. Other materials that may require field testing.

H. Provide laboratory tests of samples of constituents and of concrete as-placed. All materials incorporated in the work shall conform to accepted samples.

## 1.06 DELIVERY, STORAGE AND HANDLING

- A. Cement: Store in weathertight buildings, bins or silos to provide protection from dampness and contamination and to prevent warehouse set.
- B. Aggregate: Arrange and use stockpiles to prevent segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding three feet in thickness. Complete each layer before the next is started. Do not use frozen or partially frozen aggregate.
- C. Sand: Arrange and use stockpiles to prevent contamination. Allow sand to drain to a uniform moisture content before using. Do not use frozen or partially frozen sand.
- D. Admixtures: Store in closed containers to prevent contamination, evaporation or damage. Provide agitating equipment to uniformly disperse ingredients in admixture solutions which tend to separate. Protect liquid admixtures from freezing and other temperature changes which could adversely affect their characteristics.
- E. Sheet Curing Materials: Store in weathertight buildings or off the ground and under cover.
- F. Liquid Membrane Forming Curing Compounds: Store in closed containers.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials shall be the end products of one manufacturer in order to provide standardization for appearance, maintenance and manufacturer's service.

### 2.02 MATERIALS

- A. Materials shall comply with this Section and any applicable State or local requirements.
- B. Cement: Domestic portland cement conforming to ASTM C150. Do not use air entraining cements. Do not use cement produced by a manufacturer that uses hazardous waste derived fuel as an energy source for its kilns. Cement brand must be approved by the Engineer and one brand shall be used throughout the work. Provide the following type(s) of cement:
  - 1. All Concrete - Type I/ II
- C. Aggregates:
  - 1. Fine Aggregate: Washed inert natural sand conforming to ASTM C33.
  - 2. Coarse Aggregate: Well-graded crushed stone or washed gravel conforming to ASTM C33. Grading requirements as listed in ASTM C33, Table 2 for the specified coarse aggregate size number listed in Table 1 herein. Limits of deleterious substances and physical property requirements as listed in ASTM C33, Table 3 for severe weathering regions. Do not use coarse aggregates known to be deleteriously reactive with alkalis in cement.

3. The fine and coarse aggregates used shall not cause expansion of mortar bars greater than 0.1 percent in 16 days when tested in accordance with ASTM C1260 and using the cement proposed for the project. If aggregates proposed for use do not meet this requirement, then satisfy either a. or b. below.
  - a. Total equivalent alkali content of the cement used shall not exceed 0.60 percent as provided in the Optional Chemical Requirements of ASTM C150.
  - b. The fine and coarse aggregates used shall not cause expansion of mortar bars greater than 0.1 percent in 16 days when tested in accordance with ASTM C1260 and using the cement and fly ash proposed for the project. The proportions of the cement-fly ash mix shall be the same as those proposed for the project.
- D. Water: Potable water free of oil, acid, alkali, salts, chlorides (except those attributable to drinking water), organic matter, or other deleterious substances.
- E. Admixtures: Use admixtures free of chlorides and alkalis (except for those attributable to drinking water). The admixtures shall be from the same manufacturer when it is required to use more than one admixture in the same concrete mix. Use admixtures compatible with the concrete mix including other admixtures.
  1. Air Entraining Admixture: Conforming to ASTM C260. Proportion and mix in accordance with manufacturer's recommendations.
  2. Water Reducing Admixture: Conforming to ASTM C494, Type A. Proportion and mix in accordance with manufacturer's recommendations.
  3. High-Range Water-Reducing Admixtures (Plasticizer): Conforming to ASTM C494, Type F resulting in non-segregating plasticized concrete with little bleeding and with the physical properties of low water/cementitious ratio concrete. The treated concrete shall be capable of maintaining its plastic state in excess of 2 hours. Proportion and mix in accordance with manufacturer's recommendations.
  4. Do not use admixtures causing retarded or accelerated setting of concrete without written approval from the Engineer. Use retarding or accelerating water reducing admixtures when so approved.
- F. Sheet Curing Materials: Waterproof paper, polyethylene film or white burlap-polyethylene sheeting, all conforming to ASTM C171.
- G. Liquid Membrane-Forming Curing Compound. Compound conforming to ASTM C309, Type 1-D (clear or translucent with fugitive dye) and containing no wax, paraffin, or oil. Curing compounds shall be non-yellowing and have a unit moisture loss no greater than 0.039 gm/cm<sup>2</sup> at 72 hours as measured by ASTM C156. Curing compound shall comply with Federal, State and local VOC limits.

### 2.03 MIXES

- A. An independent testing laboratory engaged by and at the expense of the Contractor shall establish concrete mixes and perform all sampling and laboratory testing of products and materials.

- B. Select proportions of ingredients to meet the design strength and materials limits specified in Table 1 and to produce placeable, durable concrete conforming to these specifications. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing free water to collect on the surface.
- C. Base concrete mixes on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if not available, develop concrete mixes by laboratory tests using the materials proposed for the work.
  - 1. For concrete mixes based on standard deviation data of prior mixes, submit standard deviation data of prior mixes with essentially the same proportions of the same constituents in accordance with ACI 318 and based on the modification factors for standard deviation tests contained in ACI 318.
  - 2. For concrete mixes developed by laboratory testing, base cementitious content of the concrete on curves showing the relation between water cementitious ratio and 7, 14 and 28 day compressive strengths of concrete made using the proposed materials. Determine curves by four or more points, each representing an average value of at least three test specimens and one water-cementitious ratio at each age. Provide curves with a range of values sufficient to yield the desired data, including the compressive strengths specified, without extrapolation. The cementitious content of the concrete mixes to be used, as determined from the curve, shall correspond to the required average compressive strength in Table 5.3.2.2 of ACI 318. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratio and net minimum cementitious content specified in Table 1.
- D. Test aggregates for potential alkali reactivity in accordance with ASTM C1260. If initial testing indicates aggregates are not potentially reactive repeat test at 3 month intervals.
- E. Compression Tests: Provide testing of the proposed concrete mixes to demonstrate compliance with the compression strength requirements in conformity with the provisions of ACI 318.
- F. Entrained air, as measured by ASTM C231, shall be as shown in Table 1.
  - 1. If the air entraining agent proposed for use in the mix requires testing methods other than ASTM C231 to accurately determine air content, make special note of this requirement in the admixture submittal specified under Paragraph 1.03.
- G. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 1. If a high-range water-reducing admixture (plasticizer) is used, the slump indicated shall be that measured before plasticizer is added. Plasticized concrete shall have a slump ranging from 7 to 10-in.
- H. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of the other admixture(s).

TABLE 1

Class	Design Strength	Cement	Fine Aggregate	Coarse Aggregate	Cementitious Content
	1	2	3	3	4

A	4500	Type I/II	Sand	57	580	
Class	W/C Ratio	Fly Ash	AE Range	WR	HRWR	Slump Range Inches
	5	6	7	8	9	
A	0.42 max.	Yes	3.5 to 5	Yes	No	3-5

NOTES:

1. Minimum compressive strength in psi at 28 days
2. ASTM designation in ASTM C150
3. Size Number in ASTM C33
4. Minimum cementitious content in lbs per cubic yard
5. W/C is Maximum Water Cementitious ratio by weight
7. AE is percent air entrainment
8. WR is water reducing admixture
9. HRWR is high-range water-reducing admixture

PART 3 EXECUTION

3.01 MEASURING MATERIALS

- A. Provide concrete composed of portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and produced by a plant complying with ACI 318 and ASTM C94. Batch all constituents, including admixtures, at the plant. High-range water reducing admixtures may be added in the field.
- B. Measure materials for batching concrete by weighing in conformity with and within the tolerances given in ASTM C94 except as otherwise specified. Use scales last certified by the local Sealer of Weights and Measures within one year of use.
- C. Measure the amount of free water in fine aggregates within 0.5 percent with a moisture meter. Compensate for varying moisture contents of fine aggregates. Record the number of gallons of water as-batched on printed batch tickets.
- D. Dispense admixtures either manually using calibrated containers or measuring tanks, or by means of an automatic dispenser approved by the manufacturer of the specific admixture.
  1. Charge air-entraining and chemical admixtures into the mixer as a solution using an automatic dispenser or similar metering device.
  2. Inject multiple admixtures separately during the batching sequence.

3.02 MIXING AND TRANSPORTING

- A. Provide ready-mixed concrete produced by equipment complying with ACI 318 and ASTM C94 and produced by a plant certified by the NRMCA. Do not hand-mix. All truck mixers shall carry a rating plate conforming to TMMB 100. Clean each transit mix truck drum and reverse drum rotation before the truck proceeds under the batching plant. Equip each transit-mix truck with a continuous, nonreversible, revolution counter showing the number of revolutions at mixing speeds.

- B. Transport ready-mix concrete to the site in watertight agitator or mixer trucks loaded not in excess of their rated capacities as stated on the name plate.
- C. Keep the water tank valve on each transit truck locked at all times. Any addition of water must be directed by the Engineer. Incorporate water directed to be added by additional mixing of at least 50 revolutions at mixing speed after the addition of all water. Meter all added water and show the amount of water added on each delivery ticket.
- D. Comply with ACI 318 and ASTM C94 for all central plant and rolling stock equipment and methods.
- E. Select equipment of size and design to provide continuous flow of concrete at the delivery end. Use metal or metal-lined non-aluminum discharge chutes with slopes not exceeding one vertical to two horizontal and not less than one vertical to three horizontal. Chutes more than 20-ft long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.
- F. Do not retemper (mix with or without additional cement, aggregate, or water) concrete or mortar which has partially hardened.
- G. Handle concrete from mixer to placement providing concrete of specified quality in the placement area and not exceeding the maximum time interval specified in Paragraph 3.02 I.4. Dispatch trucks from the batching plant so they arrive at the work site just before the concrete is required to avoid excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms. Remix for a minimum of 5 minutes prior to discharge or testing.
- H. Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Provide a printed record of the weight of cement and each aggregate as batched individually on each ticket. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Indicate for each batch the weight of fine and coarse aggregate, cement, and water, moisture content of fine and coarse aggregate at time of batching, and types, brand and quantity of each admixture, the quantity of concrete delivered, the time any water is added and the amount, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix truck.
- I. Temperature and Mixing Time Control
  - 1. In cold weather (see Paragraph 3.07D) maintain the as-mixed temperature of the concrete and concrete temperatures at the time of placement in the forms as indicated in Table 3.
  - 2. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.
  - 3. In hot weather (see Paragraph 3.07E), cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. Well-crushed ice may be substituted for all or part of the mixing water.
  - 4. The maximum time interval between the addition of mixing water and/or cement to the batch and the final placing of concrete in the forms shall not exceed the following:

TABLE 2

AIR OR CONCRETE TEMPERATURE  
(WHICHEVER IS HIGHER)

MAXIMUM TIME

(27 Degree C) 80 Degree F to 90 Degree F (32 Degree C)	45 minutes
(21 Degree C) 70 Degree F to 79 Degree F (26 Degree C)	60 minutes
(5 Degree C) 40 Degree F to 69 Degree F (20 Degree C)	90 minutes

5. If an approved high-range water-reducing admixture (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes.

3.03 INSPECTION AND COORDINATION

- A. Batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. Advise the Engineer of readiness to proceed at least six working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment, cleanliness and tightness of formwork. Do not place concrete without the inspection and acceptance of the Engineer.

3.04 EMBEDDED ITEMS

- A. Secure to forms as required or set for embedment as required, all miscellaneous metal items, sleeves, reglets, anchor bolts, anchors, inserts and other items furnished under other Sections and required to be embedded into concrete. Set and secure such items in the locations and alignments needed so they are not displaced by concrete placement.
- B. Clean embedded items free of rust, mud, dirt, grease, oil, ice, or other contaminants which would reduce or prevent bonding with concrete.
- C. Coat or isolate all aluminum embedments to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.
- D. Do not embed piping in concrete unless shown on the Drawings.
- E. Pipes and conduits embedded within a slab or wall (other than those merely passing through) shall satisfy the following, unless otherwise shown on the Drawings or approved:
  1. Maximum outside dimension of pipe or conduit shall not be greater than one third the overall thickness of the slab or wall.
  2. Spacing of pipes or conduits shall be greater than or equal to three diameters or widths on center.
  3. Fabricate piping and conduit such that the cutting, bending, or relocation of reinforcing steel is not required.
- F. Close open ends of piping, conduits, and sleeves embedded in concrete with caps or plugs prior to placing concrete.
- G. Ensure all specified tests and inspections on embedded piping are completed and satisfactory before starting concrete placement. Ensure all mechanical or electrical tests and inspections

are completed and satisfactory prior to starting concrete placement. Do not place concrete until unsatisfactory items and conditions have been corrected.

- H. Position embedded anchor bolts using templates.
- I. Check location, alignment, and support of anchor bolts, piping, electrical conduits, and other items which will be fully or partially embedded in concrete before depositing concrete. Correct mislocated and misaligned items and secure items which have become loose before depositing concrete.
- J. Correct all embedded items not installed in the location or alignment needed or displaced by concrete placement at no additional cost to the Owner.

### 3.05 CONCRETE APPEARANCE

- A. Remix concrete showing either poor cohesion or poor coating of the coarse aggregate with paste. Reject remixed concrete showing either poor cohesion or poor coating of the coarse aggregate with paste. Make, at no additional cost to the Owner, changes in the concrete mix design for future deliveries only by adjusting one or more of the following if the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed:
  - 1. The gradation of aggregate.
  - 2. The proportion of fine and coarse aggregate.
  - 3. The percentage of entrained air, within the allowable limits.
- B. Provide concrete having a homogeneous structure which, when hardened, will have the specified strength, durability and appearance. Provide mixtures and workmanship such that concrete surfaces, when exposed, will require no finishing.

### 3.06 PLACING AND COMPACTING

- A. Placing
  - 1. Verify that all formwork completely encloses concrete to be placed and is securely braced prior to concrete placement. Remove ice, standing water, dirt, debris, and other foreign materials from forms and exposed joint surfaces. Confirm that reinforcement and other embedded items are securely in place. Have a worker at the location of the placement who can check that reinforcement and embedded items remain in designated locations and alignments while concrete is being placed. Sprinkle semi-porous subgrades or forms to eliminate suction of water from the mix. Do not place concrete on frozen subgrade, snow, or ice.
  - 2. Deposit concrete as near its final position as possible to prevent segregation due to rehandling or flowing. Place concrete continuously at a rate that allows the concrete previously placed to be integrated with fresh plastic concrete. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials or on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If the section cannot be placed continuously, place construction joints as specified or as approved.

3. Pumping of concrete will be permitted. Use a mix design and aggregate sizes chosen for pumping and submit for approval. Do not use pipelines made of aluminum or aluminum alloy. When concrete is pumped, slump will be determined at point of truck discharge and air content will be determined at point of placement.
4. Remove temporary spreaders from forms when the spreader is no longer needed. Temporary spreaders may remain embedded in concrete only when made of galvanized steel or concrete and if prior approval has been obtained.
5. Do not place concrete for supported elements until concrete previously placed in the supporting element has attained design strength.
6. Where surface mortar is to form the base of a finish, especially surfaces designated to be painted, work coarse aggregate back from forms to bring the full surface of the mortar against the form. Prevent the formation of surface voids.
7. Slabs
  - a. After bulkheads, screeds and jointing materials have been positioned, place concrete continuously between joints beginning at a bulkhead, edgeform, or corner. Place each batch into the edge of the previously placed concrete to avoid stone pockets and segregation.
  - b. Avoid delays in placement. If there is a delay in placement, spade and consolidate the concrete placed after the delay at the edge of the previously placed concrete to avoid cold joints. Bring concrete to correct level and strike off with a straightedge. Use bullfloats or darbies to smooth the surface, leaving it free of humps or hollows.
  - c. Where slabs are to be placed integrally with the walls below them, place the walls and compact as specified. Allow one hour to pass between placement of the wall and the overlying slab to permit consolidation of the wall concrete. Keep the top surface of the wall moist to prevent cold joints.
8. Formed Concrete
  - a. Place concrete in forms using tremie tubes taking care to prevent segregation. Maintain bottom of tremie tubes in contact with the concrete already placed. Do not permit concrete to drop freely more than 4-ft. Place concrete for walls in 12-in to 24-in lifts, keeping the surface horizontal. If a high-range water-reducing admixture is used do not permit concrete to drop freely more than 15-ft; maximum lift thickness not to exceed 7-ft.

#### B. Compacting

1. Consolidate concrete by vibration and puddling, spading, rodding or forking so that concrete is completely worked around reinforcement, embedded items and openings and into corners of forms. Continuously perform puddling, spading, rodding and forking along with vibration of the placement to eliminate air or stone pockets which may cause honeycombing, pitting or planes of weakness.
2. Compact all concrete with mechanical vibrators. Do not order concrete until vibrators (including standby units in working order) are on the job.

3. Use mechanical vibrators having a minimum frequency of 8000 vibrations per minute. Insert vibrators and withdraw at points from 18-in to 30-in apart. Vibrate sufficiently at each insertion to consolidate concrete, generally from 5 to 15 seconds. Do not over vibrate so as to segregate. Keep standby vibrators on the site during concrete placing operations.
4. Concrete Slabs: Vibration for concrete slabs less than 8-in thick shall be by vibrating screeds. Vibration for concrete slabs 8-in and thicker shall be by internal vibrators and (optionally) with vibrating screeds. Place vibrators into concrete vertically. Do not lay vibrators horizontally or lay over.
5. Walls and Columns: Use internal vibrators (rather than form vibrators) unless otherwise approved by the Engineer. In general, for each vibrator needed to melt down (level) the batch at the point of discharge, one or more additional vibrators must be used to densify, homogenize and perfect the surface. Insert vibrators vertically at regular intervals, through the fresh concrete and slightly into the previous lift, if any.
6. Amount of Vibration: Use vibrators to consolidate properly placed concrete. Do not use vibrators to move or transport concrete in the forms. Continue vibration until:
  - a. Frequency of vibrator returns to normal.
  - b. Surface appears liquefied, flattened and glistening.
  - c. Trapped air ceases to rise.
  - d. Coarse aggregate has blended into surface, but has not disappeared.

### 3.07 CURING AND PROTECTION

- A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.
- B. Curing Methods
  1. Curing Methods for Concrete Surfaces: Cure concrete to retain moisture and maintain a temperature of at least 50 Degrees F at the concrete surface for a minimum of seven days after placement. Use the following curing methods as specified:
    - a. Water Curing: Keep entire concrete surface wet by ponding, continuous sprinkling or covered with saturated burlap. Begin water curing as soon as concrete attains an initial set and maintain water curing 24 hours a day. Do not permit the surface of the concrete to dry out at any time during the curing period. Temperature of curing water shall be within 20 Degrees F of the concrete temperature.
    - b. Sheet Material Curing: Cover entire surface with sheet material. Anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.
    - c. Liquid Membrane Curing: Apply over the entire concrete surface except as follows. Curing compound shall NOT be placed on any concrete surface where additional concrete or grout is to be placed, where concrete sealers or surface coatings are to be used, or where the concrete finish requires an integral floor product. Apply curing

compound as soon as the free water on the surface has disappeared and no water sheen is visible, but not after the concrete is dry or when the curing compound can be absorbed into the concrete. Apply in compliance with the manufacturer's recommendations.

2. Specified applications of curing methods:
    - a. Slabs for Liquid Retaining Structures: Water curing only.
    - b. Slabs on Grade and Footings (not used to retain liquids): Water curing or sheet material curing or liquid membrane curing.
    - c. Structural Slabs (other than Liquid Retaining Structures): Water curing or liquid membrane curing.
    - d. Horizontal Surfaces which will Receive Additional Concrete, Coatings, Grout or Other Material that Requires Bond to the substrate: Water curing.
    - e. Formed Surfaces: None if nonabsorbent forms are left in place seven days. Water curing if absorbent forms are used. Water curing if forms are removed prior to seven days. Sheet cure or liquid membrane cure if forms are removed prior to seven days. Exposed horizontal surfaces of formed walls or columns shall be water cured for seven days or until next placement of concrete is made.
    - f. Surfaces of Concrete Joints: Water curing or sheet material curing.
  3. Curing time may be reduced to 3 days for concrete placement using Type III cement when approved by the Engineer.
- C. Protect finished surfaces and slabs from the direct rays of the sun to prevent checking and crazing.
- D. Cold Weather Concreting
1. For this Specification, "cold weather" is defined as a period when for more than three successive days, the average daily outdoor temperature drops below 40 degrees F. Calculate average daily temperature as the average of the highest and the lowest temperature during the period from midnight to midnight.
  2. Batch, deliver, place, cure and protect concrete during cold weather in compliance with the recommendations of ACI 306R and the additional requirements of this Section.
  3. Review the cold weather concreting plan at the preconstruction meeting. Include the methods and procedures for use during cold weather including the production, transportation, placement, protection, curing and temperature monitoring of the concrete and the procedures to be implemented upon abrupt changes in weather conditions or equipment failures.
  4. The minimum temperature of concrete immediately after placement and during the protection period shall be as indicated in Table 3. The temperature of the concrete in place and during the protection period shall not exceed these values by more than 20 degrees F. Prevent overheating and non-uniform heating of the concrete.

TABLE 3

Concrete Temperatures  
Minimum Dimension of Section

	<u>&lt; 12-in</u>	<u>12 to 36-in</u>
Min. conc temp:	55 Degree F	50 Degree F

5. Protect concrete during periods of cold weather to provide continuous warm, moist curing (with supplementary heat when required by weather conditions) for a total of at least 350 degree-days of curing.
  - a. Degree-days are defined as the total number of 24 hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (e.g., 7 days at an average 50 degrees F = 350 degree-days).
  - b. To calculate the weighted average daily air temperature, sum hourly measurements of the air temperature in the shade at the surface of the concrete taking any measurement less than 50 degrees F as 0 degrees F. Divide the sum thus calculated by 24 to obtain the weighted average temperature for that day.
6. Do not use salt, manure or other chemicals for protection.
7. At the end of the protection period, allow the concrete to cool gradually to the ambient temperature. If water curing has been used, do not expose concrete to temperatures below those shown in Table 3 until at least 24 hours after water curing has been terminated and air dry concrete for at least 3 days prior to first exposure to freezing temperatures.
8. During periods not defined as cold weather, but when freezing temperatures are expected or occur, protect concrete surfaces from freezing for the first 24 hours after placing.

E. Hot Weather Concreting

1. For this Specification, "hot weather" is defined as any combination of high air temperatures, low relative humidity and wind velocity which produces a rate of evaporation as estimated in ACI 305R, approaching or exceeding 0.2 pounds per square foot per hour (lb/sq ft/hr).
2. Batch, deliver, place, cure and protect concrete during hot weather in compliance with the recommendations of ACI 305R and the additional requirements of this Section.
  - a. Temperature of concrete being placed shall not exceed 90 degrees F. Maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall not cause loss of slump, flash set or cold joints.
  - b. Promptly deliver concrete to the site and promptly place the concrete upon its arrival at the site, not exceeding the maximum time interval specified in Paragraph 3.02I.4. Provide vibration immediately after placement.
  - c. The Engineer may direct the Contractor to immediately cover concrete with sheet curing material.

3. Review the hot weather concreting plan at the preconstruction meeting. Include the methods and procedures for use during hot weather including production, placement, and curing.

3.08 REMOVAL OF FORMS

- A. Do not remove forms before the concrete has attained a strength of at least 70 percent of its specified design strength for beams and slabs and at least 30 percent of its specified design strength for walls and vertical surfaces, nor before reaching the following number of day-degrees of curing (whichever is the longer):

TABLE 4

<u>Forms for</u>	<u>Degree Days</u>
Beams and slabs	500
Walls and vertical surfaces	100

(See definition of degree-days in Paragraph 3.07D).

- B. Do not remove shores until the concrete has attained at least 70 percent of its specified design strength and also sufficient strength to support safely its own weight and the construction live loads upon it.
- C. In cold weather, when temperature of concrete exceeds ambient air temperature by 20 Degrees F at the end of the protection period, loosen forms and leave in place for at least 24 hours to allow concrete to cool gradually to ambient air temperature.

3.09 FIELD AND LABORATORY TESTS

- A. Take field control cylinder specimens during the progress of the work, in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete placed each day shall not be less than one set per day, nor less than one set for each 100 cu yds of concrete nor less than one set for each 5,000 sq ft of surface area for slabs or walls. Specimens shall be formed in 6-in diameter by 12-in long non-absorbent cylindrical molds.
  1. A "set" of test cylinders shall consist of five cylinders: one to be tested at seven days, one to be tested at 14 days, and two to be tested and their strengths averaged at 28 days. The fifth may be used for a special test at 3 days or to verify strength after 28 days if 28 day test results are low.
  2. When the average 28 day compressive strength of the cylinders in any set falls below the required compressive strength or below proportional minimum seven-day or 14-day strengths (where proper relation between seven, 14 and 28 day strengths have been established by tests), change proportions, cementitious content, or temperature conditions to achieve the required strengths at no additional cost to the Owner.
- B. Furnish material and labor required for the purpose of taking concrete cylinder samples. All shipping of specimens shall be paid for by the Contractor.

- C. Test slump immediately prior to placing the concrete. Test shall be made in accordance with ASTM C143. When concrete is pumped, slump will be determined at point of truck discharge. If the slump is outside the specified range, the concrete will be rejected.
- D. Test for air content shall be conducted on a fresh concrete sample. Air content for concrete made of ordinary aggregates having low absorption shall be made in compliance with either the pressure method complying with ASTM C231 or by the volumetric method complying with ASTM C173. If aggregates with high absorptions are used, the latter test method shall be used. When concrete is pumped, air content will be determined at point of placement.

### 3.10 FIELD CONTROL

- A. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work. The right of the Engineer to take such cores shall not be construed as creating any obligation to take such cores, and not exercising this right to do so shall not relieve the Contractor from meeting the requirements of these Specifications.
- B. Cooperate in obtaining cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. Repair all core holes with non-shrink grout as specified in Section 03600. The work of cutting, testing and repairing the cores will be at the expense of the Contractor if defective work is uncovered. If no defective work is found, such cost will be at the expense of the Owner.

### 3.11 FAILURE TO MEET REQUIREMENTS

- A. Should the strengths shown by the test specimens made and tested in compliance with the previous provisions fall below the values given in Table 1, the Engineer may require changes in proportions or materials, or both, to apply to the remainder of the work in accordance with Paragraph 1.05E. Furthermore, the Engineer may require additional curing on those portions of the structure represented by the test specimens which fall below the values given in Table 1. The cost of such additional curing shall be at no additional cost to the Owner. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer may require strengthening or replacement of those portions of the structure which fail to develop the required strength. Coring and testing and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be at no additional cost to the Owner. In such cases of failure to meet strength requirements the Contractor and Owner shall confer to determine what adjustment, if any, can be made in compliance with Sections titled "Strength" and "Failure to Meet Strength Requirements" of ASTM C94. The "purchaser" referred to in C94 is the Contractor.
- B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In cases where tests of cores fall below the values given in Table 1, the Engineer, in addition to other recourses, may require load tests on any one of the slabs, walls, beams, and columns piles pile caps in which such concrete was used. Test need not be made until concrete has aged 60 days. The Engineer may require strengthening or replacement of those portions of the structure which fail to develop the required strength. All coring and testing and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be at no additional cost to the Owner.

- C. Should the strength of test cylinders fall below 60 percent of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced at no additional cost to the Owner.

3.12 PATCHING AND REPAIRS

- A. It is the intent of these Specifications to require quality work including forming, mixture and placement of concrete and curing so completed concrete surfaces will require no patching or repairs.
- B. As soon as the forms have been stripped and the concrete surfaces exposed: remove fins and other projections; fill recesses left by the removal of form ties; and repair surface defects which do not impair structural strength. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.
- C. Immediately after removal of forms remove tie cones and metal portions of ties as specified in Section 03100. Fill holes promptly upon stripping as follows: Moisten the hole with water, followed by a 1/16-in brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spider web. Trowel smooth with heavy pressure. Avoid burnishing.
- D. When filling tie cone holes and patching or repairing exposed surfaces use the same source of cement and sand as used in the parent concrete. Adjust color to match by addition of white cement. Rub lightly with a fine carborundum stone at an age of one to five days if necessary to bring the surface down with the parent concrete. Do not damage or stain the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.
- E. Defective concrete and honeycombed areas: Chip down square and at least 1-in deep to sound concrete with hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded in the parent concrete. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8-in wide all around the steel. For areas less than 1-1/2-in deep, the patch may be made in the same manner as described above for filling form tie holes, care being exercised to use adequately dry (non-trowelable) mixtures and to avoid sagging. Thicker repairs will require build-up in successive 1-1/2-in layers on successive days, each layer being applied (with slurry, etc.) as described above.
- F. For very heavy (generally formed) patches, the Engineer may order the addition of pea gravel to the mixture and the proportions modified as follows:

<u>Material</u>	<u>Volumes</u>	<u>Weights</u>
Cement	1.0	1.0
Sand	1.0	1.0
Pea Gravel	1.5	1.5

- G. The Contractor may use a pre-packaged patching compound, such as: Poly-Patch by Euclid Chemical Company; Emaco R310 by BASF Chemical Company; Sikatop 122 Plus by Sika Chemical Corporation or equal only if approved by the Engineer for use and for color match.

3.13 SCHEDULE

- A. The following (Table 5) are the general applications for the various concrete classes and design strengths:

TABLE 5

<u>Class</u>	<u>Design Strength (psi)</u>	<u>Description</u>
A	4,500	All structural concrete greater than 10-in in thickness.

END OF SECTION

## SECTION 03600

### GROUT

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install grout complete as shown on the Drawings and as specified herein.
- B. Perform all sampling and furnish all testing of materials and products by an independent testing laboratory acceptable to the Engineer but engaged by and at the expense of the Contractor.

##### 1.02 RELATED WORK

- A. Concrete formwork is included in Section 03100.
- B. Concrete reinforcement is included in Section 03200.
- C. Cast-in-place concrete is included in Section 03300.

##### 1.03 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of surface preparation, mixing and installation for:
  - 1. Commercially manufactured non-shrink cementitious grout and self-leveling cementitious underlayment grout. Include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to the specified ASTM standards, and Material Safety Data Sheet.
  - 2. Commercially manufactured non-shrink epoxy grout. Include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to the specified ASTM standards, and Material Safety Data Sheet.
  - 3. Cement grout. Include the type and brand of cement, the gradation of fine aggregate, product data on any proposed admixtures and the proposed grout mix.
- B. Samples
  - 1. Submit samples of commercially manufactured grout products when requested by the Engineer.
  - 2. Submit samples of aggregates proposed for use in grout mixes when requested by the Engineer.

C. Certifications

1. Certify that the Contractor is not associated with the independent testing laboratory, nor does the Contractor or its officers have a beneficial interest in the laboratory.

D. Qualifications

1. Submit documentation that grout manufacturers have a minimum of at least 10 years experience in the production and use of the grouts proposed.
2. Independent Testing Laboratory
  - a. Name and address
  - b. Names and positions of principal officers and the name, position, and qualifications of the responsible registered professional engineer in charge.
  - c. Listing of technical services to be provided. Indicate external technical services to be provided by other organizations.
  - d. Names and qualifications of the supervising laboratory technicians.
  - e. Statement of conformance provided by evaluation authority defined in ASTM C1077. Provide report prepared by evaluation authority when requested by the Engineer.
  - f. Submit as required above for other organizations that will provide external technical services.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C33 - Standard Specification for Concrete Aggregates
2. ASTM C150 - Standard Specification for Portland Cement
3. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes
4. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
5. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
6. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
7. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.

8. ASTM E329 - Standard specification for agencies engaged in the testing and/or inspection of materials used in construction

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.05 QUALITY ASSURANCE

##### A. Qualifications

1. Grout manufacturers shall have a minimum of 10 years experience in the production and use of the type of grout proposed.
2. Independent testing laboratory shall meet the requirements of ASTM E329 and ASTM C1077 and be acceptable to the Engineer. Laboratories affiliated with the Contractor or in which the Contractor or officers of the Contractor's organization have beneficial interest are not acceptable.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.
- B. Store materials in full compliance with the manufacturer's recommendations. Limit total storage time from date of manufacture to date of installation to six months or the manufacturer's recommended storage time, whichever is less.
- C. Remove immediately from the site material which becomes damp, contains lumps, or is hardened and replace with acceptable material at no additional cost to the Owner.
- D. Deliver non-shrink cementitious grout as a pre-portioned blend in prepackaged mixes requiring only the addition of water.
- E. Deliver non-shrink epoxy grout as a pre-proportioned, prepackaged, three component system requiring only mixing as directed by the manufacturer.

#### 1.07 DEFINITIONS

- A. Non-shrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.
- B. Self-Leveling Cementitious Underlayment Grout: A commercially manufactured Portland cement based, non-shrinking, self-leveling underlayment.

### PART 2 PRODUCTS

#### 2.01 GENERAL

- A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

- B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

## 2.02 MATERIALS

### A. Non-shrink Cementitious Grout

- 1. Non-shrink cementitious grouts: Conform to ASTM C1107. Grouts shall be portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and require only the addition of water. Non-shrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.
  - a. General purpose non-shrink cementitious grout: Conform to the standards stated above. SikaGrout 212 by Sika Corp.; Set Grout by BASF Building Systems; NS Grout by The Euclid Chemical Co.; Five Star Grout by Five Star Products, Inc., or equal.
  - b. Flowable (Precision) non-shrink cementitious grout: Conform to the standards stated above. Masterflow 928 by BASF Building Systems; Hi-Flow Grout by The Euclid Chemical Co.; SikaGrout 212 by Sika Corp.; Five Star Grout by Five Star Products, Inc., or equal.

### B. Non-shrink Epoxy Grout

- 1. Non-shrink epoxy grout: Grout shall be pre-proportioned, prepackaged, three component, 100 percent solids system consisting of epoxy resin, hardener and blended aggregate. It shall have a compressive strength of 10,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum coefficient of thermal expansion of  $30 \times 10^{-6}$  in/in/degrees F when tested in conformity with ASTM C531. Masterflow 648 CP by BASF Building Systems; Five Star HP Epoxy Grout by Five Stars Products, Inc; Sikadur 42 Grout-Pak by Sika Corp.; E<sup>3</sup>-G Epoxy Grout by the Euclid Chemical Co. or equal.

### C. Cement Grout

- 1. A mixture of one part portland cement conforming to ASTM C150, Type I, II, or III and one to two parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

### D. Water

- 1. Potable water free of oil, acid, alkali, salts, chlorides (except those attributable to drinking water), organic matter, or other deleterious substances.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Place grout where indicated or specified over existing concrete and cured concrete which has attained its specified design strength unless otherwise approved by the Engineer.

- B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, dust, grease, oil, form release agent, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.
- C. Roughen concrete surfaces by chipping, sandblasting, or other dry mechanical means to bond the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.
  - 1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.
- D. Remove all loose rust, oil or other deleterious substances which may affect the bond or performance of the grout from metal embedments or bottom of baseplates prior to the installation of the grout.
- E. Wash concrete surfaces clean and then keep moist for at least 24 hours prior to the placement of non-shrink cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, or flooding the surface or other method acceptable to the Engineer. Upon completion of the 24 hour period, remove visible water from the surface prior to grouting.
- F. Non-shrink epoxy grouts do not require saturation of the concrete substrate. Do not wet concrete surfaces to receive non-shrink epoxy grout. Surfaces in contact with epoxy grout shall be completely dry before grouting.
- G. Provide forms for grout. Line or coat forms with release agents recommended by the grout manufacturer. Provide forms anchored in place and shored to resist the forces imposed by the grout and its placement.
  - 1. Forms for all grout other than concrete grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.
- H. Level and align the structural or equipment bearing plates in accordance with the structural requirements or the recommendations of the equipment manufacturer, as applicable.
- I. Support equipment during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by bond breaking coatings and removed after grouting unless otherwise approved by the Engineer. Grout voids created by the removal of shims, wedges and blocks.

### 3.02 INSTALLATION - GENERAL

- A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and these specifications.
- B. Provide staffing and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.
- C. Maintain temperatures of the base plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours after placement, until grout compressive strength reaches 1000 psi or as recommended by the grout manufacturer, whichever is longer. Do not allow differential heating or cooling of baseplates and grout during the curing period.

- D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 40 to 90 degrees F range.
- E. Install grout to preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.
- F. Reflect all existing underlying expansion, control and construction joints through the grout.

### 3.03 INSTALLATION - NON-SHRINK CEMENTITIOUS GROUTS AND CEMENT GROUTS

- A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.
- B. Do not mix by hand. Mix in a mortar mixer with moving blades. Pre-wet the mixer and empty excess water. Add pre-measured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.
- C. Placements greater than 3-in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.
- D. Provide forms as specified in Paragraph 3.01G. Place grout into the designated areas and prevent segregation and entrapment of air. Do not vibrate grout to release air or to consolidate the material. Fill all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes and vent holes as necessary.
- E. Place grout rapidly and continuously to avoid cold joints. Do not place grout in layers. Do not add additional water to the mix (retemper) after initial stiffening.
- F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise ordered and approved by the Engineer. Finish this surface with a wood float or brush finish.
- G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement, until grout compressive strength reaches 1000 psi or as recommended by the manufacturer, whichever is longer. Saturate the grout surface by use of saturated burlap bags, soaker hoses or ponding. Provide sunshades. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

### 3.04 INSTALLATION – NON-SHRINK EPOXY GROUTS

- A. Mix in accordance with manufacturer's recommendations. Mix full batches only, to maintain proper proportions of resin, hardener and aggregate. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Do not entrain air bubbles by mixing too quickly.
- B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.

- C. Place grout rapidly and continuously to avoid cold joints. Place grout in lifts in accordance with manufacturer's recommendations.
- D. Provide forms as specified in Paragraph 3.01G. Place grout into the designated areas and prevent entrapment of air. Fill all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes and vent holes as necessary.
- E. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.
- F. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.
- G. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placement, until grout compressive strength reaches 1000 psi or as recommended by the manufacturer, whichever is longer.
- H. Provide grout control joints as indicated on the Drawings.

### 3.05 SCHEDULE

- A. The following list indicates where the particular types of grout are to be used:
  - 1. General purpose non-shrink cementitious grout: Use at all locations where non-shrink grout is indicated on the Drawings, except for base plates greater in area than 3-ft wide by 3-ft long.
  - 2. Flowable (precision) non-shrink cementitious grout: Use under all base plates greater in area than 3-ft wide by 3-ft long. Use at all locations indicated on the Drawings to receive flowable non-shrink grout. Flowable (precision), non-shrink, cementitious grout may be substituted for general purpose non-shrink cementitious grout.
  - 3. Non-shrink epoxy grout: Use at all locations specifically indicated on the Drawings to receive non-shrink epoxy grout.
  - 4. Cement grout: Use where indicated on the Drawings.
  - 5. Self-Leveling cementitious underlayment grout: Use over existing slab, as shown and required to provide substrate for tile work.

END OF SECTION

## SECTION 03740

### MODIFICATIONS TO EXISTING CONCRETE

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and cut, repair or otherwise modify parts of existing concrete structures or appurtenances as shown on the Drawings and as specified herein.
- B. Work under this Section shall also include bonding new concrete to existing concrete.
- C. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- D. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers, shoring and bracing and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work, protect personnel and to prevent damage to the structures or contents by falling or flying debris. Unless otherwise permitted, shown or specified, line drilling will be required in cutting existing concrete.

##### 1.02 RELATED WORK

- A. Excavation and backfill are included in Division 2.
- B. Concrete, concrete reinforcement and accessories are included in Division 3.

##### 1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
  - 2. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
  - 3. ASTM C883 - Standard Test Method for Effective Shrinkage of Epoxy-Resin Systems Used with Concrete.
  - 4. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
  - 5. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
  - 6. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
  - 7. ASTM D732 - Standard Test Method for Shear Strength of Plastics by Punch Tool.

8. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

## PART 2 PRODUCTS

### 2.01 MATERIALS

#### A. Bonding Compound

##### 1. General

a. The bonding compound shall be a two-component, solvent-free, moisture insensitive epoxy resin material suitable for use as a bonding adhesive to bond fresh, plastic concrete to clean, sound hardened concrete and for grouting bolts and the bonding of mating materials.

##### 2. Material

a. The epoxy material shall conform to the following requirements:

1) Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A type containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.

2) Component B - Component B shall be primarily a reaction product of a selected amine blend with an epoxy resin of the epichlorohydrin bisphenol A type containing suitable viscosity control agents, pigments and accelerators.

3) The ratio of Component B:A shall be 1:1 by volume.

4) The material shall not contain asbestos.

b. Properties of the mixed material\*

1) Pot Life - 25 to 35 minutes

2) Tack-Free Time to Touch (20 mil thickness) - 3 to 5 hours

3) Initial Viscosity (Brookfield Viscometer Spindle No. 3; Speed 100) - 1900 to 3700 cps

4) Color - Gray

c. Properties of the cured material\*

1) Compressive Properties (ASTM D695) at 28 days

a) Compressive Strength - 8500 psi minimum

- b) Modulus of Elasticity - 375,000 psi minimum
  - 2) Tensile Properties (ASTM D638) at 14 days
    - a) Tensile Strength - 4000 psi minimum
    - b) Elongation at Break - 1.5 to 2.25 percent
    - c) Modulus of Elasticity - 275,000 psi minimum
  - 3) Flexural Properties (ASTM D790) at 14 days
    - a) Flexural Strength (Modulus of Rupture) - 6300 psi minimum
    - b) Tangent Modulus of Elasticity in Bending - 400,000 psi minimum
  - 4) Shear Strength (ASTM D732) at 14 days
    - a) Shear Strength - 5000 psi minimum
  - 5) Water Absorption (ASTM D570; Section 6.5) at 14 days
    - a) Water Absorption - 1 percent maximum
  - 6) Bond Strength (ASTM C882) Hardened to Plastic
    - a) Bond Strength (14 days moist cure) - 1500 psi minimum
  - 7) Effective Shrinkage (ASTM C883)
    - a) Effective Shrinkage - Passes Test
- 3. All test data is based upon material and curing conditions of 73 plus or minus 2 degrees F, 50 plus or minus 5 percent Relative Humidity
- 4. Approval Requirements
  - a. Furnish notarized certification that the material proposed for use meets all of the above requirements.
  - b. Bonding agent shall be Sikastix 370, Sikadur Hi-Mod, by Sika Corporation, Lyndhurst, NJ or equal.

B. Repair Mortar

- 1. General
  - a. Repair mortar shall be a two-component, polymer-modified, cementitious, fast-setting, trowel grade, structural repair mortar suitable for use on horizontal, vertical and overhead surfaces, on grade above and below grade on concrete and mortar.

## 2. Material

- a. The polymer modified cementitious system shall consist of a factory preproportioned two-component system whose components conform to the following requirements:
  - 1) Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives. This acrylic copolymer shall have the following properties:
    - a) pH 4.5 to 6.5
    - b) Minimum film forming temperature approximately 68 degrees F
    - c) Tear Strength approximately 990 to 1420 psi
    - d) Elongation at break 500 to 900 percent
    - e) Particle Size Range Less than 0.1 micron
  - 2) Component B shall be a blend of selected portland cements, specially graded aggregates, organic accelerator and admixtures for controlling setting time, water reducers for workability and a corrosion inhibitor.
  - 3) The component ratio A:B shall be 1:7.2 by weight. The system shall not contain chlorides, nitrates, added gypsum, added lime, or high alumina cements. The system shall be non-combustible, either before or after cure.
- b. Typical Properties of Mixed Components
  - 1) Application Time (Working Time) - 15 minutes after combining components
  - 2) Finishing Time - 20 to 60 minutes after combining components
  - 3) Color - Concrete Gray
- c. Typical Properties of Cured Material
  - 1) Abrasion Resistance - 6 times that of controlled concrete
  - 2) Bond Strength (pull off method) - 100 percent concrete substrate failure
  - 3) Modulus of Elasticity - 4,500,000 psi minimum
  - 4) Surface Scaling (Deicing salt solution freeze/thaw) - No deterioration after 120 cycles
  - 5) Compressive Strength (2 hours 50 percent RH) - 150 psi minimum
  - 6) Compressive Strength (28 days 50 percent RH) - 5,550 psi minimum
  - 7) Flexural Strength (28 days 50 percent RH) - 1,300 psi minimum

- 8) This system shall conform with ECA/USPHS Standards for surface contact with potable water.
- 9) This system shall not produce a vapor barrier.
- 10) This system shall be thoroughly compatible with concrete.
- 11) Stone may be added.
- 12) System may be finished with power trowel.

d. Approval Requirements

- 1) Furnish notarized certification that the material proposed for use meets all of the above requirements.
- 2) Repair mortar shall be SikaTop 122 by Sika Corporation, Lyndhurst, NJ or equal.

C. Crack Sealant

1. General

- a. Crack sealant shall be a two-component, solvent-free, moisture insensitive epoxy resin material suitable for crack grouting, by injection or gravity feed and bolt grouting and as a binder for mortar, concrete or grout in thermally stable environments and as a concrete sealer.

2. Material

- a. The epoxy material shall conform to the following requirements:
  - 1) Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A type, containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.
  - 2) Component B - Component B shall be primarily a reaction product of a selected amine blend with an epoxy resin of the epichlorohydrin bisphenol A type containing suitable viscosity control agents and accelerators.
  - 3) The ratio of Components B:A shall be 1:2 by volume.
  - 4) The material shall not contain asbestos.
- b. Properties of the mixed components\*
  - 1) Pot Life - 20 to 30 minutes
  - 2) Tack free time to touch (3 to 5 mils) - 2 to 4 hours
  - 3) Initial Viscosity (Brookfield Viscometer Spindle No. 2, Speed 100) - 300 to 450 cps

- 4) Color - Amber
- c. Properties of the cured material\*
  - 1) Compressive Properties (ASTM D695) at 28 days
    - a) Compressive Strength - 10,500 psi minimum
    - b) Modulus of Elasticity - 300,000 psi minimum
  - 2) Tensile Properties (ASTM D638) at 14 days
    - a) Tensile Strength - 5500 psi minimum
    - b) Elongation at Break - 2 to 5 percent
    - c) Modulus of Elasticity - 60,000 psi minimum
  - 3) Flexural Properties (ASTM D790) at 14 days
    - a) Flexural Strength (Modulus of Rupture) - 12,500 psi minimum
    - b) Tangent Modulus of Elasticity in Bending - 325,000 psi minimum
  - 4) Shear Strength (ASTM D732) at 14 days
    - a) Shear Strength - 4500 psi minimum
  - 5) Water Absorption (ASTM D570; Section 6.5) at 7 days
    - a) Water Absorption - 1.5 percent maximum
  - 6) Bond Strength (ASTM C882)
    - a) Bond Strength (2 days dry) - 2000 psi minimum
    - b) Bond Strength (2 days dry plus 12 days moist) - 2000 psi minimum
  - 7) Effective Shrinkage (ASTM C883)
    - a) Effective Shrinkage - Passes Test
  - 8) When tested following the procedure prescribed by the Environmental Control Administration of the U.S. Public Health Service, the cured material shall be in conformity with the Federal Regulation requiring water extractables of less than 0.5 mg/in<sup>2</sup> of exposed surface for potable water containers.
3. All test data is based upon material and curing conditions of 73 plus or minus 2 degrees F, 50 plus or minus 5 percent R.H.
4. Approval Requirements

- a. Furnish notarized certification that the material proposed for use meets all of the above requirements.
- b. Crack sealant shall be Sikastix 350, Sikadur Hi-Mod LV, by Sika Corporation, Lyndhurst, NJ or equal.

D. Epoxy Paste Adhesive

1. General

- a. Epoxy paste adhesive shall be a two-component, solvent-free, moisture insensitive epoxy resin material suitable for bolt grouting, as an adhesive for mating surfaces where the glue line is 1/8-in or less and to bond fresh, plastic concrete to clean, sound, hardened concrete.
- b. The material shall be classified as Type I, Grade 3, Class B and C and a Type II, Grade 3, Class B and C adhesive in conformity to ASTM C881.

2. Material

- a. The epoxy material shall conform to the following requirements:
  - 1) Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A type, containing suitable viscosity control agents and pigments. It shall not contain butyl glycidyl ether.
  - 2) Component B - Component B shall be primarily a reaction product of a selected amine blend with an epoxy resin of the epichlorohydrin bisphenol A type containing suitable viscosity control agents, pigments and accelerators.
  - 3) The ratio of Component B:A shall be 1:2 by volume.
  - 4) The material shall not contain asbestos.
- b. Properties of the mixed material\*
  - 1) Pot Life - 25 to 45 minutes
  - 2) Tack-Free-Time to Touch - 2 to 3 hours
  - 3) Consistency (1/2-in thick) - Non-Sag
  - 4) Color - Gray
- c. Properties of the cured material\*
  - 1) Compressive Properties (ASTM D695) at 28 days
    - a) Compressive Strength, psi - 10,000 minimum
    - b) Modulus of Elasticity, psi - 700,000 minimum

- 2) Tensile Properties (ASTM D638) at 14 days
    - a) Tensile Strength, psi - 3000 minimum
    - b) Elongation at Break, percent - 0.3 minimum
    - c) Modulus of Elasticity, psi - 630,000 minimum
  - 3) Flexural Properties (ASTM D790) at 14 days
    - a) Flexural Strength (Modulus of Rupture), psi - 3700 minimum
    - b) Tangent Modulus of Elasticity in Bending, psi - 850,000 minimum
  - 4) Shear Strength (ASTM D732) at 14 days
    - a) Shear Strength, psi - 2800 minimum
  - 5) Water Absorption (ASTM D570; Section 6.5) at 7 days
    - a) Water Absorption, percent - 1.0 maximum
  - 6) When tested following the procedure prescribed by the Environmental Control Administration of the U.S. Public Health Service, the cured material shall be in conformity with the Federal Regulation requiring water extractables of less than 18 mg/sq in of exposed surface for potable water containers.
3. All test data is based upon material and curing condition of 73 plus/minus 2 degrees F; 50 plus/minus 5 percent Relative Humidity
  4. Approval Requirements
    - a. Furnish notarized certification that the material proposed for use meets all of the above requirements.
    - b. Epoxy paste adhesive shall be Sikastix 390, Sikadur 31 Hi-Mod Gel, by Sika Corporation, Lyndhurst, NJ or equal.

#### E. Special Joint Sealant

1. Sealant shall be foamed polyurethane strip saturated with polybutylene waterproofing material. Sealant shall be applied to joint in a precompressed state.
2. When compressed to 50 percent of its original volume, sealant shall produce a hydrostatic seal.
3. Sealant shall maintain its resiliency to temperatures as low as minus 40 degrees F. Sealant shall be waterproof (when compressed to 50 percent of its original volume) in temperatures from minus 40 degrees F to plus 200 degrees F.

4. Elongation shall be at least 325 percent with a tensile strength of not less than 53 psi. The polybutylene compound in the polyurethane strip shall not migrate.
- F. Metal primer shall be an approved organic zinc rich primer containing 95 percent zinc dust by weight.
- G. Non-shrink Grout
  1. Non-shrink grout for setting new anchor bolts in existing concrete shall be ready-to-use formulation, which when mixed with specific amounts of water will provide a pourable cementitious mixture.
  2. Non-shrink grout for setting new anchor bolts shall be Super POR-ROK by Minwax Construction Products Division of Sterling Drug Inc., or equal.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Concrete removal, repairs and fabrication shall be as shown on the Drawings and as specified herein.
- B. Except as otherwise indicated, in all locations where new concrete is to be deposited against existing concrete, bonding compound shall be applied to the surfaces of the existing concrete prior to placement of new concrete.
- C. In all cases where the joint between new concrete and existing concrete will be exposed in the finished work, except as otherwise shown or specified, the limit of concrete removal shall be defined by a 1-1/2-in deep saw cut on each exposed surface of the existing concrete.
- D. When the finished surface is not specified to be coated, the color of new concrete in the exposed surfaces shall match the color of the existing adjoining concrete as closely as possible.
- E. Where indicated or specified, existing concrete shall be removed to the depth indicated or required to expose sound concrete. The surface exposed shall be roughened by chipping, sandblasting, scarifying or other appropriate means before applying bonding compounds, or repair material as specified.
- F. The Engineer may from time to time direct the Contractor to make repairs to existing concrete, these repairs shall be made as specified herein or by such other methods as may be appropriate.
- G. Reinforcing in existing concrete which is exposed as a result of removal of deteriorated concrete shall be wire brushed to remove all loose material and products of corrosion before proceeding with the repair.
- H. All commercial products specified in this Section shall be stored, mixed and applied in strict accordance with the manufacturer's recommendations.

- I. In all cases where concrete is repaired in the vicinity of an expansion joint or isolation joint the repairs shall be made so as to preserve the isolation between components on either side of the joint.
- J. Where exposed embedded metal is required to be painted, prepare substrate as approved and paint with two coats zinc rich primer before installation of adjacent new materials.

### 3.02 SURFACE REPAIR AND PATCHING

- A. Remove fractured, loose, deteriorated and unsound concrete by saw cutting, bush hammering, chipping or other appropriate means. Restore area to original limits or as shown using repair mortar.

### 3.03 EXPANSION JOINT REPAIR

- A. Where indicated, existing premolded joint filler shall be removed and replaced. Special joint sealant shall be installed as indicated in accordance with manufacturer's instructions.

### 3.04 ANCHOR BOLTS IN EXISTING CONCRETE

- A. Drill holes in concrete of the size and to the depth indicated.
- B. Clean and moisten concrete in accordance with manufacturer's instructions.
- C. Locate bolts in hole so as to provide the indicated embedment and projection.
- D. Proportion and mix the grout constituents and pour into the space surrounding the bolts.

END OF SECTION

## SECTION 05500

### MISCELLANEOUS METAL

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all miscellaneous metal complete as shown on the Drawings and as specified herein.

##### 1.02 SUBMITTALS

- A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installation for:
  - 1. Shop drawings, showing sizes of members, method of assembly, anchorage and connection to other members.
- B. Design Data
  - 1. Submit calculations demonstrating that the railings will resist the loads specified in the International Building Code at the post spacing provided.
  - 2. Submit manufacturer's load and deflection tables for grating.
- C. Test Reports
  - 1. Certified copy of mill test reports on each steel, aluminum proposed for use showing the physical properties and chemical analysis.
- D. Certificates
  - 1. Submit certification that the railing system is in compliance with OSHA requirements and The International Building Code.

##### 1.03 REFERENCE STANDARDS

- A. Aluminum Association (AA)
  - 1. AA M31C22A41
    - a. M31: Mechanical Finish, Fine Satin
    - b. C22: Finish, Medium Matte
    - c. A41: Clear Anodic Coating, Class I
- B. American Society for Testing and Materials (ASTM)
  - 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
  - 2. ASTM A48 - Standard Specification for Gray Iron Castings.

3. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A108 - Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
5. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A240 - Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Plate, Sheet, and Strip Pressure Vessels.
8. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
9. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 Psi Tensile Strength.
10. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
11. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. ASTM A536 - Standard Specification for Ductile Iron Castings.
14. ASTM A570 - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
15. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
16. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
17. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
18. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

C. American Iron and Steel Institute (AISI).

1. Specification for Structural Steel Buildings.

D. American Welding Society (AWS)

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.2 - Structural Welding Code - Aluminum.
3. AWS D1.6 - Structural Welding Code - Stainless Steel

E. Federal Specifications

1. FS-FF-B-575C - Bolts, Hexagonal and Square

F. Occupational Safety and Health Administration (OSHA)

G. International Building Code

H. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

- A. The work of this Section shall be completely coordinated with the work of other Sections. Verify, at the site, both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.
- C. All welding shall be performed by qualified welders and shall conform to the applicable AWS welding code. Welding of steel shall conform to AWS D1.1 and welding of aluminum shall conform to AWS D1.2 and welding of stainless steel shall conform to AWS D1.6.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation.
- B. Repair items that have become damaged or corroded to the satisfaction of the Engineer prior to incorporating them into the work.

1.06 PROJECT/SITE REQUIREMENTS

- A. Field measurements shall be taken at the site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 PRODUCTS

2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials shall be the end products of one manufacturer in order to provide standardization for appearance, maintenance and manufacturer's service.

## 2.02 MATERIALS

A. Unless otherwise noted, materials for miscellaneous metals shall conform to the following standards:

1. Structural Steel ASTM A36
2. Structural Steel Tubing ASTM A500, Grade B
3. Welded and Seamless Steel Pipe ASTM A501 or ASTM A53, Type E or S, Grade B Schedule 40. Use standard malleable iron fittings, galvanized for exterior work
4. Steel Sheets ASTM A1008
5. Gray Iron Castings ASTM A48, Class 35
6. Ductile Iron Castings ASTM A536, Grade 65-45-12
7. Aluminum Extruded Pipe ASTM B429, Alloy 6063 T6
8. Aluminum Extruded Shapes ASTM B221, Alloy 6061 T6
9. Aluminum Sheet and Plate ASTM B209, Alloy 6061 T6
10. Stainless Steel Plates, Sheets, and Structural Shapes
  - a. Exterior, Submerged or Industrial Use ASTM A240, Type 316 (Type 316L for welded)
  - b. Interior and Architectural Use ASTM A240, Type 304
11. Stainless Steel Bolts, Nuts, and Washers ASTM A276, Type 316
12. Carbon Steel Bolts and Studs ASTM A307, Grade A (hot dip galvanized nuts and washers where noted)
13. High Strength Steel Bolts, Nuts and washers ASTM A325 (mechanically galvanized per ASTM B695, Class 50, where noted)
  - a. Elevated Temperature Exposure Type I
  - b. General Application Type I or Type II
14. Galvanizing ASTM A123, Zn w/0.05 percent minimum Ni
15. Galvanizing, hardware ASTM A153, Zn w/0.05 percent minimum Ni

## 2.03 ANCHORS, BOLTS AND FASTENING DEVICES

- A. Anchor bolt material shall be ASTM A325 unless otherwise noted.
- B. Unless otherwise noted, bolts for the connection of carbon steel or iron shall be steel machine bolts; bolts for the connection of galvanized steel or iron shall be galvanized steel or stainless steel machine bolts; and bolts for the connection of aluminum or stainless steel shall be stainless steel machine bolts.
- C. Adhesive capsule anchors shall be a two-part stud and capsule chemical resin anchoring system. Capsules shall contain premeasured amounts of polyester or vinyl ester resin, aggregate and a hardener contained in a separate vial within the capsule. Stud assemblies shall consist of an all-thread anchor rod with nut and washer. Adhesive capsule anchors shall be Hilti, HIT-RE 500-SD Adhesive Anchor or equal.
- D. Adhesive anchors, for fastening to hollow concrete block or brick, shall be a three-part stud, screen and chemical dispenser anchoring system. Adhesive cartridges shall contain premeasured amounts of resin and hardener which are mixed and deposited in a screen tube by a dispenser. Stud assemblies shall consist of an all-thread anchor rod with nut and washer. Anchors shall be Hilti, HIT HY-150 System or equal.

## 2.04 METAL GRATING

- A. Grating shall have rectangular, 3/16-in thick, bearing bars spaced 1-3/16-in on center with cross bars spaced at 4-in on center. All grating panels shall be banded with a bar the same size as the bearing bars.
  - 1. Grating shall be of the same depth shown on the Drawings, not exceed the fabricator's maximum recommended span, and meet or exceed the following load and deflection criteria for the maximum span length at the opening being covered by the grating.
    - a. The grating shall produce a deflection of 1/360 of the span or less under a uniform live load of 200 lbs/sq ft on the maximum span.
    - b. The grating shall produce a deflection of 1/360 of the span or less under a concentrated live load of 300 lbs applied at the mid point of the maximum span.
  - 2. Openings 2-in or greater in diameter/dimension and grating edges shall be banded with a bar of the same depth and thickness as the bearing bars. Cut bearing bars or cross bars shall be welded to the banding bar.
  - 3. Provide trench grating with symmetrical cross bar arrangement.
  - 4. Grating clamps, nuts, bolts, washers and other fastening devices for grating and grating supports shall be Type 316 stainless steel. Anchor blocks, when used, shall be of the same material as the grating. All grating shall be anchored to the supporting system using saddle clips.
- B. Aluminum grating material shall be aluminum alloy 6063-T6 with a mill finish. Cross bars shall be attached to the bearing bars with interlocked swaged joints. The grating shall be Type BS by IKG Borden, Houston, TX; Type 19 SG-4 by Ohio Gratings, Inc., Canton, OH; Type 19S4 by Seidelhuber Metal Products, San Carlos, CA or equal.

## 2.05 RAILINGS

- A. Handrail and railing systems shall comply with the requirements of OSHA and IBC.
- B. Aluminum railing and handrail shall be a welded or mechanically fastened, seamless, extruded aluminum pipe system. Rails shall be 6063-T6 alloy. Posts shall be 6061-T6 alloy. Splice and reinforcing sleeves, brackets, end caps, toeboards, etc, shall be aluminum alloy 6063-T6 or 6061-T6. Railing system fastening hardware shall be Type 316 stainless steel. After welding, aluminum shall be anodized. All railing, posts, toeboards and exposed aluminum shall be anodized with an architectural Class I satin finish providing a minimum coating thickness of 0.7 mils and a minimum coating weight of 32 milligrams per square inch in compliance with AA M12C22A41
- C. Railings shall be 2 rail welded railing systems, as shown on the Drawings, fabricated with 1-1/2-in nominal diameter pipe. Posts shall be Schedule 80 pipe, minimum and rails and handrail shall be Schedule 40 pipe, minimum. Posts and top rails shall be continuous. Spacing of posts shall not exceed 5-ft on center and shall be uniformly spaced except as otherwise shown on the Drawings. Posts will be required on each side of structure expansion joints. All railing posts shall be vertical.
- D. Welds shall be circumferential welds ground smooth and even to produce a railing that is neat in appearance and structurally sound. Welding methods shall be in conformity with AWS standards for the materials being joined. All rails to post connections shall be coped and fastened by continuous welds. There shall be no burrs, sharp edges or protrusions on any weld on any part of the handrail system. After fabrication, the welds and surrounding area shall be cleaned and hand buffed to blend with the adjacent finish. All mechanical fasteners shall be unobtrusively located in countersunk holes with the top flush with the surface of the rail. Bends in the railing shall be as indicated by the Drawings. No distortion of the circular railing shape will be allowed. Bends and terminal sections shall be made without the use of fittings. Corner bends shall be mitered and welded bends.
- E. Railing shall be assembled in sections as long as practical but shall not be greater than 24-ft in length. A field splice shall be used when an assembled section is to be attached to another section. Field splices shall be used in all railing panels that cross over structure expansion joints.
  - 1. Field splices shall use internal splice sleeves located within 8-in of railing posts. The sleeve shall be welded to the rail on one side and fastened with a set screw to the rail on other side. The field splice shall be detailed to take the differential expansion between the railing system and the supporting structure.
  - 2. When the field splice occurs in a railing panel crossing a structure expansion joint, the sleeve shall be welded to the rail on one side and be free to slide in the rail on other side. The field splice shall be detailed to take the same movement as the structure expansion joint.
- F. The bases or supports for railing posts and handrail shall be the types indicated on the Drawings.
  - 1. Aluminum railing posts, which may collect condensation, shall have a 3/16-in drain hole drilled immediately above the concrete encased area, the base flange, or supporting socket on the side away from the walking area. The bottom of the rail post between the

drain hole and the bottom of the post shall be filled with an inert material such as a compressed closed cell neoprene rod.

2. Where handrail is to be fastened to walls, the rails shall be provided with screwed wall flanges fastened to the walls with three 3/8-in stainless steel flat head machine screws. The horizontal projection of the handrail support off the wall shall provide 2-1/2-in minimum clearance below the bottom of the handrail.
- G. Toeboards shall be provided on all railing adjacent to a drop in elevation of 4-ft or more. Toeboards are not required on the inclined portion of stairway railings or where concrete or steel curbs, 4-in or more in height, are present. Toeboards shall be 4-in high plates of the same material as the railing. The plates shall have a minimum thickness of 1/4-in. Toeboards shall be positioned with a maximum clearance of 1/4-in from the floor and fastened to railing posts with 1/4-in stainless steel U-bolts, with J-bolts at corner posts and with clip angles and two 1/4-in stainless steel expansion bolts at walls.
- H. All railings shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed. After protective materials are removed, the surfaces shall be made clean and free from stains, marks, or defects of any kind.

## 2.06 MISCELLANEOUS ALUMINUM

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Welding shall be on the unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous aluminum items shall include: beams, angles, closure angles, grates, floor plates, stair nosings and any other miscellaneous aluminum called for on the Drawings and not otherwise specified.
- D. Stair treads for aluminum stairs shall have abrasive non-slip nosing as approved.

## 2.07 MISCELLANEOUS STEEL

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous steel items shall include: beams, angles, lintels, metal stairs, support brackets, base plates for other than structural steel or equipment, closure angles, bridge crane rails, monorail hoist beams, holddown straps and lugs, door frames, splice plates, subframing at roof openings and any other miscellaneous steel called for on the Drawings and not otherwise specified.
- D. All steel finish work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust and foreign matter and shall be given one shop coat of primer compatible with the finish coat after fabrication but before shipment. Paint shall be omitted within 3-in of proposed field welds. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces.
- E. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Coating shall be not less than 2 oz/sq ft of surface.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install all items except those to be embedded in concrete or other masonry which shall be installed under Division 3 and Division 4 respectively. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.
- B. Abrasions in the shop primer shall be touched up immediately after erection. Areas left unprimed for welding shall be painted with primer after welding.
- C. Zinc coating which has been burned by welding, abraded, or otherwise damaged shall be cleaned and repaired after installation. The damage area shall be thoroughly cleaned by wire brushing and all traces of welding flux and loose or cracked zinc coating removed prior to painting. The cleaned area shall be painted with two coats of zinc oxide-zinc dust paint conforming to the requirements of Military Specifications MIL-P-15145. The paint shall be properly compounded with a suitable vehicle in the ratio of one part zinc oxide to four parts zinc dust by weight.
- D. Specialty products shall be installed in accordance with the manufacturer's recommendations..
- E. Install adhesive capsule anchors using manufacturer's recommended drive units and adapters and in compliance with the manufacturer's recommendations.
- F. All railings shall be erected to line and plumb.

- G. All steel surfaces that come into contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.
- H. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.
- I. Where aluminum contacts masonry or concrete, apply a heavy coat of approved alkali resistant paint to the masonry or concrete.
- J. Between aluminum gratings, aluminum stair treads, or aluminum handrail brackets and steel supports, insert 1/4-in thick neoprene isolator pads, 85 plus or minus 5 Shore A durometer, sized for full width and length of bracket or support.

END OF SECTION

## SECTION 15151

### SLIDE GATES AND APPURTENANCES

#### PART 1 GENERAL

##### 1.01 DEFINITIONS OF GATE TERMINOLOGY

- A. *Gate Leaf* – The cast or fabricated body of the gate; the moving part that controls flow, which is guided to and from the gate frame, within its guides, by the gate hoist under power or by its own weight.
- B. *Gate Guide* – The guides and rails installed within the gate slot, which serve to guide the gate leaf to and from the mounting and sealing surfaces on the gate frame. There can be more gate guides than gate leaves.
- C. *Gate Frame* – The component at the opening to the channel, conduit or penstock; or within a conduit or tunnel structure and contains the sealing surfaces (seal plates) that mate to the metallic or elastomer seals on the gate leaf. On cast iron roller gates the sealing surfaces on both the gate leaf and frame are metallic. There can be more gate frames and guides than gate leaves.
- D. *Non-Self-Contained Gate* – A vertical-lift gate having a gate leaf, guides, frame and hoist furnished as separate components, to be surface-mounted to or encased within the channel or conduit. These gates impart dynamic structural loads to the channel, outlet wall and hoist support structure. Loads imparted on the supporting structures by hoists utilized with these gates must be added to those required by code.
- E. *Self-Contained Gate* – A vertical-lift gate having a gate leaf, guides, frame and yoke-mounted hoist furnished as an assembled unit, surface-mounted to or encased within the channel or conduit. These gates can be shipped within their guides and frame or separate to be assembled in the field. The loads to the supporting structure created by these gates are limited to the dead load from the assembly. No dynamic load is imparted by the gate or hoist to the concrete hydraulic structures.
- F. *Slide Gates* – Vertical-lift gates mounted on metallic and/or plastic slides on the gate leaf, guides and gate frames. The terms “slide gate” and “sluice gate” are interchangeable. However, the term “slide gate” will be used in this Section. Slide gates are classified by the material of construction, which include wood timbers with cast iron fixtures; fiberglass reinforced plastic; iron and copper alloy castings; and fabricated metal weldments. The material of construction is the prefix in the descriptor for a gate design (i.e. cast iron slide gate, fabricated stainless steel slide gate, etc...). The sealing surfaces can be elastomer-to-metal, elastomer-to-elastomer or metal-to-metal in configuration. The slide is the gate mounting, supporting the gate during its travel to and from the gate frame under the hydraulic load. The gate slide is separate from the sealing surfaces. Slide gates can open upward or downward.
- G. *Weir Gate* – A vertical lift gate that lowers to open.
- H. *Bulkhead* – This term defines the service classification for a vertical-lift gate. The term bulkhead gate can also be used interchangeably with “stop plate” and “stop gate”. Bulkhead gates are used

to temporarily isolate conduits, penstocks, channels and hydraulic machinery for maintenance. Bulkhead gates are typically stored in their guides using a dogging device, or removed and stored outside its guides after each maintenance outage.

- I. *Regulator* – This term defines the service classification for a vertical lift gate. These gates are permanently installed in their guides and used for flow control, isolation and emergency guard service for hydraulic turbines and outlet works. Regulating gates can be the conventional or self-contained type.
- J. *Drive* – A mechanism that positions the gate stem by an “operator” or powered actuator. They include stem nuts, bevel gears, spur gears, parallel shaft gearboxes, etc.
- K. *Hoist* – A manual, electric or fluid power operated device that positions the gate via the drive or directly connected to the gate stem. Operators, actuators and drives shall be positioned on the valve and oriented as illustrated on the drawings.

#### 1.02 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to provide slide gates and appurtenances shown on the Drawings and specified herein.
- B. One 5 ft x 5 ft metal-seated, non-self-contained cast iron slide gate shall be furnished for the lower outlet at Lake Munson Dam. The gate shall be operated by a rising stem and a bevel gear driven floor stand. The floor stand shall be operable with a portable operator.
- C. One 2 ft x 2 ft metal-seated; non-self-contained cast iron wier (inverted slide) gate shall be furnished for the upper outlet at Lake Munson Dam. The gate shall be operated by a rising stem and a bevel gear driven floor stand. The floor stand shall be operable with a portable operator.

#### 1.03 RELATED WORK

- A. Miscellaneous metals and related work are included in Section 05500.

#### 1.04 SUBMITTALS

- A. Submit, in accordance with Division 1, design calculations, shop drawings and product data showing materials of construction and details of installation as specified herein. In the event it is not possible to conform to certain details of this Section, describe completely all non-conforming aspects. The following information shall be submitted at a minimum:
  - 1. Calculations showing anchor bolt selection, and hoist selection and design calculations, in accordance with the design criteria specified herein. Calculations shall be signed and sealed by a Professional Engineer registered in the state where the project site is located. This submittal shall be submitted separate from all other submittals required under this section.
  - 2. P.E. Certification Form included in Division 1.
  - 3. A complete bill of materials.

4. Descriptive literature, bulletins and/or catalog cut sheets with notations showing selections for all commercially obtained components. Each cut sheet shall be marked with corresponding part number from the bill of materials.
  5. Detailed shop drawings for all custom designed and fabricated components signed and sealed by a Professional Engineer registered in the state where the system is designed. The drawings shall include a parts list, including the part number, description, material of construction and weight for each component.
  6. Field installation drawings and manuals shall provide a detailed description of the field installation procedures. The description shall include the location and method of support, and handling of equipment; provisions to be taken to protect concrete and other work during installation; method of maintaining components in correct alignment; descriptions of connections, anchorages, and measuring equipment required; dimensioned drawings showing anchor bolt locations; recommended bolting procedure and the minimum and maximum torque required.
  7. Contractors procedure for aligning gate guides and frame, and methodology for demonstrating alignment to the Engineer during the Gate Guide and Frame Alignment inspections.
  8. Description of surface preparation and shop prime painting for ferrous metal components and accessories.
  9. Manufacturer's list of recommended spare parts.
- B. The following descriptive installation and operation information shall be included in the submittal:
1. A narrative of the system operation procedures.
  2. A layout drawing and step-by-step description of the field assembly, installation and start-up procedures.
- C. The following operation and maintenance data shall be included in the submittal:
1. Operating and maintenance instructions for each system component furnished. All non-applicable information shall be crossed out, and applicable information specific to this installation clearly marked and described.

#### 1.05 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC)
  1. Steel Construction Manual
- D. American Society for Testing and Materials (ASTM)
  8. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes

9. ASTM A380 – Standard Specification for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
  11. ASTM A564 – Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
  14. ASTM B30 – Standard Specification for Copper Alloys in Ingot Form
  15. ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings
  18. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
- E. American Society of Mechanical Engineers (ASME)
1. ASME B1.1 – Unified Inch Screw Threads (UN and UNR Thread Form)
  2. ASME B1.5 – ACME Screw Threads
  3. ASME B17.1 – Keys and Keyseats
  4. ASME B17.2 – Woodruff Keys and Keyseats
  5. ASME B18.2.1 – Square and Hex Bolts and Screws, Inch Series
  6. ASME B18.2.2 – Square and Hex Nuts
  7. ASME B18.6.2 – Slotted Head Cap Screws, Square Head Set Screws and Slotted Headless Set Screws: Inch Series
  8. ASME B31.3 – Process Piping
  9. ASME B40.1 – Pressure Gauges and Gauge Attachments
  10. ASME B46.1 – Surface Texture, Surface Roughness, Waviness and Lay
  11. ASME Y14.5M – Dimensioning and Tolerancing
  12. ASME Boiler & Pressure Vessel Code
- F. The Society for Protective Coatings (SSPC)
1. SSPC-SP 1 – Joint Surface Preparation Standard SSPC-SP 1: Solvent Cleaning
  2. SSPC-SP 10/NACE No. 2 – Joint Surface Preparation Standard SSPC-SP 10/NACE No. 2: Near-White Blast Cleaning
- G. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

## 1.06 QUALITY CONTROL AND QUALITY ASSURANCE

- A. Quality control (QC) for the design, fabrication and installation of the products specified herein shall be the responsibility of the manufacturer, including all QC procedures in the shop and field required to comply with this Section. Quality assurance (QA) during manufacturing, delivery to the project site and installation shall be the responsibility of the Contractor. The Owner shall retain the services of industry specialist and the Engineer to perform additional QA inspections, examinations and testing to verify compliance with this Section. The details and acceptance criterion for the Owner's examinations and testing are included in Part 3 below. The Contractor and manufacturer shall allow unhindered access to the Engineer, inspection staff and the Owner's personnel, including access for progress photographs and video documentation of the work.
- B. If work is rejected during the Owners QA examinations and testing, additional QA inspections and examinations performed on corrected work shall be paid for by the Contractor. Reimbursement for subsequent QA inspections shall include the following:
  - 1. All repeat testing and/or inspection related costs, including costs associated with inspection staff; laboratory analysis; and testing or inspection result analysis by the Engineer, Owner, or Owner's representative.
  - 2. Travel expenses to the location of inspection (e.g. manufacturer's facilities, project site, etc.) for one Owner representative and one Engineer representative to perform repeat QA inspections. These expenses shall include airfare for direct flights (if available), hotel accommodations and a per diem amount in accordance with the current GSA per diem rate for the location of inspection GSA region.
  - 3. Travel expenses for travel outside the United States of America shall be as described above with the exception that a per diem rate of \$100.00 shall apply.
- C. The gates specified under this Section shall be designed, manufactured and furnished by Manufacturers who are fully experienced and qualified in the manufacture of the equipment specified. All equipment shall be designed, constructed and installed in accordance with the requirements of this Section.
- D. All equipment furnished under this Section shall be new and unused products of Manufacturers having a successful record of manufacturing and servicing the equipment specified herein for a minimum of 10 years.
- E. Should alternative Manufacturers not named be offered by the Contractor, as a recommended equal to that specified, such equipment shall be acceptable only on the basis that any revisions in the design and/or construction of the structure, appurtenant equipment, etc. required to accommodate such a substitution, shall be design and installed by the Contractor and manufacturer at no additional cost to the Owner following approval by the Engineer.
- F. The Contractor shall submit to the Engineer, 4 copies of all certified mill test reports for corresponding ladle analysis for each heat for castings and bar stock materials, and mechanical properties including tensile and impact test results on test bars from castings. The mill test reports shall identify the components for which the material will be used, by part number, and information necessary to verify compliance with this Section.

- G. A factory representative who has complete knowledge of proper operation and maintenance of the equipment provided under this Section shall be provided for two (2) 8-hour days to inspect the installation of the equipment and instruct representatives of the Owner and Engineer on the proper operation and maintenance. Manufacturer's sales representative and/or distributor staff shall not be used for installation inspection, start-up and training of the Owners operations personnel. The work hours described above shall not include travel time. The Contractor shall only be paid for the hours specified above.
- H. If there are difficulties in operation of the equipment, due to the manufacturer's design or workmanship, or improper installation by the Contractor additional service to correct the deficiencies shall be provided at no change in Contract Price or Contract Time to correct the problems and meet the acceptance testing requirements specified below.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. The Contractor shall be responsible for protecting the work and products specified herein after it departs from the manufacturer's facility. Gate leaves, guides, frames and appurtenances shall be covered to protect them from physical damage, such as rubbing, abrasion and exposure to sunlight where it can be detrimental to coatings.

#### 1.08 WARRANTY

- A. In addition to the manufacturer's standard guarantee, the Contractor shall include the services of a factory-trained service person to provide repair service for the equipment for the period of 2 years commencing with the time the equipment is placed in continuous permanent operation. This service shall include the cost of all replacement parts required during the interval.
- B. The Manufacturer and Contractor shall warrant all equipment supplied under this Section for a period of 1 years from the date substantial completion has been issued to the Contactor.
- C. The Manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision shall be allowed.

### PART 2 PRODUCTS

#### 2.01 GENERAL REQUIREMENTS AND DESIGN CRITERIA

- A. The Contractor shall engage the services of a designer/fabricator who shall assume unit responsibility for design and fabrication of the gate leaves, guides and embedded parts, accessories and all appurtenant items as specified herein. The gate designer/fabricator shall meet the experience requirements specified in paragraph 1.05 above. Gate designer/fabricators that meet these experience requirements include the following:
  - 1. Rodney Hunt Company, Orange, Massachusetts.
  - 2. Hydro Gate, Commerce City, Colorado.
  - 3. Whipps, Inc., Athol, Massachusetts.
  - 4. Waterman Industries, Inc., Exeter, California.

- B. Mechanical and structural design criteria shall meet the following limitations set forth by this specification. Allowable stresses in tension and compression for design of structural components, threaded fasteners, etc., are provided in the paragraphs below.
1. Allowable stresses in tension and compression for rolled steel and stainless steel shall be 33% of the yield stress; and 20% of the ultimate tensile strength.
  2. Allowable stresses in tension and compression for steel and stainless steel anchors, cap screw, nuts and other fastening components shall be 33% of the yield stress; and 20% of the ultimate tensile strength.
  3. Allowable stresses in tension and compression for rolled steel and stainless steel shall be 33% of the yield stress; and 20% of the ultimate tensile strength.
  4. Allowable stresses in tension and compression for carbon steel and stainless steel castings shall be 33% of the yield stress; and 20% of the ultimate tensile strength.
  5. Allowable stresses in tension and compression for gray iron castings shall be 10% of the yield stress in tension; and 50% of the ultimate tensile strength in compression.
  6. Allowable stresses in tension and compression for machined bronze castings shall be 10% of the yield stress; and 20% of the ultimate tensile strength.
  7. Shear stress for the materials described above shall not exceed 0.6 times the allowable tensile stress, except for cast iron, which shall be equal to the allowable tensile stress.
  8. Allowable stresses for fiberglass reinforced plastic composite sheets and shapes shall be limited to 0.4 times the yield stress of the combined layers of the laminate materials. Gates shall be suitably reinforced to withstand the maximum head with a deflection at the maximum operating head of less than 1/180 of the gate width, or 1/4 inch, whichever is less. Dimensional distortion under the maximum net head shall not produce a crown of more than 1/16 inch in any direction throughout the entire gate.
- C. Ground or machined finishes shall be denoted on the shop drawings in micro-inches root-mean-squared ( $\mu$ inches RMS) in accordance with the requirements of ASME B46.1. Except as otherwise specified or illustrated on the drawings, machined finishes with surface roughness shall not exceed the following:
1. 29- $\mu$ inch Ra – This finish shall apply to plain sleeve (journal) bearings, shaft surfaces in contact with journal bearing areas, and sealing surfaces for shafts.
  2. 57- $\mu$ inch Ra – This surface finish shall apply to all metal surfaces in sliding contact.
  3. 113- $\mu$ in Ra – This surface finish shall apply to exposed surfaces of shafts and metal seating faces in permanent contact where a tight joint is required.
  4. 225- $\mu$ inch Ra – This surface finish applies to seating faces in permanent contact where a tight joint is not required.

5. 450- $\mu$ in Ra – For all other machined finishes.

- D. The gate manufacturer shall be responsible for determining the correct mechanical drive size and configuration; and the leaf, guide and frame design suitable for the flow conditions described below and illustrated on the Contract drawings. Gate hoists shall be designed having sufficient strength and function smoothly and efficiently under all conditions specified when installed properly. All hoist components subject to periodic replacement shall be readily accessible with minimum dismantling of the equipment involved. The assembly shall be designed to prevent vibration and detrimental dimensional distortion during operation under all operating conditions specified.

## 2.02 CAST IRON HEAVY-DUTY SLIDE GATES

- A. Cast iron heavy-duty slide gates shall be installed where scheduled and illustrated on the drawings. Cast iron slide gates shall include the gate leaf, frame, wall thimble, stem, and stem guides.
- B. The gate leaf, frame, guide extensions and wall thimble shall be constructed of ASTM B126, Class B fine grain gray cast iron. The front face of the thimble shall be machined and holes drilled and tapped for attaching the gate frame. Studs shall be constructed of ASTM F593, Alloy Group 2 stainless steel. Nuts shall be constructed of ASTM F594, Alloy Group 2 stainless steel.
- C. The vertical centerline shall be clearly marked at top and bottom ensuring proper alignment of the front face in the vertical plane. Wall thimbles shall be internally braced during concrete placement to prevent warping. Square thimbles shall be provided with holes in the invert to allow satisfactory concrete/grout placement beneath the thimble. Holes shall be on centers of 24 inches or less. An SBR red rubber gasket of uniform thickness shall be used to form a seal between the front face of the thimble and the back of the gate frame.
- D. Wall thimbles (1 through 5 below, letter designation) and guide configuration (6 through 13 below, SG# designation) shall be available in the following configurations, and the designations defined below are used to identify the proper guide/frames on the drawings and on the attached schedule:
1. L – Cast metal embedded wall thimble for cast metal slide gates, having unlimited wall depths, and a single flange for flush mounting at the gate side of the wall.
  2. F – Cast iron embedded wall thimble for unlimited wall depths, having a single large flange for flush mounting at the gate side of the wall and a single water stop.
  3. C – Cast iron embedded wall thimble for limited wall depths, having a double flange for flush mounting at each side of the wall.
  4. E – Cast iron embedded wall thimble for limited wall depths, having two long flanges at each end for flush mounting at each side of the wall and a water stop on.
  5. FB – Cast iron embedded wall thimble having a circular Type F configuration on one end and a mechanical joint bell on the other end, to receive a pipe spigot end.
  6. SG1 – Slide gate frame, non-self-contained, surface-mounted within or at the entrance or

turnout end of a channel or conduit.

7. SG2 – Slide gate frame, non-self-contained, concrete encased within a channel or conduit walls.
  8. SG3 – Slide gate frame, self-contained, surface-mounted at the end of a channel or conduit.
  9. SG4 – Slide gate frame, self-contained, concrete encased within or at the entrance or turnout end of a channel or conduit.
  10. SG5 – Slide gate frame, non-self-contained with flush-bottom elastomer seal configuration; surface-mounted within or at the entrance or turnout end of a channel or conduit.
  11. SG6 – Slide gate frame, non-self-contained with flush-bottom elastomer seal configuration; concrete encased within a channel or conduit walls.
  12. SG7 – Slide gate frame, self-contained with flush-bottom elastomer seal configuration; surface-mounted at the end of a channel or conduit.
  13. SG8 – Slide gate frame, self-contained with flush-bottom elastomer seal configuration; concrete encased within or at the entrance or turnout end of a channel or conduit.
- C. The gate leaf shall be circular, square or rectangular in shape with integrally cast vertical and horizontal reinforcing ribs. The gate leaf shall have heavy reinforcing ribs along each side sized to create rigidity between side wedges. The gate leaf shall be designed to operate under the seating and unseating heads entered into the gate schedule with the minimum safety factory of five. A nut pocket shall be cast on the vertical centerline of the gate configured to attach the stem to the gate leaf. The gate stem block shall be designed for installation in the nut pocket, and shall be constructed of ASTM B584, Grade C865 manganese bronze.
- D. The gate frame and guides shall be a one piece integral casting. Guide grooves shall be machined parallel on all contact faces. Overall clearances with slide tongue shall be not more than 1/8 in. Guide grooves for regulator gates shall be sized to support at least one-half of the gate leaf when it's in the full open position. Frames with a spigot-back arrangement are not allowed. Gates having round openings shall have a circular flange cast as part of the frame for mounting to a wall or pipe flange. Wall thimble-mounted gates shall have a square or rectangular flanged-back frame. The frame shall be fully machined and drilled to match the wall thimble.
- E. The leaf seats and frame seats shall be constructed on ASTM B98, Grade C651 silicon bronze and have dovetail construction. Seating faces shall be mounted around the perimeter of the gate leaf and frame. They shall be mechanically impacted into dovetail slots and held in position without use of screws or other fasteners. After mounting, they shall be machined to a plane with a 57  $\mu$ inch Ra finish or better. When the gate leaf is in the fully closed position and wedged against the gate frame, maximum clearance between seating faces shall not exceed 0.004 in. The Engineer shall inspect the clearance with feeler gage stock prior to commissioning.
- F. Gate stems shall be sized to withstand the axial compressive and tensile forces created during gate operation under the specified seating and/or unseating heads transmit thrust in compression at two times the rated output of the hoist, as a minimum, with a 40-lb effort on the crank or

handwheel operator, or 1.25 times the stall thrust of the electric-motorized hoist. The thread form on stems, used with manual operators and electric-motorized hoists, shall be die-formed ASME B1.8 29° Acme threads. Machine cut threads shall not be allowed. The contact surfaces of the threads shall have a maximum 14 μinch Ra finish. Stem couplings shall have internal threads for transmitting the full thrust of the stem and shall be keyed in place, simultaneously engaging the coupling and both stems. The gate stem and stem couplings shall be constructed of ASTM A276, Type 316 stainless steel.

- G. Each gate shall be provided with a sufficient number of wedges to minimize leakage. Wedges and wedge blocks shall be constructed of ASTM B584, Alloy C862 or equivalent. Side wedging devices shall be designed to make full metal-to-metal contact with the overhung portion of the frame-mounted wedge block. Wedges shall be fully adjustable and keyed to prevent any lateral rotation. Side wedges shall be machined with angled faces and secured with a stud bolt to prevent any slippage during operation of the gate. Gate shall be designed with adjustable top and bottom wedges attached to the gate frame and leaf. The top and bottom wedges shall be mounted in a machined slot and bolted to the slide to prevent lateral rotation. All contact faces of wedges and wedge blocks shall be machined to a 57 μinch Ra finish or better.
- H. Stem guides shall be fully adjustable, heavy duty ASTM A126, Grade B gray iron castings, with 2 piece cast bronze removable collars. The stem guides shall be properly spaced to support the stem as a long column, with maximum spacing not to exceed an l/r of 200.
- I. Cast iron heavy-duty slide gates shall be manufactured be:
  - 1. Rectangular Slide Gates manufactured by Rodney Hunt Company, Orange, Massachusetts.
  - 2. Model 100-30 manufactured by Hydro Gate, Commerce City, Colorado.
  - 3. Series 5000 manufactured by Waterman Industries, Inc., Exeter, California.
  - 4. Series 400 manufactured by Whipps, Inc., Athol, Massachusetts.

### 2.03 ELECTRIC OR HYDRAULIC OPERATED PORTABLE RISING-STEM GATE HOISTS

- A. Electric or hydraulically operated rising stem floor stand hoists shall be mounted to the deck above non self contained slide or wier gates, having thrust loads within their operating range. The hoist design shall include a bevel geared drive having a centralized thrust nut mounted on rolling-element anti-friction bearings encased in a permanently lubricated housing. The thrust nut shall be constructed of ASTM B584, Grade C865 manganese bronze machined, having internal ASME B1.5 general purpose centralizing ACME threads. The nut housing shall be constructed of ASTM B126, Class B fine-grain gray cast iron, permanently sealed for outdoor installation, regardless of the installation location. Floor stand hoists shall be furnished with one of the portable operators specified below. The hoist design shall include an operating (thrust) nut mounted on rolling element anti-friction bearings encased in a lubricated housing.
- B. Electric portable operators shall be 120 volt single phase power rated for continuous duty. The portable electric operator shall be capable of reversing operation for both raising and lowering the gate. A flexible coupling overload release clutch shall be included with the electric operator to prevent overloading the electric operator. The overload clutch shall feature user adjustable

torque selection. The assembly shall be capable of developing 70 foot-pounds of torque. A tripod shall be furnished with the electric operator.

- C. Gasoline powered hydraulic portable operators shall be capable of reversing operation for both raising and lowering the gate. A pressure relief valve shall be provided and set for a hydraulic motor output maximum of 50 foot-pounds. If brackets were not furnished with the hoists, brackets shall be provided with the hydraulic operator to suit the hoists to be operated. The hydraulic unit shall be furnished with 300 SSU grade hydraulic oil. The hydraulic

#### 2.04 THREAD SEALANTS

- A. Type TS1 thread sealants shall be used for general mild aqueous fluid applications. Thread sealants to be used in drinking water applications shall be NSF 61 approved. Type TS1 thread sealants for natural waters and other aqueous applications shall be:
  - 1. Blue Goop® oil-based PTFE enriched thread sealant (up to 350°F), manufactured by Swagelok, Solon, Ohio.
  - 2. Silver Goop® oil based high-temperature thread sealant (up to 1500°F) manufactured by Swagelok, Solon, Ohio.
  - 3. RectorSeal Tru-Blu Thread Sealant, manufactured by RectorSeal, Houston, Texas.
  - 4. Brush-on Blue Block Thread Sealant, manufactured by Hercules Chemical Company, Passaic, New Jersey.

#### 2.05 FABRICATED STEEL OPERATOR AND STEM COVER PRIMER AND COATING

- A. Fabricated steel operators and stem covers shall receive a high performance coating system. The primer and finish coatings shall be:
  - 1. One coat of Hydro-Zinc® Series 91-H2O® moisture-cured zinc-rich primer to 3.0 mils DFT; one intermediate coat and one topcoat of Hi-Build Epoxyline II polyamidoamine epoxy to 4.0 mils DFT each, manufactured by TNEMEC Company, Kansas City, Missouri.
  - 2. One coat 5.0 mils DFT of Carbozinc® 859 zinc-rich primer; one intermediate coat and one topcoat of Carboguard® 888 epoxy polyamide to 5.0 mils DFT each; manufactured by Carboline, St. Louis, Missouri.
  - 3. One coat MC-Zinc 100 moisture cured urethane organic zinc-rich primer to 5.0 mils DFT; one intermediate and one final coat MC Tar coal tar epoxy each to 7.0 mils DFT, manufactured by Wasser Corporation, Auburn, Washington.

### PART 3 EXECUTION

#### 3.01 SHOP FABRICATION AND ASSEMBLY

- A. Shop assembly shall include the attachment of all accessories to the gate leaf. Seal assemblies shall be attached to the gate leaf during shop assembly and removed for shipment. The rubber seals of the assemblies shall be accurately fitted and drilled to match the seal retainers, match marked, and removed for shipment.
- B. Shop assembly requirements for gate leaf, guides, frame and appurtenant items shall be as illustrated on the approved shop drawings. Gate, frame, guides, and appurtenant items

shall be assembled completely in the shop prior to shop testing to avoid distortion of the gate leaf and attached components during fabrication, and assure successful shop inspection and erection in the field.

- C. Adequate support shall be provided during assembly to maintain components within 2 mm 1/16 inch of actual installation planes.
- D. Shop assembled components shall be delivered assembled, if practically permitted by shipping and field installation conditions, with the exception of gate seals. Assembled components shall be shop welded in their final positions in so far as delivery and field installation conditions allow.
- E. Match-mark and register unassembled components that will be disassembled and preserved until the components are assembled. Seal assemblies shall be attached to the gate leaf during shop assembly and removed for shipment. Elastomer rubber seals shall be accurately fitted and drilled to match the seal retainers, match marked, and removed after the shop inspection for shipment.
- F. Gate leaves shall be completely assembled prior to the shop inspection being shipped to the site. All necessary precautions shall be taken to avoid distortion of the gate leaf and attached components during fabrication.

### 3.02 CONTROL OF FREE-IRON CONTAMINATION ON STAINLESS STEEL PARTS

- A. Rust spots on stored stainless steel components are nearly always due to free iron surface contamination, and shall not be allowed. If free iron is not removed deep corrosion pits can result, especially in an aqueous process environment (water or wastewater). Stainless steel gate components shall be inspected by the Engineer and Contractor upon delivery, and stored in a location that will prevent entry of contaminants prior to erection. The Contractor shall be responsible for protection of all roller gate components during storage, and adhere to the following mandatory requirements:
  - 1. All stainless steel materials shall be protected from contact with carbon steel from fabrication to start-up. Protect stainless steel components from contaminant sources including but not limited to hoisting and rigging equipment, steel tables, storage racks and hand tools.
  - 2. Weldments shall not be bundled using ferrous metal banding in the shop, during shipment and at the distributor's facility.
  - 3. Contact and wear surfaces of tools used for carbon steel fabrication shall not be used for fabrication of stainless steel gate components in the shop or field. These include abrasive grinding and cutting wheels and all edge bearing tools.
  - 4. All manual or powered wire brushes used for surface finishing stainless steel components shall be manufactured from stainless steel as specified below. No brushes with carbon steel wire shall be used for surface finishing processes of stainless steel components.
  - 5. All on-site carbon steel cutting and blasting operations shall be shielded to protect stored and installed stainless steel gate components.

6. All exterior surface scratches, surface contamination by ferrous metal grinding kerf, and contamination by paint markers and crayons etc. during storage shall be removed prior to fabrication and erection in the field.
- C. Stainless steel surfaces shall be examined by the Engineer for free iron contamination by the ferroxyl test. All contaminated surfaces shall be cleaned in the field by pickling using a lean spray-applied pickling cleaner suitable for large surfaces. Pickling shall be followed with passivation of the entire treated surface by a neutralizing rinse. The spray-applied pickling solution shall be:
1. Avesta Classic Cleaner 401®, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.
  2. Antox® 75E Pickling Cleaner, manufactured by Chemetall US, Inc., New Providence, New Jersey.
  3. Kytex® Brightener 123, manufactured/distributed by Harvard Chemical Research, Atlanta, Georgia.

### 3.03 APPLICATION AND INSPECTION OF SHOP PRIME AND FINISH COATINGS

- A. Fabricated gate leaves shall be primed and painted in the gate fabricators shop. The Contractor shall be responsible for performing all QC procedures necessary to be in compliance with this Section prior to QA inspections by the Owner and Engineer. Each gate leaf shall be solvent cleaned prior to abrasive blasting in accordance with SSPC-SP1. The surface to be coated must be dry, clean, dull, and free from dirt, grease, oil, rust, mill scale, salts or any other surface contaminants that interfere with adhesion.
- B. The gate leaf shall be blast cleaned in accordance with SSPC-SP 10 immediately prior to priming. Consult the coating manufacturer regarding required surface profiles. The following surface inspection and precleaning procedures shall be followed prior to abrasive Removal of the following surface defects shall be mandatory:
1. Undercutting or reverse ridges and sharp peaks along the weld bead.
  2. Weld spatter on or adjacent to the weld or any other area to receive coatings.
  3. Embedded pieces of electrode or wire flush with the adjacent surface of the weld bead.
  4. Oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
- C. The fabricator's coatings applicator shall utilize the equipment types, speed of travel and the type and size of abrasive to produce a surface profile that meets the coating manufacturer's recommendations for the particular coating to be applied; or not less than 20 percent of the specified coating thickness, whichever is more stringent.
- D. Abrasive media shall not be reused, unless abrasive is a recyclable as determined and documented by the manufacturer

- E. Notify Engineer at least 7 days prior to start of shop blast cleaning to allow for inspection of the work by the Owner or their representative during surface preparation and shop application of coatings. Work shall be subject to the Engineer's approval before shipment to the jobsite.
- F. Perform sandblasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed. Materials, equipment, procedures, shall meet requirements of Steel Structures Painting Council.
- G. After blasting and successful inspection of the surface preparation, clean surfaces of dust and residual particles from blasting operations by dry (no oil or water vapor) air blast cleaning or other method prior to coating system application. Vacuum clean enclosed areas and other areas where dust settling is a problem and wiped with a tack cloth. Coatings shall be applied to surfaces the same day they are sandblasted. Surfaces having rust/corrosion initiated on the surface shall be re-blasted prior to application of the coating system.
- H. The gate shall be shop primed and finish coated in accordance with the approved coating manufacturer's recommendations. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces. All surfaces to be painted as well as the atmosphere in which painting is to be done shall be kept warm and dry by heating and ventilation, if necessary, until each coat of paint has cured.
- I. Apply coatings in accordance with the paint manufacturer's recommendations. Paint units to be bolted together and to structures prior to assembly or installation. Power sand areas of chipped, peeled, or abraded coating and feather the edges. Follow with a spot primer using specified primer coating. For two-package or converted coatings, consult the coatings manufacturer for specific procedures as relates to top coating of products. After welding, prepare and prime holdback areas as required for the specified paint system.
- J. Coating system film thickness per coat shall be applied at the specified DFT, or the manufacturer's recommended minimum DFT, whichever is greater. Where the manufacturer has not specified a minimum coating thickness on the product data sheets, the minimum recommended coating application thickness shall apply. Maximum film build per coat shall not exceed the coating manufacturer's recommendations.
- K. Prior to application of finish coats, clean shop-primed surfaces of dirt, oil, and grease, and apply a mist coat of specified primer, 1.0 mil dry film thickness. Apply primer in accordance with manufacturer's instructions. Allow sufficient time between coats to assure thorough drying of previously applied paint.
- L. Surfaces near girders, stiffeners, intercostals and others having angles, edges, corners, threads and welds shall be strip-coated. Stripe coat shall be an extra coat of the intermediate or topcoat material. The stripe coat shall be a separate coat of paint from coats specified under the coating system. The minimum number of coats shall be as specified, irrespective of the coating thickness. Additional coats may be required to obtain the minimum required DFT, depending on method of application, differences in manufacturers' products, and atmospheric conditions.

- M. After equipment is delivered to the site, repair abraded areas on factory-finished items in accordance with the equipment manufacturer's directions. Carefully blend repaired areas into the original finish.
- N. The Contractor shall determine the DFT of the primer, intermediate and topcoats and the presence of holidays using DFT measurements and electrical inspection instruments and techniques. QC inspections shall be performed with properly calibrated instruments. Recoat and repair as necessary for compliance with the Specifications prior to the QA inspection by the Owner and engineer.
- O. All coatings shall be subject to inspection by the Engineer and/or the Owner's coating specialist. The Contractor shall arrange for the manufacturer's representative to visit jobsite during the QA inspection to confirm compliance with manufacturer's instructions and these specifications; and as may be necessary to resolve field problems attributable to, or associated with, manufacturer's products furnished under this Contract.
- P. Shop QA Coating Thickness Inspection:
1. The inspection shall be conducted as necessary at the fabrication or coating applicator's shop and without limitation. The test procedure shall be conducted as follows:
    - a. The coating system shall be visually inspected and to ensure proper and complete coverage has been attained. Particular attention shall be given to edges, angles, flanges, and other areas where insufficient film thicknesses are likely to be present and ensure proper coverage and integrity in these areas.
    - b. The coating system DFT, specified in mils, shall be measure with a magnetic type dry film thickness gauge. The magnetic type or electronic dry film thickness gauge used for this inspection test shall be:
      - i. Mikrotest manufactured by Nordson Corp., Anaheim, CA.
      - ii. Positector manufactured by DeFelsko Corp., Anaheim, CA,
      - iii. Or equal.
  2. The inspector shall check each coat for the correct DFT.
  3. The inspection of each coat shall not be conducted before a minimum of 8 hours cure/dry time between applications of each coat.
  4. Acceptance Criteria: Areas of the coating system not meeting the minimum DFT as specified above shall:
    - a. Be repair by the fabricator or coatings applicator in accordance with the coatings manufacturer's recommendations.
    - b. The designated deficient areas shall be re-tested by the Engineer after the minimum cure/dry time.

Q. Shop QA Coating Holiday Inspection:

1. The Engineer shall inspect the finish coating for holidays and discontinuities following the DFT inspection. The test shall be conducted with an electrical holiday detector, low voltage, wet-sponge type. The test procedure shall be conducted as follows:
2. The test shall be conducted with an electrical holiday detector, low voltage, wet-sponge type. The holiday detector shall be:
  - a. Model M-1 manufactured by Tinker and Razor, San Gabriel, CA.
  - b. Or equal.

R. Acceptance Criteria:

1. Holidays detected by the electrical inspection of the coating system shall be corrected as follows:
  - a. Holidays shall be repair by the fabricator or coatings applicator in accordance with the coatings manufacturer's recommendations.
  - b. The designated deficient areas shall be re-tested by the Engineer after the minimum cure/dry time.

3.04 SHOP QA INSPECTION AND TESTING

A. Shop inspections will be part of the Owner's QA procedures. The Owner and Engineer shall attend and perform the shop inspections described below. The Contractor shall provide 21 days notice prior to scheduling shop inspections required by this Section. All shop inspections and testing shall be performed indoors.

B. Shop QA Mechanical Tolerance Inspection:

1. Shop assembled components shall be inspected for accurate fit and compliance with dimensional tolerances. Sealing, guiding, and connecting surfaces shall be inspected for alignment, parallelism and uniform contact with opposing surfaces. The inspection shall be carried out as follows:
2. The gate leaf shall be assembled within the gate frame and uniformly blocked in the sealing position..

C. Acceptance Criteria:

1. It shall not be possible to insert a feeler gauge of greater than 0.005 inch thickness at any point between bearing bars and slide; and seals and seal plates.
2. This test shall be rechecked after erection at the site.

D. Match-mark and register components that require disassembly and preservation during shipment and storage at the site.

END OF SECTION

**Appendix A:**  
**Soil Borings and Laboratory Testing Data**

**2000 Geotechnical Investigation by  
Environmental and Geotechnical Specialists, Inc.**

# **APPENDIX A SOIL PROFILES**

# REPORT OF TESTS

PROJECT NAME: CUTOFF WALL FOR LAKE MINSON DAM  
 COUNTY: LEON  
 DISTRICT NO.: 03  
 SAMPLED BY: M. MCCONNELL  
 TESTED BY: S. MCCONNELL  
 DATE REPORTED: 7-14-00  
 SUBMITTED BY: M. HAYDEN

MATERIAL NO.	MOISTURE CONTENT		SPT VALUE	SIEVE ANALYSIS RESULTS							ATTERBERG LIMITS			CLASSIFICATION		
	NO. OF TESTS	% MOISTURE		NO. OF TESTS	4 MESH	10 MESH	20 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT		PLASTICITY INDEX	UNIFIED GROUP
1	3	10-42	3-10	--	--	--	--	--	--	--	--	--	--	SM	A-2-4	LOOSE SILTY FINE SAND WITH ORGANICS
2	7	3-9	11-22	100	100	97-99	80-91	15-31	9-12	--	--	--	--	SM	A-2-4	MEDIUM DENSE SILTY FINE SAND
3	6	15-22	6-11	--	--	--	--	--	--	--	--	--	--	SM	A-2-4	LOOSE SILTY FINE SAND
4	1	55	7	100	100	100	99	97	61	--	--	--	--	CH	A-7-6	SOFT PLASTIC CLAY
5	5	23-30	10-12	--	--	--	--	--	--	--	--	--	--	--	--	SOFT HIGHLY WEATHERED LIMESTONE
6	2	16-26	38-50/2'	--	--	--	--	--	--	--	--	--	--	--	--	HARD WEATHERED LIMESTONE

**GENERAL NOTES:**

SOIL STRATA DESCRIPTIONS SHOWN ARE FOR THE BORINGS SHOWN IN THESE PLANS ONLY AND ARE NOT TO BE CONSTRUED AS A GUARANTEE OF SOIL CONDITIONS OTHER THAN THE EXACT LOCATIONS OF THE BORINGS. ALL TEST VALUES WERE OBTAINED FROM SAMPLES TAKEN FROM ONE OR MORE OF THE BORINGS AND ARE NOT INTENDED TO GUARANTEE ANY TEST VALUES OTHER THAN AN APPROXIMATION AT THE LOCATION OF THE BORINGS. THOSE TEST VALUES SHOWING A RANGE OF VALUES MAY NOT INCLUDE THE HIGH AND/OR LOW VALUE FOR THE SPECIFIC STRATUM, IF THERE ARE ANY DOUBTS AS TO THE PREVAILING SUBSURFACE CONDITIONS, IT IS INCUMBENT UPON THE INDIVIDUAL RAISING THE QUESTION TO PERFORM HIS OWN SUBSURFACE INVESTIGATION. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT THIS DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS.

**LEGEND:**

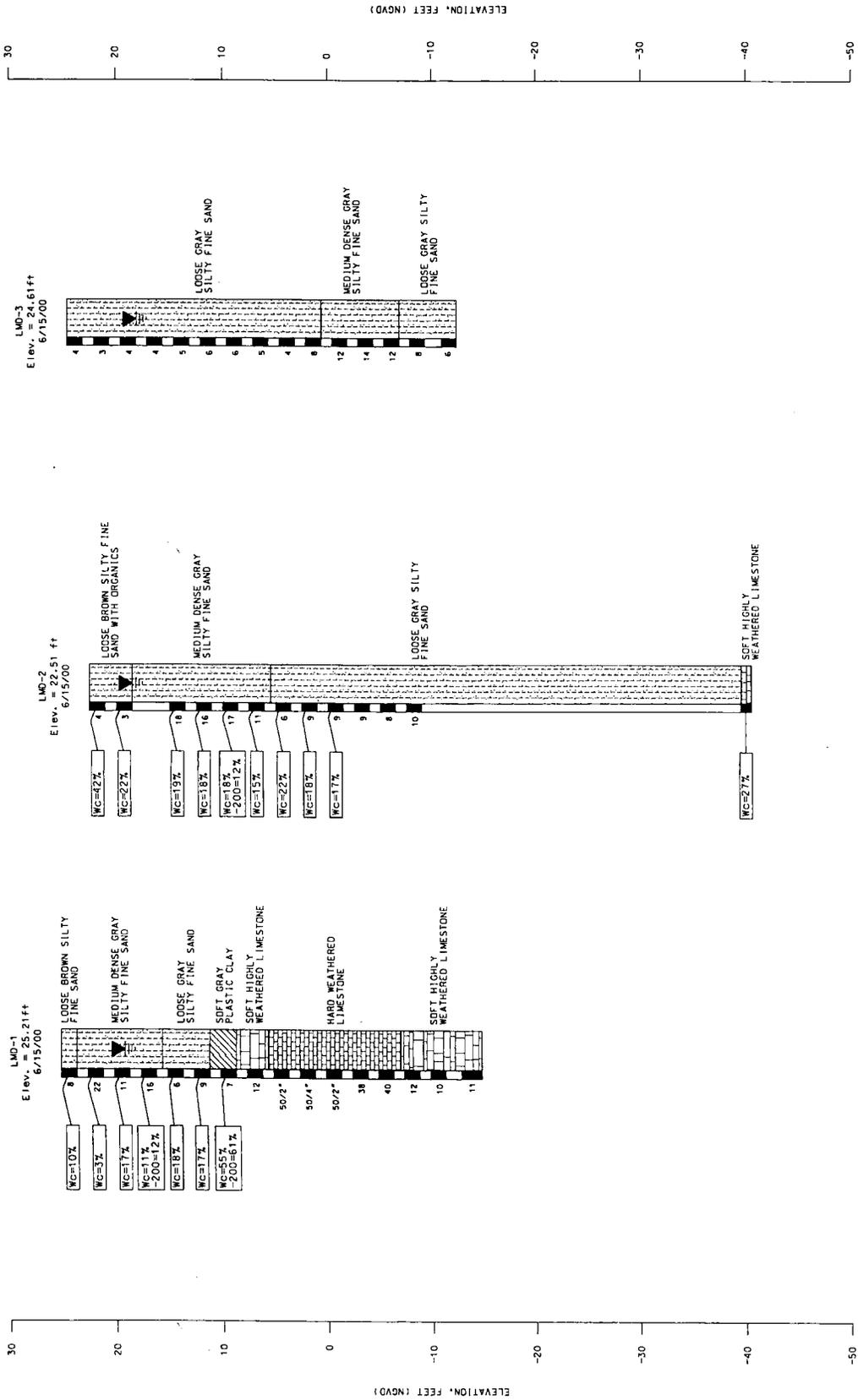
- UNMEASURED PARAMETERS
- ▼ GROUNDWATER LEVEL DURING AUGURING
- PPM PARTS PER MILLION

**MATERIAL NOTES:**

1. CORROSNIVITY OF SOILS (MODERATELY AGGRESSIVE)
  - pH = 7.3
  - SULFATES = 32 PPM
  - CHLORIDES = 51 PPM
  - RESISIVITY = 2,200 ohm-cm
2. CORROSNIVITY OF WATER (SLIGHTLY AGGRESSIVE)
  - pH = 7.1
  - SULFATES = 30 PPM
  - CHLORIDES = 12 PPM
  - RESISIVITY = 5,100 ohm-cm

<b>EGS</b> ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.		REPORT OF TESTS
DATE: _____ BY: _____	DATE: _____ BY: _____	DATE: _____ BY: _____
DATE: _____ BY: _____	DATE: _____ BY: _____	DATE: _____ BY: _____
REVIEWED: _____ DATE: _____		SKIN: _____ APPROVED: _____ DATE: _____

# SOIL PROFILE



DATE		DESCRIPTION		DATE		DESCRIPTION		DATE		DESCRIPTION	

SEAL:

MYRON L. HAYDEN, P.E.

DATE:

**EGS**

ENVIRONMENTAL & GEOTECHNICAL  
SPECIALISTS, INC.

BORING LOG PROFILE

BORING LMD-1 THROUGH LMD-3



**APPENDIX B**  
**SOIL CLASSIFICATION DATA**

**ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.**  
**LAKE MUNSON DAM**  
**BORING LMD-1**  
**SOIL CLASSIFICATION DATA**

BORING	LOCATION		W (%)	MECHANICAL ANALYSIS							ATTERBERG LIMIT		"N" VALUE	AASHTO CLASSIFICATION	MAT'L NO.	DESCRIPTION	
	METERS	FEET		(% ) PASSING							LIQUID LIMIT	PLASTICITY INDEX					ORG. (%)
	4	10	20	40	100	200											
LMD-1	0.0 - 0.5	0.0 - 1.5	10											8	SM/A-2-4	1	LOOSE BROWN SILTY FINE SAND
LMD-1	0.8 - 1.2	2.5 - 4.0	3											22	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-1	1.5 - 2.0	5.0 - 6.5	17											11	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-1	2.3 - 2.7	7.5 - 9.0	11	100	100	99	91	31	12					16	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-1	3.0 - 3.5	10.0 - 11.5	18											6	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-1	3.8 - 4.3	12.5 - 14.0	17											9	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-1	4.6 - 5.0	15.0 - 16.5	55	100	100	100	99	97	61					7	CH/A-7-6	4	SOFT BROWN PLASTIC CLAY
LMD-1	5.3 - 5.8	17.5 - 19.0	23											12		5	SOFT HIGHLY WEATHERED LIMESTONE
LMD-1	6.1 - 6.6	20.0 - 21.5												50/2"		6	HARD WEATHERED LIMESTONE
LMD-1	6.9 - 7.3	22.5 - 24.0												50/4"		6	HARD WEATHERED LIMESTONE
LMD-1	7.6 - 8.1	25.0 - 26.5												50/2"		6	HARD WEATHERED LIMESTONE
LMD-1	8.4 - 8.8	27.5 - 29.0	16											38		6	HARD WEATHERED LIMESTONE
LMD-1	9.1 - 9.6	30.0 - 31.5	26											40		6	HARD WEATHERED LIMESTONE
LMD-1	9.9 - 10.4	32.5 - 34.0	30											12		5	SOFT HIGHLY WEATHERED LIMESTONE
LMD-1	10.7 - 11.1	35.0 - 36.5	24											10		5	SOFT HIGHLY WEATHERED LIMESTONE
LMD-1	11.6 - 12.2	38.0 - 40.0	25											11		5	SOFT HIGHLY WEATHERED LIMESTONE

DEPTH TO GROUND WATER (FEET) = 6.0

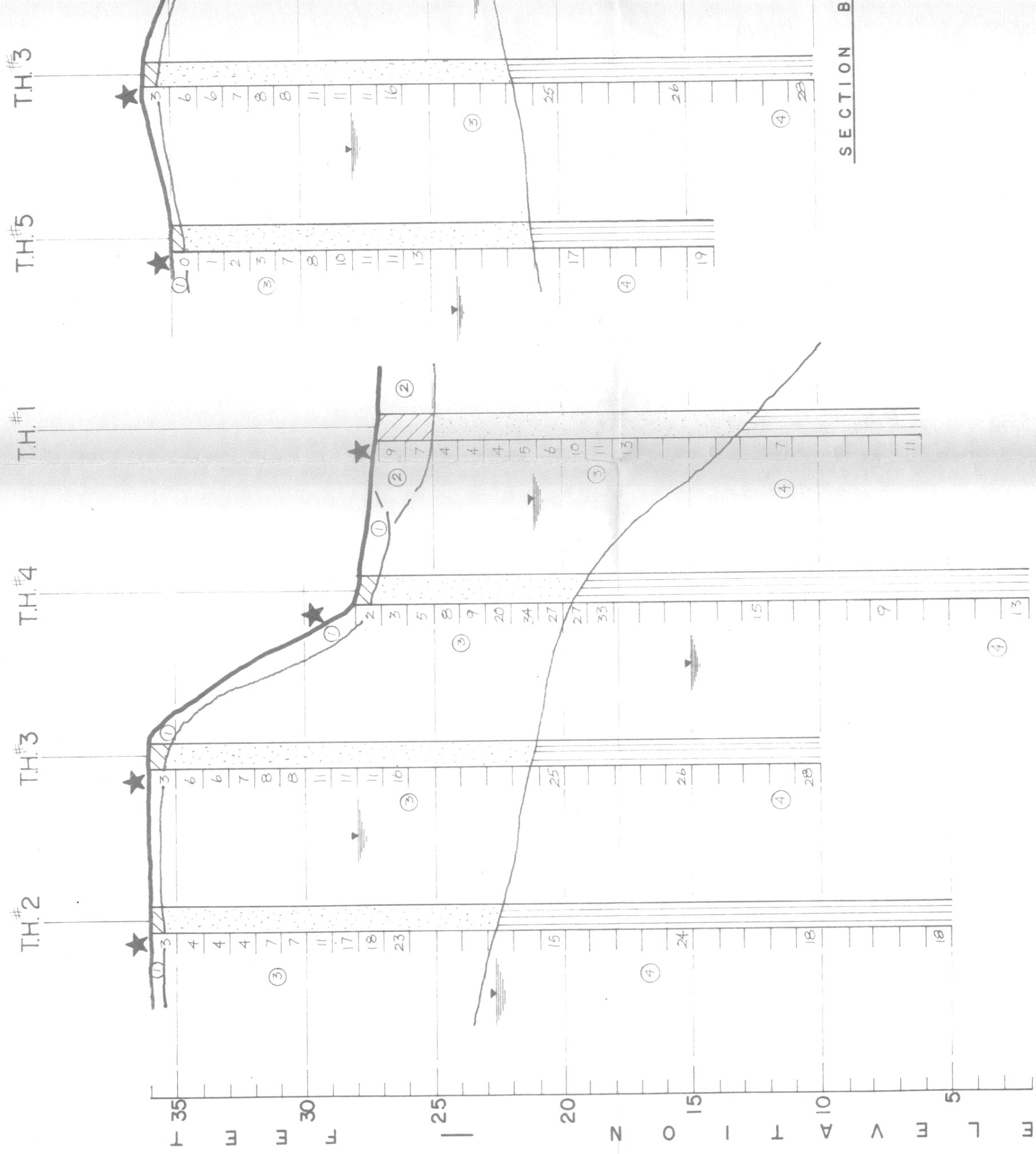
**ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.**  
**LAKE MUNSON DAM**  
**BORING LMD-2**  
**SOIL CLASSIFICATION DATA**

BORING	LOCATION		W (%)	MECHANICAL ANALYSIS						ATTERBERG LIMIT		AASHTO CLASSIFICATION	MAT'L NO.	DESCRIPTION
	METERS	FEET		4	10	20	40	100	200	LIQUID LIMIT	PLASTICITY INDEX			
LMD-2	0.0 - 0.5	0.0 - 1.5	42								4	SM/A-2-4	1	LOOSE BROWN SILTY FINE SAND WITH ORGANICS
LMD-2	0.8 - 1.2	2.5 - 4.0	22								3	SM/A-2-4	1	LOOSE BROWN SILTY FINE SAND WITH ORGANICS
LMD-2	1.5 - 2.0	5.0 - 6.5	NO SAMPLE								15	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-2	2.3 - 2.7	7.5 - 9.0	19								18	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-2	3.0 - 3.5	10.0 - 11.5	18								16	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-2	3.8 - 4.3	12.5 - 14.0	18	100	100	97	80	18	12		17	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-2	4.6 - 5.0	15.0 - 16.5	15								11	SM/A-2-4	2	MEDIUM DENSE GRAY SILTY FINE SAND
LMD-2	5.3 - 5.8	17.5 - 19.0	22								6	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	6.1 - 6.6	20.0 - 21.5	18								9	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	6.9 - 7.3	22.5 - 24.0	17								9	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	7.6 - 8.1	25.0 - 26.5	15								10	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	8.4 - 8.8	27.5 - 29.0	16								11	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	9.1 - 9.6	30.0 - 31.5	17								10	SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	9.9 - 10.4	32.5 - 34.0										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	10.7 - 11.1	35.0 - 36.5										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	11.4 - 11.9	37.5 - 39.0										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	12.2 - 12.6	40.0 - 41.5										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	13.0 - 13.4	42.5 - 44.0										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	13.7 - 14.2	45.0 - 46.5										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	14.5 - 14.9	47.5 - 49.0										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	15.2 - 15.7	50.0 - 51.5										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	16.0 - 16.5	52.5 - 54.0										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	16.8 - 17.2	55.0 - 56.5										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	17.5 - 18.0	57.5 - 59.0										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	18.3 - 18.7	60.0 - 61.5										SM/A-2-4	3	LOOSE GRAY SILTY FINE SAND
LMD-2	18.9 - 19.2	62.0 - 63.0	27										5	SOFT HIGHLY WEATHERED LIMESTONE

DEPTH TO GROUND WATER (FEET) = 4.0



**1967 Subsurface Soil Investigation for Lake Munson Dam by  
Ardaman & Associates**



**SECTION A - A**

**SOIL LEGEND**

- ① BROWN FINE SAND (TOPSOIL)
- ② REDDISH-BROWN FINE TO MEDIUM GRAINED CLAYEY SAND
- ③ VERY LIGHT GRAY TO LIGHT BROWN FINE SAND
- ④ LIGHT GRAY TO WHITE SLIGHTLY CLAYEY SAND

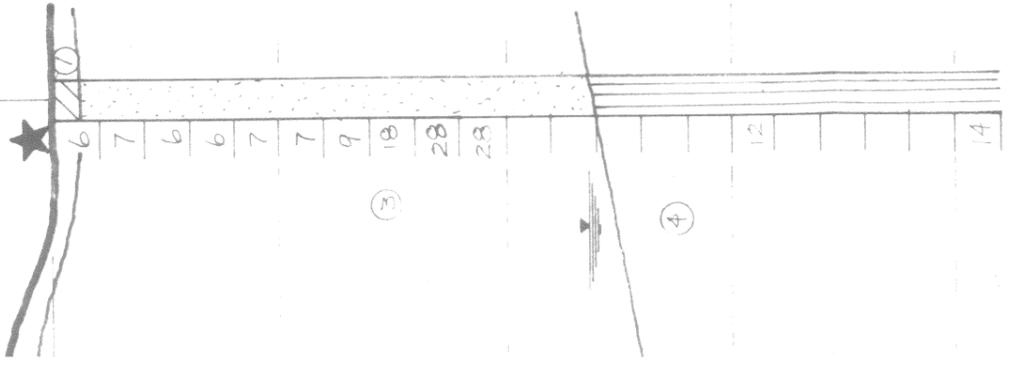
GROUND WATER TABLE- NOVEMBER 9, 10, 1967



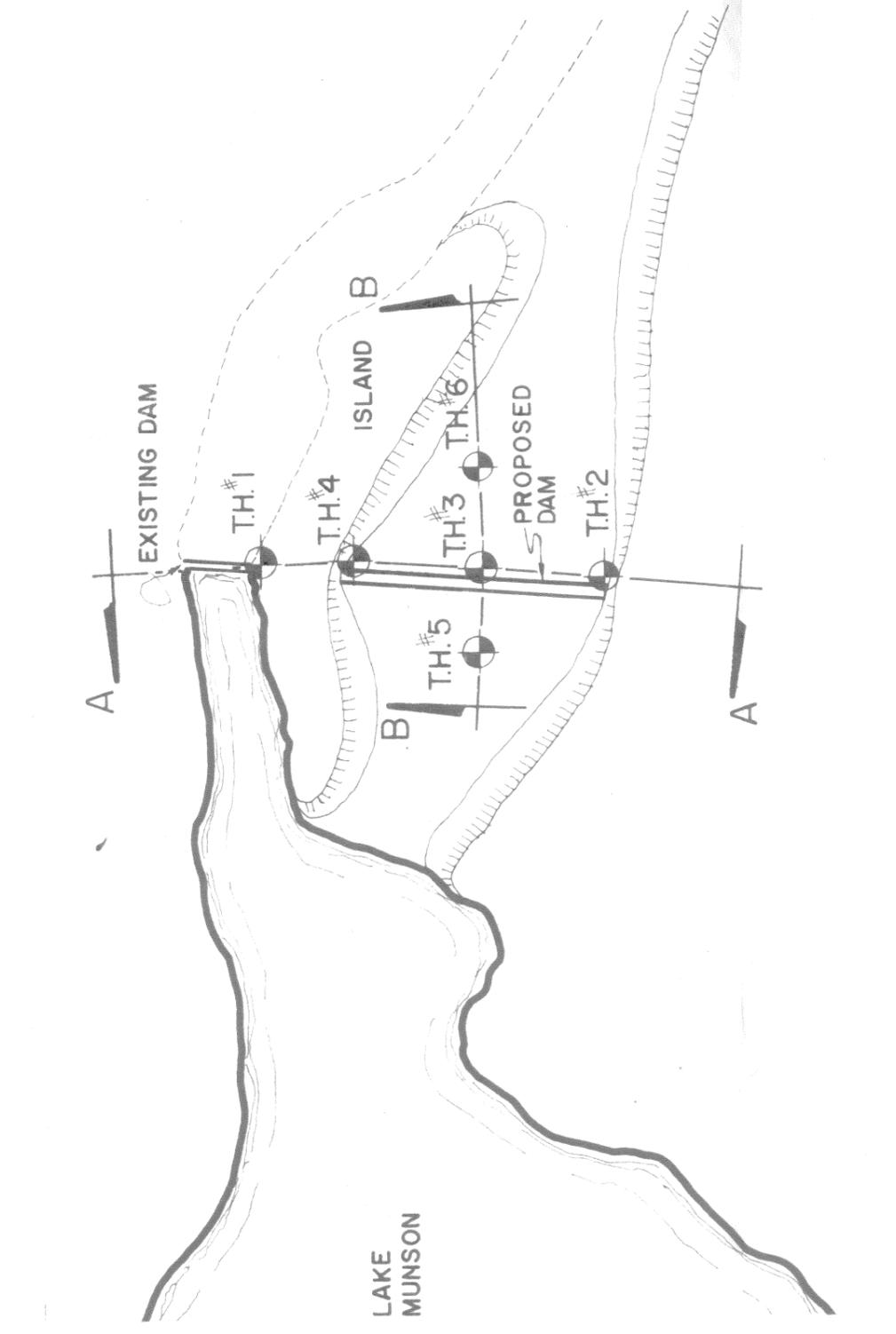
★ NUMBER OF BLOWS FOR EACH FOOT OF PENETRATION INTO THE SOIL; 2" O.D. SPLIT SPOON SAMPLER DRIVEN BY 140 POUND HAMMER DROPPING 30 INCHES.

**SECTION B**

3 T.H.#6



SCALE 1" = 100'



LOCATION OF TEST BORINGS

N B - B

ARDAMAN & ASSOCIATES engineering & materials laboratories	
SOIL BORINGS & PROFILES for PROPOSED EXTENSION of DAM at LAKE MUNSON LEON COUNTY, FLORIDA	
Drawn by	PA.S.
Tested by	C.P. C.B. W.S.