

CITY OF NORTH LITTLE ROCK, ARKANSAS  
COMMERCE DEPARTMENT  
Mary Beth Bowman, Director  
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P.O. BOX 5757  
NORTH LITTLE ROCK, AR 72119  
501-975-8881 Phone  
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## INVITATION TO BID

Bid Number: 16-3396 Date Issued: July 29, 2016

Date & Time Bid Opening: Friday, August 12, 2016 at 10:00 a.m.

CONSTRUCTION OF A LARGE POWER TRANSFORMER CONCRETE  
FOUNDATION & EMERGENCY OIL CONTAINMENT PIT FOR THE NLRED

Total Project Bid Price: \$ \_\_\_\_\_

### SPECIFICATIONS ATTACHED.

Plans and specifications may be examined at:

- Commerce Department, 120 Main, North Little Rock, Arkansas
- [www.northlittlerock.ar.gov](http://www.northlittlerock.ar.gov)

Please direct technical questions and/or comments to Eric Heinrichs at 501-992-4086 or [eheinrichs@nlr.ar.gov](mailto:eheinrichs@nlr.ar.gov).

Please contact the Commerce Department at 501-975-8881 with questions and/or comments regarding bid procedure.

**Note: FAILURE TO FILL OUT AND SIGN THE INVITATION TO BID SHEET WILL RESULT IN REJECTION OF THE BID.**

### EXECUTION OF BID

Upon signing this page, the organization certifies that they have read and agree to the requirements set forth in this RFQ/RFP/BID including conditions set forth and pertinent information requests.

Name of Firm: \_\_\_\_\_ Phone No.: \_\_\_\_\_

Tax Identification No.: \_\_\_\_\_

Business Address: \_\_\_\_\_

Signature of Authorized Person: \_\_\_\_\_

Title: \_\_\_\_\_ Date: \_\_\_\_\_, 2016

**UNSIGNED COVER SHEETS WILL BE REJECTED.**

**TERMS AND STANDARD CONDITIONS  
CITY OF NORTH LITTLE ROCK, ARKANSAS**

PLEASE READ CAREFULLY

1. When submitting an "Invitation to Bid," the bidder warrants that the commodities covered by the bid shall be free from defects in material and workmanship under normal use and service. In addition, bidder must deliver new commodities of the latest design and model, unless otherwise specified in the "Invitation to Bid."
2. Prices quoted are to be net process, and when an error is made in extending total prices, the City may accept the bid for the lesser amount whether reflected by extension or by the correct multiple of the unit price.
3. Discounts offered will be taken when the City qualifies for such. The beginning date for computing discounts will be the date of invoice or the date of delivery and acceptance, whichever is later.
4. When bidding other than the brand and/or model specified in the "Invitation to Bid," the brand and/or model number must be stated by that item in the "Invitation to Bid," and descriptive literature be submitted with the bid.
5. The City reserves the right to reject any and all bids.
6. The Purchasing office reserves the right to award items, all or none, or by line item(s).
7. Quality, time and probability of performance may be factors in making an award.
8. Bid quotes submitted will remain firm for 30 calendar days from bid opening date; however, the prices may remain firm for a longer period of time if mutually agreeable between bidder and the Commerce Department.
9. Bidder must submit a completed signed copy of the front page of the "Invitation to Bid" and must submit any other information required in the "Invitation to Bid."
10. In the event a contract is entered into pursuant to the "Invitation to Bid," the bidder shall not discriminate against any qualified employee or qualified applicant for employment because of race, sex, color, creed, national origin or ancestry. The bidder must include in any and all subcontracts a provision similar to the above.
11. Sales or use tax is not to be included in the bid price, but is to be added by the vendor to the invoice billing to the City. Although use tax is not to be included in this bid, vendors are to register and pay tax direct to the Arkansas State Revenue Department.
12. Prices quoted shall be "Free on Board" (F.O.B.) to destination at designated facility in North Little Rock. Charges may not be added after the bid is opened.
13. In the event of two or more identical low bids, the contract may be awarded arbitrarily or for any reason to any of such bidders or split in any proportion between them at the discretion of the Commerce Department.
14. Specifications furnished with this Invitation are intended to establish a desired quality or performance level, or other minimum dimensions and capacities, which will provide the best product available at the lowest possible price. Other than designated brands and/or models approved as equal to designated products shall receive an equal consideration.
15. Samples of items when required, must be furnished free, and, if not called for within 30 days from date of bid opening, will become property of the City.
16. Bids will not be considered if they are: 1. Submitted after the bid's opening time. 2. Submitted electronically or faxed (unless authorized by Purchasing Agent).
17. Guarantees and warranties should be submitted with the bid, as they may be a consideration in making an award.
18. **CONSTRUCTION**
  - A. Contractor is to supply the City with evidence of having and maintaining proper and complete insurance, specifically Workman's Compensation Insurance in accordance with the laws of the State of Arkansas, Public Liability and Property Damage. All premiums and cost shall be paid by the Contractor. In no way will the City be responsible in case of accident.
  - B. When noted, a Certified check or bid bond in the amount of 5% of total bid shall accompany bid.
  - C. A Performance Bond equaling the total amount of any bid exceeding \$10,000.00 must be provided for any contract for the repair, alteration or erection of any public building, public structure or public improvement (pursuant to Act 351 or 1953 as amended by Act 539 of 1979).
19. **LIQUIDATED DAMAGES** - Liquidated damages shall be assessed beginning on the first day following the maximum delivery or completion time entered on this bid form and/or provided for by the plans and specifications.
20. **AMBIGUITY IN BID** - Any ambiguity in any bid as the result of omission, error, lack of clarity or non-compliance by the bidder with specifications, instructions, and all conditions of bidding shall be construed in the light most favorable to the City.
21. The bid number should be stated on the face of the sealed bid envelope. If it is not, the envelope will have to be opened to identify.
22. Whenever a bid is sought seeking a source of supply for a specified period of time for materials and services, the quantities of usage shown are estimated ONLY. No guarantee or warranty is given or implied by the participants as to the total amount that may or may not be purchased from any resulting contracts. These quantities are for the bidders information ONLY and will be used for tabulation and presentation of bid and the participant reserves the right to increase or decrease quantities as required.
23. The City of North Little Rock reserves the right to reject any and all bids, to accept in whole or in part, to waive any informalities in bids received, to accept bids on materials or equipment with variations from specifications in those cases where efficiency of operation will not be impaired, and unless otherwise specified by the bidder, to accept any item in the bid. If unit prices and extensions thereof do not coincide, the City of North Little Rock may accept the bid for the lesser amount whether reflected by the extension or by the correct multiple of the unit price.
24. Additional information or bid forms may be obtained from:  
COMMERCE DEPARTMENT, 120 Main Street, P.O. Box 5757, North Little Rock, Arkansas 72119 (501) 975-8881 [www.nlr.ar.gov](http://www.nlr.ar.gov)

**Bidding documents must be submitted on or before the bid's opening date and time. Unless noted, sealed bids must be submitted to the Commerce Department at 120 Main Street, North Little Rock, AR 72114 or PO Box 5757, North Little Rock, AR 72119**

## SECTION 00570

### SCOPE OF WORK NORTH LITTLE ROCK ELECTRIC DEPARTMENT POWER TRANSFORMER FOUNDATION MCCAIN SUBSTATION MODIFICATION

#### 1. GENERAL INFORMATION

- 1.1 North Little Rock Electric Department's (NLRED) McCain 115-13.8 kV Substation is being modified and expanded. A second 115-13.8 kV power transformer is to be installed. NLRED requires a new supporting foundation with oil containment pit be constructed and installed for the new power transformer.
- 1.2 The following Specifications and associated Drawings shall define the Scope of Work. The Contractor is responsible for inspecting the site, verifying existing conditions, and completing the project per the plans and specifications.
- 1.3 The Contractor is responsible for development of complete Bill of Material including quantities for all material items required to complete the construction and installation of the power transformer foundation.
- 1.4 The work will be completed while the 115kV to 13.8kV Substation is electrically energized. The closest edge of the foundation is at a minimum of 30 feet from the energized substation equipment.
- 1.5 The substation is located at 4500 43<sup>rd</sup> Street, North Little Rock, Arkansas 72116. The approximate coordinates for the location are 34° 47' 35.78" N, 92° 12' 53.50" W.

#### 4.0 CONSTRUCTION

- 4.1 The Contractor shall be responsible for constructing and completing the new substation per the Specifications and Plans.
- 4.2 The Contractor shall be responsible for procurement, assembly, installation and testing as may be required per the Specifications and Plans
- 4.4 During construction, the Contractor shall be responsible for site drainage and erosion controls, run-off controls, site permits by the

Arkansas Department of Environmental Quality and preparation and maintaining of a site Storm Water Pollution Prevention Plan, if required.

**END OF SECTION**

## SECTION 01410

### TESTING LABORATORY SERVICES

#### PART 1 - GENERAL

##### 1.01 REQUIREMENTS INCLUDED

- A. The Owner will employ, and pay for, services of an independent testing laboratory to perform specified services. See respective specification sections for required services.

##### 1.02 RELATED DOCUMENTS

- A. Design Drawings
- B. Section 02210: Site Grading and Filling
- C. Section 03300: Cast-In-Place Concrete

##### 1.03 QUALIFICATION OF LABORATORIES

- A. Meet Recommended Requirements for Independent Laboratory Qualifications, edition which is current when Agreement is signed by Owner and Contractor, published by American Council of Independent Laboratories.
- B. Meet basic requirements of ASTM E 329-72 Standards for Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.
- C. Be licensed to operate in the State of Arkansas.
- D. Have properly calibrated equipment, calibrated within the past 12 months by devices of accuracy traceable to either:
  - 1. National Bureau of Standards; or
  - 2. Accepted values of natural physical constants.

##### 1.04 LABORATORY DUTIES

- A. Cooperate with Engineer and Contractor and provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
  2. Ascertain compliance with requirements of Contract Documents.
- C. Promptly notify Engineer, Owner and Contractor of irregularities or deficiencies in Work which are observed during performance of duties.
- D. Promptly submit three copies of reports of inspections and tests to Engineer, and submit two copies of those reports to Contractor at the project site. Test reports shall include:
1. Date issued
  2. Project title, number, and location
  3. Testing laboratory name and address
  4. Name and signature of inspector
  5. Date of inspection and sampling
  6. Date of test
  7. Identification of product and specifications section
  8. Type of inspection or test and
  9. Observations regarding compliance with Contract Documents.

#### 1.05 LIMITATIONS OF AUTHORITY

- A. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on, requirements of Contract Documents.
  2. Approve or accept any portion of the Work.
  3. Perform any duties of the Contractor.

#### 1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with Laboratory personnel and provide access to Work.
- B. Provide to Laboratory, representative samples of materials to be tested, in required quantities.
- C. Furnish copies of mill test reports to Engineer.
- E. Furnish casual labor and facilities.
1. To provide access to work to be tested;
  2. To obtain and handle samples at the site;

3. To facilitate inspections and tests; and
  4. For Laboratory's exclusive use for storage and curing of test samples.
- F. Notify Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.
- G. Pay Laboratory travel and labor costs if Laboratory personnel come to job site and find work not ready for testing.
- H. Pay for additional test when initial test indicate work does not comply with contract documents.

**END OF SECTION**

## SECTION 02210

### SITE GRADING AND FILLING

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Each bidder will be furnished a copy of a site grading plan that is believed to accurately represent the existing grades. The Contractor shall inspect and review the existing site grades and include in his bid proposal necessary funding to bring the site to the grade level shown on the plans.
- B. Work Included:
  - 1. Grade and fill the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the Construction Documents.
- C. Related Work:
  - 1. Soils Report
  - 2. Design Drawings
  - 3. Section 01410: Testing Laboratory Services

##### 1.02 QUALITY ASSURANCE

- A. The Owner's Representative shall have the right to reject any and all materials, any and all work, which in his opinion does not meet the requirements of the Specifications or Drawings at any stage of the operations. All rejected materials shall be removed from the site and shall not be discarded on adjacent sites.
- B. Testing Laboratory and Soils Engineer:
  - 1. Soils compaction testing of in-place soil, and filled and compacted areas will be performed by a Testing Laboratory in accordance with ASTM D 698-78 (Standard Proctor) as specified below.
  - 2. The Testing Laboratory and Soils Engineer's fees will be paid for by Owner. Any re-testing due to failure of the initial tests will be the responsibility of the Contractor.

##### 1.03 PROTECTION



- A. Contractor shall protect excavations and grounds from water ponding and water damage. Construct and maintain temporary drainage. Pump, if required to keep excavations free of water. Maintain site in well-drained condition at all times.
- B. Contractor shall protect, maintain and restore benchmarks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed surveyor, paid for by the Contractor, who shall furnish Engineer with certification of his work. All fees and costs associated with re-establishing benchmarks, monuments or other permanent reference points are the sole responsibility of the Contractor.
- C. Contractor shall protect utilities and other construction designated to remain in place.

#### 1.04 LINES AND GRADES

- A. It is imperative that lines and grades established on drawings be met, except for allowance for installation of fill aggregate, concrete, and topsoil established below, when this work is completed.

#### 1.05 SUBMITTALS TO ENGINEER

- A. Submit one copy of permits and notices obtained from appropriate jurisdiction before commencing work.
- B. Obtain and submit certification of adequacy of site grading and filling from the Testing Laboratory, signed and sealed by a qualified Soils Engineer, stating that work is in accordance with Contract Documents, and that soils are capable of supporting the structures to be constructed under the Contract.
- C. Submit one copy of all Proctor and Sieve analyses as well as the results of all compaction density testing.

## PART 2 - PRODUCTS

### 2.01 NO. 67 COARSE AGGREGATE

- A. **Surface Material:** To be installed over the surface of the substation fenced area (including ground grid protection area outside the fence). Wherever noted in the Specifications or on the Plans, #67 Stone or #67 Coarse Aggregate shall refer to a mixture of washed #67 coarse aggregate mixed with #8 or #10 stone to achieve a sieve analysis as shown in the table below:

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
1 inch	90-100
3/4 inch	80-90
1/2 inch	40-50
3/8 inch	30-40
No. 4	10-20
No. 8	5-15
No. 16	5-10
No. 30	5-10
No. 100	0-5

The purpose of this mixture is to maintain the “under-foot” resistivity of the #67 stone while providing a solid surface for vehicular traffic inside the fenced substation area.

### 2.02 SELECT BACKFILL

- A. **Select Backfill:** To be installed in the substation and driveway stabilization areas requiring select backfill material to bring sub-grade to lines shown on substation grading drawings. Select backfill shall consist of granular materials with not more than 1-1/2” in its largest dimension and uniformly ranging down to, but with less than 15 percent passing, a No. 200 Sieve. The portion of the material passing the No. 40 Sieve shall be non-plastic and shall have a liquid limit of not more than 30 and a plasticity index of not more than 10. Select backfill shall be approved by the Geotechnical Engineer prior to use.
- B. Material obtained from the site excavation may be used as select backfill providing it meets the requirements of Item 2.02.A described above.

- C. **Documentation:** Contractor shall obtain material as specified above and be prepared to furnish samples of the material and material testing for the contract price. It will be the responsibility of the Contractor to obtain, excavate, load, haul, place, and compact the material as specified. All material to be used shall be inspected, tested, and approved by a qualified geotechnical engineer and Owner's Representative before construction.

2.03 TOPSOIL

- A. Topsoil shall be clean earth (free from organic material, cinders, ice and rocks over 2 inches in their longest dimension) consisting of low plasticity clay having a plasticity index between 5 and 25 and a liquid limit less than 45%.
- B. On-site earth removed during stripping operations may be used for top soil if it meets the above requirements.

2.04 FILTER FABRIC AND FASTENERS (N. I. C.)

- A. The filter cloth material used as a lining for subgrade, roadway and driveway stabilization and surface material shall be pervious sheets of strong, rot-proof non-woven polypropylene plastic fabric meeting the following specifications:

<b>Physical Property</b>	<b>Test Method</b>	<b>Acceptable Test Results</b>
Tensile Strength, wet, lbs.	ASTM D-4632	240 (min.)
Elongation, wet, %	ASTM D-4632	70 (min)
Flow Rate, gal/min/sq. ft.	ASTM D-4491	95 (min)
Puncture Strength, lbs.	ASTM D-6241	630 (min)
Apparent Opening Size - AOS	ASTM D-4751	100 (US Sieve)

**The filter cloth shall be Mirafi 180N/O – 8.5oz. per sq. yd.**

The contractor shall furnish a certified laboratory test report from an approved testing laboratory with each shipment of materials. Laboratory test reports shall include actual numerical test data obtained on this product.

## **PART 3 - EXECUTION**

### **3.01 CLEARING, GRUBBING AND REMOVAL OF OBSTRUCTIONS**

- A. Clear all areas to the limits as shown on the drawings.
- B. All trees to be cleared shall be felled so as not to damage existing structures or trees that are to remain.
- C. Remove all tree stumps to within 12" of final ground surface. If any part of the stump lies within 10 feet of any structural element, including but not limited to concrete pads, walls, piles, foundations, buildings, wet wells, vaults, or manholes, the entire stump shall be removed with roots up to 3 inches in diameter. Backfill for stumps will be performed as general site fill and will be at the Contractor's expense.
- D. Grub all areas to the limits as shown on the drawings.
- E. Clean out cellars, cisterns, septic tanks and drain fields, cesspools, catch basins, manholes, and similar items to solid subgrade and break up masonry and/or concrete bottoms so that no pieces remain which are over 12 inches in their largest dimension. Break out masonry and concrete sides of such construction to a depth of at least 2'-0" below bottoms of footings to be installed as part of this project or subgrade, as applicable.
- F. Fill basements, cellars, walls and other items enumerated above with specified granular fill and compact to 95 percent Standard Proctor Density.

### **3.02 DISPOSITION OF ABANDONED UTILITIES**

- A. If abandoned underground utility lines or electric conduit are uncovered (verify with respective utility company) in the course of grading, the Contractor shall immediately notify the Engineer. That part uncovered shall be removed and capped off at points of removal as well as at property lines.

### **3.03 REMOVAL AND STORAGE OF TOPSOIL**

- A. Remove sufficient topsoil from areas to be covered by construction, excavated, filled or graded to provide the amount required in topsoil replacement.
- B. Remove topsoil to entire depth (minimum of 6") and remove existing pavement in fill areas.
- C. Mow grass, weeds and other annual-type growth, and brush close to ground.

- D. Scrape or rake area to remove all brush, roots, loose grass, weeds and rocks before stripping topsoil.
- E. Topsoil to be stored for reuse shall meet requirements established above.
- F. Store topsoil in area designated by Engineer. Store so as to prevent erosion and mixture with debris and other materials.
- G. After completion of removal of the topsoil material, the area shall be rough graded and allowed to "equilibrate" for a period of 10-14 days.

#### 3.04 SUBGRADE PREPARATION

- A. The area to be occupied by the substation and the new driveway shall be cleared of all large rocks, trees, roots, vegetation, and similar material. The slopes and ground surface shall be trimmed in conformity to the lines and grades indicated on the Drawings or as directed by the Engineer and shall be compacted by the use of hand or mechanical tamps.
- B. All in situ sub-grade soil shall be leveled, fine graded, and compacted to a density of 95% Standard Proctor. In-situ soil, or any combination of in-situ soil and select backfill, shall be subsequently compacted to a density of 95% Standard Proctor.
- C. Excavated in-situ material that does not meet the requirements of 2.02.A shall be removed from the site and disposed of as shown on the plans or as directed by the Owner's Representative. Spoil material shall not be disposed of in a watercourse or on the banks of a watercourse, but only on an approved upland site.
- D. All foundation excavations shall be observed by the Geotechnical Engineer to verify suitable bearing and adequate undercut, if necessary. Foundation excavations shall be clean and dry at the time of concrete placement. Where foundation excavations must be open for extended periods of time, a thin layer of seal concrete or a mud mat is required.

#### 3.05 GENERAL SITEWORK

- A. General filling and establishment of the substation area will commence upon completion of clearing and grubbing and compaction of the in situ soils.
- B. Fill and grade to attain elevations indicated  $\pm 0.1'$  less allowances for placement of final aggregate, concrete pads, or topsoil. New drives shall be cut and/or filled, graded and compacted from the prepared subgrade to the surface grades as shown on the Contract Drawings.

- C. Inside of building lines, add select backfill only in areas where the general filling and transfer of in situ soils is required and allow for placement of indicated depth of stone aggregate fill material and indicated thickness of concrete, unless noted otherwise on the Contract Drawings.
- D. In areas designated to receive select backfill or finish aggregate, grade, or fill and compact specified material, to bring areas to finished grade minus 6" for placing topsoil or finish aggregate surface.
- E. The ground grid shall be installed at the proper location when the filling process has been completed and prior to installation of the filter fabric and the aggregate surface.

### 3.06 GRADING

- A. All excess waste material resulting from the foundation work shall be removed from the jobsite by the foundation Contractor.
- B. Grade to uniform levels and slopes, without abrupt changes. Make transitions from levels to slopes with rounding of large radius.
- C. Finish areas to a reasonably true and even plane at required elevations, less allowances for items specified above.
- D. Along the lines indicating the limits of work, taper finish grade to the existing grade at a slope matching the natural contour. Perform all of this work within the limit lines.
- E. When excavation is complete, place washed granular fill base for concrete slabs. Roll and tamp granular fill to thoroughly compact it.
- F. Outside of building in areas to be paved or covered by construction, fill as specified above within building lines.
- G. Fill and backfill should be placed in horizontal, nominal 6" to 8" thick loose lifts. Each lift of fill and backfill should be properly compacted, tested and approved prior to placing subsequent lifts.

### 3.07 INSTALLATION OF FILTER FABRIC (N. I. C.)

- A. The Contractor shall check the filter fabric upon delivery to verify that the proper material has been received. The filter fabric shall be inspected by the Contractor to be free of flaws or damage occurring during manufacturing, shipping, or handling.

- B. Filter fabric shall be placed on the prepared and compacted subgrade within the limits shown on the Plans. The filter fabric shall be laid loosely without wrinkles or crease.
- C. When more than one width or length of filter fabric is necessary, the joints shall be overlapped a minimum of 24 inches. Laps shall be secured with hog rings, which shall be inserted through the overlapped fabric at not greater than 2-foot intervals along a line through the midpoint of the overlap.
- D. If the fabric is torn or damaged, a patch overlapping the edges of the damaged area by 2 feet shall be sewn securely to the fabric with a continuous, monofilament, rot-proof material.
- E. Crushed limestone surface aggregate (# 67 Stone) material as specified herein shall be placed in a single lift and compacted to a minimum depth of 6 inches over the filter fabric. Backfill shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in and/or movement of the filter fabric.
- F. Tracked construction equipment shall not be operated directly on the filter fabric. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the filter fabric. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the filter fabric.
- G. Crushed limestone sub-surface aggregate/driveway aggregate (CR610 Stone) material as specified herein shall be placed in multiple lifts over the filter fabric and compacted to a depth of 2'6" and a density of 95% Standard Proctor.
- H. Any filter fabric damaged during installation shall be replaced by the Contractor at no additional cost to the Owner.

### 3.08 FINISH SURFACE (N. I. C.)

- A. When grading for general site work, construction of all foundations and installation of ground grid are complete, filter fabric shall be placed in accordance with Section 3.05 and Section 3.06 of this Specification.
- B. Mineral aggregate surface material shall be placed over the filter fabric. Roll and tamp granular fill to thoroughly compact it to required density.

### 3.09 COMPACTION DENSITIES

- A. Compaction for stone aggregates and select backfill material inside the fenced area and for driveway construction shall be to a density of 95 percent (ASTM D 698, Standard Proctor Method) at optimum moisture content.
- B. For areas where no construction will be placed, compact to a density of 95 percent (ASTM D 698, Standard Proctor Method) at optimum moisture content.

### 3.10 COMPACTION TESTING

- A. While filling and compacting operations are in progress, a Soils Engineer will make density tests of at least four (4) per lift and at random locations to determine adequacy of compaction. If compaction tests do not meet specified densities, water or aerate as needed and recompact to required densities and retest to verify compaction densities.

### 3.11 PLACING OF TOPSOIL

- A. Place topsoil in areas disturbed by construction and not covered by paving, buildings and other hard-surfaced materials.
- B. When directed by Engineer, scarify sub-grade to a depth of 3" and spread topsoil uniformly to bring finished grade to elevations indicated after topsoil has been lightly compacted with roller. Topsoil shall be a minimum of 6" thick.
- C. Level and slope topsoil as indicated so that finished grades are +/- 0.1' elevations indicated.

### 3.12 SODDING

All areas falling within the project work areas that are designated to be disturbed during construction shall be sodded as specified.

- A. Sod shall consist of live, dense, well-rooted growth of 419 tifway Bermuda, free from Johnson grass, nut grass and other grasses and weeds. The health and quality of all sodding related materials shall be in accordance with the Arkansas State Highway and Transportation Department.
- B. Sod shall be cleanly cut in rolls having a reasonably uniform thickness of not less than 1-1/2 inches and a uniform width.
- C. Commercial Fertilizer: Commercial Fertilizer shall be 13-13-13. Fertilizer



shall be a standard commercial fertilizer containing the specified percentages by weight of nitrogen, phosphoric acid, and potash.

- D. Agriculture Limestone: Agriculture limestone shall contain not less than 85% of calcium carbonate and magnesium carbonate combined and shall be crushed so that at least 85% will pass the No.10 mesh sieve.
- E. The area to be sodded shall be brought to the lines and grades shown on the Plans allowing for the sod thickness to be installed. The surface of the ground to be sodded shall be loosened to a depth of not less than 1 inch with a rake or other device. The ground shall be sprinkled until saturated for a minimum depth of 1 inch and kept moist until the sod is placed.
- F. Insofar as is practicable, sod shall be laid the day of delivery. In the event that this is not possible, the Contractor shall protect the sod not laid by placing it in a shaded area. Sod that cannot be laid immediately on delivery shall be kept well watered and shall not remain unplanted for longer than 48 hours after delivery to the site.
- G. The sod shall be carefully placed by hand on prepared ground surface with the edges in close contact and as far as possible in a position to break joints. Immediately after placing the sod, it shall be thoroughly wetted and rolled with an approved roller. On slopes of 3 to 1, or steeper, pinning or pegging is required to hold the sod in place.
- H. Three days after placing the sod, fertilizer and lime shall be applied uniformly to the prepared surface of the sod. Fertilizer shall be applied at the rate recommended by soil testing.
- I. Maintain, protect and care for newly sodded lawns and reconditioned areas until a healthy, uniform, close stand of grass is established free of weeds, bare spots or surface irregularities. Sodded areas will not be accepted prior to substantial completion of project.
- J. The Contractor shall regrade, refertilize, and resod any or all sodded areas as directed by the Engineer to correct any unsatisfactory and unacceptable conditions. Surface gullied, eroded areas or damaged areas found following sodding shall be repaired by regrading and resodding. The Contractor shall be responsible for protecting his work at all time and shall erect temporary barricades to do so.

- K. Inspection of the planting work, to determine its completion for beginning the guarantee period, will be made by the Design Professional, and given approval in writing upon notice requesting such inspection by the Contractor. All planting must be alive, healthy, and a uniform stand of grass in order to be considered complete.
- L. One year after final completion of the project, seeded areas shall be solid color, well matted, and reasonably free from weeds. Inspection of the planting to determine its final acceptance will be made at the conclusion of the guarantee period by the Owner's Representative. No grassing shall be accepted unless the area shows a uniform, health stand of grass.

### 3.13 SEEDING

Seeding shall take place over all areas disturbed by the Contractor that do not fall within the designated project work area. There is no specified pay item for seeding.

- A. All seed is to meet the requirements of the Arkansas State Highway and Transportation Department and no "Below Standard" seed will be accepted. Seed shall meet Federal and Local seed laws and have a minimum germination of 75 percent and minimum purity of 97 percent. Seed mixes shall contain 100% Crown Vetch and 100% Common Bermuda (hulled) as appropriate.
- B. Commercial fertilizer shall be 5-20-20 for hydroseeded areas with a minimum of 50 percent of elements derived from organic sources. Fertilizer shall be a standard commercial fertilizer containing the specified percentages by weight of nitrogen, phosphoric acid, and potash.
- C. Agriculture limestone shall contain not less than 85% of calcium carbonate and magnesium carbonate combined and shall be crushed so that at least 85% will pass the No. 10 mesh sieve.
- D. All mulch material shall be air-dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth on the project or on adjacent agriculture lands. Mulch material shall be wheat straw or approved equal.
- E. Each area to be seeded shall be scarified, disced, harrowed, raked, or otherwise worked until it has been loosened and pulverized to a depth of not less than 1" to 2" (inches). This operation shall be performed only when the soil is in a tillable and workable condition.
- F. All construction material debris, rocks, and refuse material larger than 2 inch

diameter, shall be removed from the seed beds. No seeding shall be done during windy weather or when the ground surface is frozen, wet, or otherwise non-tillable.

- G. Seed, fertilizer and hydraulic mulch shall be thoroughly mixed in a water slurry and be distributed uniformly over the surface area via an approved hydraulic mulcher the rates of application per acre shall be as indicated below:

Seed Mix	75 lb.
5-20-20 Fertilizer	650 lb.
Hydraulic Mulch	1,500 lb.
Water	9,000 gal.

- H. The Contractor shall take all reasonable care to prevent the contamination by operations of structures, fences, utilities and all such installations and where such contamination occurs, he shall remove it to the satisfaction of and by means approved by the Owner's Representative.
- I. The Contractor shall regrade, refertilize, and reseed any or all seeded areas as directed by the Owner's Representative to correct any unsatisfactory and unacceptable conditions as determined by the Owner's Representative regardless of who may have caused the unacceptable or unsatisfactory area. If in the opinion of the Owner's Representative that any seeded areas do not show a uniform or healthy stand of grass, the Contractor shall reseed and or refertilize those areas as directed by the Owner's Representative without any additional cost to the Owner.
- J. Inspection of the planting work, to determine its completion for beginning the guarantee period, will be made by the Design Professional, and given approval in writing upon notice requesting such inspection by the Contractor. All planting must be alive, healthy, and a uniform stand of grass in order to be considered complete.
- K. One year after final completion of the project, seeded areas shall be solid color, well matted, and reasonably free from weeds. Inspection of the planting to determine its final acceptance will be made at the conclusion of the guarantee period by the Owner's Representative. No grassing shall be accepted unless the area shows a uniform, health stand of grass.

### 3.14 CLEANUP

- A. After all other work of this section is completed; leave area clean and free of any debris

**END OF SECTION**

## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### PART 1 – GENERAL

##### 1.01 SECTION INCLUDES

- A. Cast-in-place structural concrete
- B. Portland cement concrete paving
- C. Concrete fill for steel pan stairs
- D. Building-in of items furnished under other Sections

##### 1.02 RELATED SECTIONS

- A. Section 01410: Testing Laboratory Services
- B. Section 02210: Site Grading and Filling
- C. Section 16190: Concrete Foundations

##### 1.03 SUBMITTALS – ACTION

- A. Product Data: Proprietary products. Provide material certificates or test reports for other materials as requested by the Engineer.
- B. Shop Drawings: Concrete reinforcement. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" plus the following. Indicate material grade, bar size, length, number, spacing, location, bar schedules, bent bar diagrams, splicing, concrete cover, and accessories. Also, include plans, elevations, sections, and details with sufficient dimensions and of large enough scale for proper fabrication and placement. Elevations and sections are required for all concrete and masonry walls. Reproduction of any portions of design drawings for use as shop drawings will not be permitted.
- C. Mix Designs: Submit written reports of designs for approval for each class of concrete at least 15 days before starting work. Include Product Data for admixtures.

#### 1.04 SUBMITTALS – INFORMATIONAL

- A. Material Certifications: Submit following per ACI 301.
  - 1. Mill tests for cement.
  - 2. Admixture certification: include statement of chloride ion content.
  - 3. Aggregate certifications.
- B. Quality Control Submittals:
  - 1. Locations of construction joints and contraction joints not shown on Drawings.
  - 2. Proposed method for developing bond at joints.
  - 3. Proposed materials and methods for curing.
- C. Ready-Mix Delivery Tickets: Submit 2 copies per requirements of ASTM C94; include description and quantity of site-added materials (including water) with authorizing signatures.
- D. Special Procedures: Submit proposed hot and cold weather procedures.
- E. Submit temperature records weekly during hot and cold weather placement.
- F. Test Reports: Submit written laboratory reports within 24 hours of tests.

#### 1.05 QUALITY ASSURANCE

- A. Pre-installation Conference: Arrange a meeting with reinforcing installer, reinforcing inspector, and the Engineer to review Project conditions and Contract requirements for concrete reinforcing work.

#### 1.06 REFERENCE STANDARDS

- A. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
- B. Standard Specification: Comply with applicable provisions of the ACI 301 "Specifications for Structural Concrete for Buildings" except as modified and supplemented herein. Maintain a copy of this specification and the ACI SP-15 "Field Reference Manual" at the site during concrete work.

C. MODIFICATIONS AND SUPPLEMENTS TO ACI 301:

- 2.2.1.1 Air entraining admixtures conforming to ASTM C260 are required for air-entrained concrete. Do not use air-entrained cement.
- 3.7.1 Do not use materials containing calcium chloride or other chlorides.
- 3.8.1.2 Proportioning shall be as specified in Section 3.9.
- 4.1.3 Earth cuts may be used for footings if sufficiently stable for accurate forming.
- 5.4 Welding of reinforcing is not permitted.
- 5.6.4 At corners and intersections of footings, walls, and grade beams, provide bent bars of equal size and at same spacing as reinforcing in straight sections of concrete. Embed such corner bars 48 diameters but not less than 24 inches.
- 7.5.2 When concrete is below maximum slump, up to 1.5 gal/CY of water may be added in 1.0 gal/CY increments with 3 minutes additional mixing time to bring mix to specified slump if all the following requirements are complied with:
1. Maximum water-cement ratio is not exceeded.
  2. Method of measuring water is approved in writing by the Engineer.
  3. Standard cylinder samples are taken after addition of water and tested at Contractor's expense.
  4. Person authorized to add water shall be mutually acceptable to the Engineer, Contractor, and concrete producer.
  5. Concrete does not require slump change of more than 2 inches.
- 8.4.4 Cold Weather Procedures: Comply with ACI 306; exhibit preparations for compliance before scheduling concrete work.
- 8.4.5 Hot Weather Procedures: Comply with ACI 305; exhibit preparations for compliance before scheduling concrete work.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS – FORMING**

- A. Provide formwork of sufficient strength to prevent displacement, distortion, and deflection, and as needed for required finishes.
- B. Forms for Exposed Faces: New plywood or MDO plywood. After first use, undamaged plywood may be re-used. Limit surface irregularity to 1/8 inch in 5 ft. Arrange form components for minimum size and number of joints.
- C. Non-Architectural Forms: Form surfaces with plywood, metal, or other acceptable material to limit surface irregularity to 1 inch in 5 ft.
- D. Form Coating: Commercial compounds that will not bond with, stain, or otherwise adversely affect concrete surfaces and which will not impair subsequent surface finishes.
- E. Form Ties: Snap-off type; high strength steel.

### **2.02 MATERIALS - REINFORCING**

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed except #2 and #3 bars are to be Grade 40.
- B. Welded wire fabric for concrete reinforcement shall conform to specifications for welded steel wire fabric for concrete reinforcement, ASTM A185.
- C. Reinforcing Accessories: Bolsters, chairs, spacers, and other devices for spacing, supporting, connecting, and fastening reinforcing bars and mesh in place. Use wire type bar supports conforming to CRSI recommendations. Accessories to be stainless steel where concrete is exposed.
- D. Steel Wire: ASTM A82, plain cold-drawn wire.
  - 1. Use wire with nylon or other plastic coating with epoxy coated reinforcing bars.

- E. Fiber Reinforcing: Alkaline-resistant polypropylene fibers specially manufactured for concrete reinforcement.
  - 1. Euclid Chemical Co. Euco Fiberstrand.
  - 2. Forta Fibre, Inc. Forta CR.
  - 3. Fibermesh, Inc. Fibermesh.
- F. Anchor Bolts: Anchor bolts shall conform to the standard specifications for ASTM A709 Grade 36 unless noted otherwise. Sizes shall be as shown on the plans and will be provided by the Steel Supplier or Contractor.

### 2.03 MATERIALS - CONCRETE

- A. Portland Cement: ASTM C150, Type I. Supply all cement from a single manufacturer for each type.
- B. Normal Weight Aggregates: ASTM C33, normal weight, single source.
- C. Light Weight Aggregates: ASTM C330, single source.
- D. Water: Water used in mixing concrete shall be clean and free from injurious amounts of oil, acid, alkalies, organic matter, or other deleterious substances.
- E. Fly Ash: ASTM C618, Type C or Type F.
- F. Air-Entraining Admixture: ASTM C260.
- G. Water-Reducing Admixture: ASTM C494, Type A and containing not more than 0.05 percent chloride ions.
  - 1. Euclid Chemical Co. Eucon WR-75.
  - 2. Master Builders Pozzolith 200N.
  - 3. Sika Chemical Co. Plastocrete 161.
  - 4. W.R. Grace WRDA Hycol.
- H. High-Range Water-Reducing Admixture: ASTM C494, Type F or Type G and containing not more than 0.05 percent chloride ions.
  - 1. Euclid Chemical Co. Eucon Super 37.
  - 2. Master Builders Rheobuild.
  - 3. Sika Chemical Co. Sikament.
  - 4. W.R. Grace. Daracem.



I. Water-Reducing, Retarding Admixture: ASTM C494, Type D and containing not more than 0.05 percent chloride ions.

- |    |                     |                            |
|----|---------------------|----------------------------|
| 1. | Euclid Chemical Co. | Eucon Retarder 75.         |
| 2. | Master Builders     | Pozzolith 300-R.           |
| 3. | Sika Chemical Co.   | Plastiment or Plastocrete. |
| 4. | W.R. Grace          | Daratard.                  |

J. Other Admixtures: If desired, submit product data for proposed retarding or other admixtures to Architect/Engineer for review. No admixture containing calcium chloride, thiocyanates, or more than 0.05 percent chloride ions may be used.

## 2.04 ACCESSORIES

A. Joint Filler for Sealant Joints: Closed cell plastic foam strips similar to W.R. Meadows "Ceramar" and sized for 25 - 35 percent installed compression.

B. Joint Filler for Unsealed Joints: Asphalt-impregnated fiberboard; ASTM D1752.

- |    |               |              |
|----|---------------|--------------|
| 1. | Celotex Corp. | Flexcell.    |
| 2. | W.R. Meadows  | Fiber Joint. |

C. Epoxy Joint Filler: Multi-component, 100 percent solids compound with minimum Shore D hardness of 50.

- |    |                     |                        |
|----|---------------------|------------------------|
| 1. | Euclid Chemical Co. | Euco Epoxy 600 or 700. |
| 2. | Metzger-McGuire Co  | MM-80.                 |

D. Vapor Retarder: Conforming to ASTM E1745, Class C. Maximum 0.04 perms permeance per ASTM E96. Provide manufacturer's self-adhering joint tape and other recommended installation accessories for Project applications.

- |    |                     |                                 |
|----|---------------------|---------------------------------|
| 1. | Stego Industries    | Stego Wrap 10-mil.              |
| 2. | Reef Industries     | Griffolyn T-85.                 |
| 3. | W. R. Meadows, Inc. | Premoulded Membrane Vapor Seal. |

E. Bonding Agent: Epoxy or polyvinyl acetate type.

- |    |                     |             |
|----|---------------------|-------------|
| 1. | Euclid Chemical Co. | Euco-Bond.  |
| 2. | Larsen Co.          | Weld-Crete. |

- F. Structural Bonding Adhesive: 100 percent solids product suitable for use on damp or dry surfaces.
1. Euclid Chemical Co. Euco Epoxy 452VM or 620.
  2. Sika Chemical Corp. Sikadur Hi-Mod.
- G. Absorptive Cover: Burlap cloth made from jute or kenaf, 9 oz per sq yard weight; AASHTO M182, Class 2.
- H. Moisture-Retaining Cover: One of the following as conforming to ASTM C171
1. Waterproof paper.
  2. Polyethylene film.
  3. Polyethylene-coated burlap.
- I. Curing Compound: Dissipating resin type, ASTM C309, Type I. Curing compounds, for water retaining structures, must be nontoxic and free of taste and odor.
1. Euclid Chemical Co. Kurez DR.
  2. L&M Construction Chemicals L&M Cure DR.
  3. Mameco International Vulkem 2100.
- J. Curing and Sealing Compound: Clear styrene acrylate type, 30 percent minimum solids. Curing and sealing compounds, for water retaining structures, must be nontoxic and free of taste and odor.
1. Euclid Chemical Co. Super Rez Seal.
  2. Mameco International Vulkem 2101.
  3. Master Builders Masterkure 30.
- K. Waterstops: Indicated type and size; CRD C 572 polyvinyl chloride. Provide prefabricated units for changes in plane and manufacturer's system for watertight seaming.
- L. Dovetail Anchor Slots: 0.0336 inch (22 gage) minimum galvanized sheet metal; furnish slots with resilient filler strips.
- M. Non-Shrink Grout: Pre-mixed non-metallic type conforming to CE CRD C621 and suitable for exterior uses; 8000 psi minimum compressive strength.
1. Euclid Chemical Co. Euco-NS.
  2. Master Builders Masterflow 713.
  3. U.S. Grout Corp. Five Star Grout.

- N. Abrasive Aggregate for Non-Slip Finish: Euclid Chemical Co. "Non-Slip" or North Company "Alundum."
- O. Mineral Aggregate Hardener: Proprietary mixture of Portland cement, graded quartz aggregate, and plasticizing admixtures.
  - 1. Euclid Chemical Co. Surfex.
  - 2. Master Builders Mastercron.

## 2.05 CONCRETE MIXES

- A. Prepare design mixes by either laboratory trial batch or field experience methods per ACI 301. If trial batch method is used, employ testing agency acceptable to the Engineer and independent of agency employed for quality control testing to prepare proposed mix designs.
- B. Submit written reports to the Engineer/Owner of each proposed mix for each class of concrete at least 15 days before start of concrete production. Do not begin concrete production until mixes have been approved by the Engineer/Owner.
- C. Fly Ash: Except where required, fly ash may be substituted for up to 20 percent of the cement content in mixes. Where fly ash is required, the maximum water-cement plus fly ash ratio shall be 0.45.
- D. Admixtures: Use of other admixtures is subject to the Engineer/Owner's prior approval.
- E. Required Admixtures:
  - 1. All concrete: Water-reducing admixture.
  - 2. Concrete placed at ambient temperatures below 50 deg F: Accelerator.
  - 3. Air-entrained concrete: Air-entraining admixture.
  - 4. Pumped concrete, concrete at water retaining structures, and all concrete with W/C ratio below 0.50: Fly ash substituted for 20 percent of the cement content and high-range water-reducing admixture.

- F. Adjustments: Mix design adjustments may be requested when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant. Such adjustments are subject to prior approval of the Engineer and shall be made without change to Contract Sum or Time. Laboratory test data for revised mix design and strength results shall be submitted to and accepted by the Engineer/Owner before using revised mixes in work.
- G. Slump for Concrete with High-Range Water-Reducing Admixture: Deliver concrete to site with 2 to 3 inch slump. After verification of slump on site, add high-range water-reducing admixture to achieve not more than 9 inch slump.
- H. Fiber Reinforcing: Use fiber reinforcing in all, slabs on grade, and all concrete with exterior exposure. Comply with manufacturer's recommendations. Fiber reinforcing is not to be used in water retaining structures.
- I. Concrete Class 4000 psi (Non Air-entrained): Footings, foundation walls, and interior slabs on grade.
1. Compressive Strength: 4,000 psi at 28 days.
  2. Minimum Cement: 6-1/4 sacks per cubic yard.
  3. Maximum Water: 5-1/2 gallons per sack.
  4. Aggregate: no. 57 normal weight.
  5. Slump: 3 to 5 inches.
- J. Concrete Class 4000 psi (Air-entrained): All concrete in water-retaining structures and pipe gallery and all concrete with exterior exposure.
1. Compressive Strength: 4,000 psi at 28 days.
  2. Minimum Cement: 6-1/4 sacks per cubic yard.
  3. Maximum Water: 5 gallons per sack.
  4. Aggregate: no. 57 normal weight limestone.
  5. Entrained Air: 5 to 7 percent.
  6. Slump: 3 to 4 inches.
- K. Concrete Class 4000 psi (Structural Lightweight): Equipment pads on structural slabs.
1. Compressive Strength: 4,000 psi at 28 days.
  2. Entrained Air: 4 to 8 percent.
  3. Maximum Dry Weight: 113 lb per cubic foot.
  4. Slump: 2 to 4 inches.

L. Concrete Class 3000 psi (Non Air-entrained): Concrete fill for reinforced masonry.

1. Compressive Strength: 3,000 psi at 28 days.
2. Minimum Cement: 5-1/4 sacks per cubic yard.
3. Maximum Water: 6-1/2 gallons per sack.
4. Aggregate: no. 7 normal weight.
5. Slump: 5 inch slump ( $\pm 1$  inch).

## 2.06 CONCRETE MIXING

A. Ready-Mix Concrete shall conform to the standard specifications for Ready-Mix Concrete, ASTM C94.

B. During hot weather or under other conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes.
2. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 – EXECUTION

### 3.01 INSTALLATION - FORMWORK

A. Design and construct formwork to support construction loads until concrete can support loads. Provide bracing to maintain correct position.

B. Construct formwork to be readily removable without damage to concrete surfaces or adjacent materials.

C. Construct formwork joints to prevent leakage of mortar.

D. Chamfer exposed corners with applied strips that produce straight, smooth edges and surfaces. Provide 1" chamfering at all exposed corners.

E. Arrange form components to minimize size and number of joints.

F. Provide openings in formwork to accommodate work of other trades.

G. Accurately place and securely support items built into forms.

H. Clean and adjust forms before placing concrete. Remove dirt, debris, and other waste or foreign materials.

- I. Retighten forms and bracing after concrete placement as needed to eliminate mortar leaks and maintain alignment.
- J. When using earth forms, hand trim sides and bottoms, and remove loose dirt before placing concrete.

### 3.02 INSTALLATION - REINFORCING

- A. Position, support, and secure reinforcing for accurate placement with indicated clearance, and to prevent displacement.
- B. Clean reinforcing of loose rust, earth, ice, and other materials which impair bond with concrete.
- C. Touch up damaged portions of epoxy coating per coating manufacturer's recommendations.
- D. Install welded wire fabric in all slabs on grade. Use longest practicable sheets. Lap edges one full mesh and lace splices with wire, and offset laps in adjacent sheets. Offset end laps in adjacent sheets to prevent continuous laps in either direction.
- E. Vapor Retarder: Install vapor retarder sheets under all interior slabs on grade per ASTM E1643.
  - 1. Lap edges 6 inches and seal vapor tight.
  - 2. Seal punctures and penetrations vapor tight.
  - 3. Inspect vapor retarder installation before placing concrete to ensure complete coverage.
  - 4. Repair tears and other damaged areas.

### 3.03 INSTALLATION - CONCRETE

- A. Provide construction, isolation, and contraction joints as indicated or needed.
  - 1. Locate construction joints so that strength and appearance will not be impaired and as indicated on Drawings.
  - 2. Place isolation joints where concrete abuts other construction or existing concrete, unless otherwise indicated.
  - 3. Locate contraction joints as indicated on Drawings; Form or saw cut contraction joints 1/8 inch wide by 1/4 slab depth as indicated.
  - 4. Place full depth filler in joints to receive sealant; score filler nearly through at correct depth for sealant to facilitate later removal by sealant installer.

- B. Set and build into work anchorage devices and other embedded items for other work attached to or supported by concrete. Use setting diagrams, templates, and instructions provided by others for proper locating and setting.
- C. Placing Concrete: Notify the Engineer/Owner at least 24 hours before placing concrete.
- D. Comply with ACI 304; place concrete in continuous pour between predetermined construction or contraction joints.
  - 1. Hot weather placing: Comply with ACI 305.
  - 2. Cold weather placing: Comply with ACI 306.
  - 3. Backup concrete placing equipment should be available for use within 30 minutes in the event the primary placing equipment breaks down.
  - 4. Do not allow concrete to drop more than 4 feet or through a cage of reinforcing steel.
  - 5. Chutes used to transport concrete should have a slope not exceeding one vertical to two horizontal and not less than one vertical to three horizontal so that the concrete will travel fast enough to keep the chute clean but slow enough to avoid segregation of materials. At end of chute, provide baffle, drop chute, "tremie", or elephant truck to help prevent segregation.
  - 6. To prevent segregation, the concrete shall be deposited in approximately 12 to 24 inch deep horizontal layers as near as possible to its final position. Each horizontal layer shall be consolidated by the use of acceptable mechanical vibratory equipment to thoroughly work concrete around reinforcing and into forms. The vibrator shall extend into the underlying layer to bond the two layers together.
- E. Slabs on Grade: Bring slab surface to correct level with straightedge and strike off. Use highway straightedges to form smooth surface free of humps and hollows; do not use bullfloats. Protect slab surfaces against moisture loss before final finishing.
- F. Finishes for Formed Surfaces:
  - 1. Exposed Surfaces: As-cast, smooth form finish.
  - 2. Concealed Surfaces: As-cast, rough form finish.
- G. Slab Finishes:
  - 1. Exterior Slabs: Texture floated finish.

2. Interior Slabs: Smooth trowel finish; grind smooth defects which would telegraph through applied coverings.
- H. Slab Tolerances: Comply with ACI 117; tolerances may be measured by methods described in Section 4.5.6 or 4.5.7.
1. Classification: Conventional, straight-edged.
  2. Exterior Slabs on Grade:
    - a. Flatness: FF = 13 Specified Overall Value (SOV), 10 Minimum Local Value (MLV).
    - b. Sloped Areas: Positive drainage with no 'ponds' greater than 4 ft in diameter.
  3. Interior Slabs on Grade:
    - a. Flatness: FF = 35 Specified Overall Value (SOV), 25 Minimum Local Value (MLV).
    - b. Levelness (except sloped areas): FL = 13 Specified Overall Value (SOV), 10 Minimum Local Value (MLV).
    - c. Sloped Areas: Positive drainage with no 'ponds' greater than 4 ft in diameter.
  4. Supported Slabs: (Measured before removal of shores.)
    - a. Flatness: FF = 20 Specified Overall Value (SOV), 15 Minimum Local Value (MLV).
    - b. Levelness: According to ACI 117.
  5. Level Alignment: Plus or minus 3/4 inch from design elevations except plus or minus 1/8 inch where new slab abuts existing slabs.
  6. Do not remove forms, shores, or bracing until concrete has gained sufficient strength to carry loads on it.

### 3.04 CURING

- A. Begin curing as soon as possible following initial set or completion of surface finishing, as soon as marring of the concrete surface will not occur and as soon as the water sheen has disappeared from exposed surfaces.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature as needed for full, even hydration of cement.
- C. Cure formed surfaces by moist curing for seven days after forms are removed.
- D. Cure slabs that are to receive additional concrete, paint, or tile that requires a positive bond by moisture method only; do not use liquid membrane-forming curing compounds.
- E. Apply anti-spall mixture to exterior concrete traffic surfaces at least 28 days after placement. Spray on clean, dry concrete free of oil, dirt, and other foreign materials: first application at rate of 40 sq yards per gallon;



second application at 60 sq yards per gallon. Allow complete drying between applications.

### 3.05 ADJUSTING

- A. Modify or replace concrete not conforming to requirements as directed.
- B. Repair of surface and structural defects is subject to approval by the Engineer.
  - 1. Tie Holes - After being thoroughly cleaned and dampened, the tie holes shall be grouted solid with nonmetallic, non-shrinking grout.
  - 2. Patching minor defects – Patching of defective areas shall be done as soon as the forms can be removed and before curing compound is applied.
  - 3. Honeycombed areas - If patching is allowed by the Engineer/Owner, all unsound material shall be chipped out back to sound, solid concrete and inspected prior to the start of filling and patching operations.
- C. Remove defective concrete that cannot be repaired to proper strength or desired appearance and provide new conforming concrete.

### 3.06 QUALITY CONTROL TESTING AND INSPECTION DURING CONSTRUCTION

- A. Testing and Inspection: Employ at Contractor's expense an independent testing laboratory acceptable to the Engineer/Owner to make required tests and inspections. Provide re-testing as directed by the Engineer/Owner for material that fails to meet specified requirements in first test.
- B. Refer to Section 01410 for applicable requirements.
- C. Concrete Sampling and Testing:
  - 1. Make one test consisting of 4 test cylinders per ASTM C31 and C172 for each day's pour or for each 100 or less cubic yards of each class of concrete. Provide correct temperature, moisture, and protection conditions, including curing boxes, for test cylinders.
  - 2. Test one cylinder at 7 days and two at 28 days for compressive strength per ASTM C39. Retain fourth cylinder in reserve.
  - 3. Perform one slump test per ASTM C143 for each set of test cylinders and when directed by the Engineer.
  - 4. Perform air content test per ASTM C173 for each set of compressive strength specimens of air-entrained concrete.
  - 5. Comply with applicable requirements of Section 01410, including provisions for re-testing.

- D. Cooperate with testing agency and assist in sampling as requested by the testing agency. Provide curing boxes and curing for test samples.
- E. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer/Owner. Contractor shall pay for such additional testing.
- F. Reinforcing Inspection: Inspect reinforcing in all reinforced concrete and masonry.
- G. Test results will be reported in writing to the Engineer/Owner and Contractor as soon as practicable after tests and inspections are made.

**END OF SECTION**

## SECTION 16190

### CONCRETE FOUNDATIONS

#### PART 1 - GENERAL

##### 1.01 GENERAL REQUIREMENT

- A. Foundations are required for supporting a power transformer contained in a substation.

##### 1.02 RELATED WORK

- A. Soils Report
- B. Section 01410: Testing Laboratory Services
- C. Section 03300: Cast-In-Place Concrete

#### PART 2 - PRODUCTS

##### 2.01 DETAILED MATERIALS

Forming materials, concrete materials, reinforcing materials, and concrete accessories shall be as detailed in Section 03300, Part 2 – Products, of these Specifications.

#### PART 3 - EXECUTION

##### 3.01 GENERAL DESIGN

- A. Basic Standards
  - 1. All concrete shall conform to the requirements of the "Building Code Requirements for Reinforced Concrete" of the American Concrete Institute, ACI 318 (latest date) except as otherwise modified herein.
- B. Mix Design
  - 1. The supplier shall furnish a laboratory mix design using actual representative samples of prepared aggregates and cement. This mix design shall be submitted showing the mix proportions used and the slump and compressive strength of the concrete as determined by the laboratory tests. The mix proportions and appropriate water-cement ratio shall be determined on the basis of procuring concrete

having suitable workability, density, impermeability, durability, and required strength.

C. Strength of Concrete

1. Concrete shall have a minimum compressive strength of 4,000 psi at 28 days. Slump shall not exceed 4". Air content shall be between 3 and 6 percent. Slump and air entrainment tests will be made regularly by a testing company to be approved by the Owner.

D. Test Specimens

1. The supplier shall furnish the concrete required for all test specimens and the Contractor (or his representative) will obtain the compression test specimens from this quantity as required. This work will be done in accordance with the standard method for Making and Curing Concrete Compression and Flexure Test Specimens in the Field, ASTM C31 (latest date). Not less than two specimens will be made for each test. There shall be at least one test per truck delivery.
2. The average strength of all the test cylinders shall be equal to or greater than the strengths specified and at least 90 percent of all tests shall indicate a strength equal to or greater than the strength specified. In cases where the strength of the test cylinders for any portion of the work falls below the requirements herein, the supplier may be required to secure test specimens of the hardened concrete represented by these cylinders. Specimens shall be secured and tested by the standard method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, ASTM C42 (latest date).
3. If the specimen test further substantiates that the concrete represented by the cylinders and specimens is below the strength requirements specified herein, the supplier may be required to remove and replace such concrete at his expense.
4. The Contractor shall supply a copy of all test reports to the Engineer/Owner before final acceptance.
5. All costs relating to the concrete testing shall be borne by the Owner with the exception of any re-testing which will be the responsibility of the Contractor as detailed in Section 01410 of these Specifications.

E. Mix Proportions

1. Mix proportions shall conform to Section 03300, Part 2.05.J., of these Specifications.

#### F. Unit Stresses

1. Unit stresses in concrete shall be in accordance with the requirements of the alternate design method (working stress design) of the "Building Code Requirements for Reinforced Concrete" of the American Concrete Institute, ACI 318 (latest date).
2. No allowable stress increase shall be allowed for members subject to stresses produced by wind loadings.

#### G. Design Loads

1. Foundations used to support steel structures shall be designed to resist both uplift and down thrust loads acting in combination with the respective horizontal shears applied at the top of the footing. These loads shall be the values produced by the loadings specified for the structure mounted thereon. These loads will be specified by the Steel Supplier prior to final foundation design.
2. Foundations used to support electrical equipment shall be designed to resist the dead weight in conjunction with the wind loadings and will be specified by the Steel Supplier prior to final foundation design.

#### H. Bearing Values of Soils for Concrete Footings

1. All foundations shall have adequate area for limiting the bearing on the soil to a safe value. The load imposed on the soil shall be calculated by totaling the weight of the load supported on the foundation, the weight of the foundation itself, and the weight of any earth supported by the base of the concrete foundation. In making this calculation, the concrete shall be included at 145 pounds per cubic foot and the earth or rock at 100 pounds per cubic foot.
2. Foundations used to support electrical equipment carry their design loads continuously; and under these conditions, the allowable bearing value of the soil shall be as stated in the soils report for this project.
3. Foundations used to support steel structures resisting horizontal pulls are not required to carry their design loads continuously as the maximum loading condition is seldom encountered and is of short duration. Foundations used shall be designed to resist the loads as specified by the steel supplier. In reviewing foundations for structures, where the maximum value of the foundation must be checked to prevent excessive settlement or rotation, the maximum loadings shall be used with a permissible maximum bearing value of soil as stated in the soils report. The concrete and reinforcement should also be reviewed for this maximum condition.

I. Settlement

The use of the allowable bearing values for soil specified above will result in a design free from objectionable settlement.

J. Horizontal Shear

The design loads of each particular structure shall be resolved into vertical and horizontal components and applied at the top of the foundations. The resultant of these loads shall be resisted by lateral pressure against the soil and by sliding friction between soil and concrete. In reviewing foundations for structures, where the maximum value of the foundation must be checked to prevent excessive settlement or rotation, the maximum loadings shall be used with a permissible maximum bearing and lateral pressure resistance of the soil as stated in the soils report.

K. Resistance to Uplift

Foundations resisting uplift shall be designed so that the weight of the foundation together with the weight of the earth directly above it is equal to or greater than the uplift force. Concrete shall be included at 145 pounds per cubic foot, and the earth included therein weighs 100 pounds per cubic foot.

### 3.02 DETAILS OF DESIGN

- A. Concrete foundations shall be set high enough above ground to protect the steel or equipment mounted on it from moisture. A minimum of 6 inches shall be allowed for this projection.
- B. Concrete foundations shall be carried deep enough to reach firm soil and shall extend below the frost line, which for this area shall be considered as 18 inches. Foundations shall be carried to a minimum depth of two feet as shown on plans.
- C. All exposed foundation edges above ground shall have a one-inch bevel.
- D. Reinforcing steel shall be covered by a minimum of three inches of concrete at all locations.
- E. Foundations for supporting structures shall be designed for leveling and grouting as shown in plans. See paragraph 3.03,E.,5. for grout mix.

### 3.03 CONSTRUCTION REQUIREMENTS

#### A. Excavation and Backfill

1. The areas to be occupied by the spread foundations shall be cleared of all trees, roots, vegetation and similar unapproved subgrade materials. The areas shall be excavated and trimmed in conformity to the lines and grades indicated on the Plans or as directed by the Engineer.
2. Subgrade preparation shall be performed in accordance with Section 02210 of these Specifications allowing for the installation of the CR-610 aggregate beneath each individual foundation.
3. Should the subgrade not be able to achieve the bearing value of the soil as specified in the soils report, it shall be immediately reported to the Owner and Engineer.
4. Surplus excavated materials shall be removed from the site and disposed of as directed by the Owner's Representative. Spoil material shall not be disposed of in a watercourse or on the banks of a watercourse, but only on approved upland site.
5. Upon completion of foundation construction and removal of the forms, the surrounding ground shall be prepared, stabilized and backfilled in accordance with Section 02210 of these specifications.

#### B. Forms

1. Forms shall conform to the shape, lines, and dimensions of the concrete as called for on the drawings. Lumber used in forms should be planed on one side to obtain a smooth surface where exposed. Undressed lumber may be used for backing, rough work, and unexposed surfaces. Lumber which may warp readily, such as hemlock or oak, should not be used. If forms are for repeated use, they should be oiled to prevent shrinkage and the absorption of water. Joints in forms shall be horizontal or vertical. Molding shall be placed in the angles of all forms to provide a one-inch bevel where exposed.
2. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and so designed as to permit their removal without injury to adjoining work. They shall be properly braced or tied together so as to maintain position and shape. Tie wires may be used for internal ties, but they shall be cut back and the surface dressed after the forms are removed if the concrete surface is exposed above ground.
3. Forms shall not be removed until the concrete has thoroughly set. Usually three to seven days are required for ordinary foundations to set, but in cool weather additional time will be required. Forms for reinforced concrete or those used to support heavy loads should not be removed so quickly as additional time should be allowed for thorough hardening. Nonbearing walls, mass foundations, etc., may

have their forms removed as soon as the concrete is able to bear its own weight.

C. Metal Reinforcement

1. Metal reinforcement, before being positioned, shall be thoroughly cleaned of mill scale and rust and of coatings that will destroy or reduce the bond. Where there is a delay in depositing concrete, the reinforcement shall be re-cleaned if necessary.
2. Reinforcement shall be accurately positioned and secured by using wire of not less than No. 18 gauge, or suitable clips at intersections, and shall be supported by concrete or metal chairs or metal hangers. Vertical column rods shall be rigidly wired to binders at every intersection. Splices shall provide sufficient lap to transfer the stress between bars by bond and shear and, unless shown otherwise, shall not be less than 40 diameters. Adjacent bars shall not be spliced at the same point unless shown otherwise. Dowels, when used, shall extend a minimum of 40 diameters each side of construction joints. The minimum coverage of reinforcing steel shall meet the requirements of paragraph 3.02.D.
3. Pipe sleeves and similar openings shall not be built into structural members in groups in such a way as to weaken the members. Sufficient space shall be left for concrete to flow around and encase all embedded conduits and reinforcing steel. The reinforcing steel shall be located as detailed on the drawings and shall not be displaced by conduit or piping. All pipe sleeves shall be polyvinyl chloride (PVC) conforming to Schedule 40, ASTM D1785 for conduit and ASTM D2466 for fittings.

D. Storage of Cement and Aggregate

1. The cement shall be received in good condition and stored in a watertight building, wherever possible, so that it can be kept dry. Protection by tarpaulin covers must be such as to positively maintain the cement in a dry condition.
2. The fine and coarse aggregate shall be separately stored outdoors in neat piles without any protection. The piles shall be separated far enough to prevent accidental mixing. That portion of the aggregate resting against the ground shall not be used.

E. Mixing Concrete

1. Proportioning Mix

If a small quantity of concrete is required, the expense of making preliminary tests to determine the most economical proportion of



aggregate may not be justified. The water, cement, and fine and coarse aggregate shall be proportioned approximately as specified in Section 03300 Part 2.05 of these specifications. The relative proportions of fine and coarse aggregates should be varied depending upon the relative firmness or coarseness of the material. Larger proportions of coarse sand than of fine sand should be used, and the proportion of sand should be increased if the coarse aggregate consists mostly of larger sizes without sufficient amounts of the smaller sizes mixed with it. The ratio of total water to cement must be maintained to control the strength, but the total amount of aggregate per batch should be increased to the point where it gives the driest consistency which can be handled economically.

## 2. Mixing

- a. In general, all concrete shall be machine mixed. Hand-mixed concrete should not be used unless the amount of concrete involved is so small that the use of a concrete mixer is not justified. Before beginning a run of concrete, hardened concrete and foreign material shall be removed from the inner surfaces of the mixing equipment.
- b. Ready-Mixed concrete shall be done in a batch mixer which will insure a uniform distribution of the materials through the mass so that the mixture is homogeneous and uniform in color. The mixer shall be equipped with charging hopper, water storage, and a water-measuring device. The entire contents of the drum shall be discharged before recharging. The mixer shall be cleaned at frequent intervals while in use. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer.
- c. For concrete mixed on the job in mixers of one cubic yard or less, the mixing of each batch shall continue for not less than one minute after all materials are in the drum. For mixers of larger capacity, the minimum time of mixing shall be 12 minutes after all materials are in the drum. During this time, the mixer shall rotate at a peripheral speed of about 200 feet per minute.
- d. Hand mixing shall be done on a watertight platform. The cement and fine aggregate shall first be mixed dry until the whole is of uniform color. The water and coarse aggregate shall then be added and the entire mass turned at least three times or until a homogeneous mixture of the required consistency is obtained.

3. Consistency

The consistency of the concrete shall be such that it will flow sluggishly, but will completely fill the forms and the space between the reinforcement. Any wetter consistency than that necessary to ensure the above results is objectionable. The quantity of water used shall therefore be the minimum necessary to produce concrete of the strength and workability required. The consistency shall be measured by the slump test, and it shall not be greater than that previously specified.

4. Remixing

The re-tempering of concrete or mortar which has partially hardened, that is, remixing with or without additional cement, aggregate, or water, will not be permitted.

5. Grout

Grout shall be proportioned with one part cement to two parts sand. Use only enough water in grout to make a mix which can be well packed.

F. Placing Concrete

1. Before depositing concrete, debris shall be removed from the space to be occupied by the concrete; forms shall be oiled or thoroughly wetted and kept wet until the concrete is poured.
2. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods, which shall prevent the separation or loss of the ingredients. It shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling. It shall be so deposited as to maintain, until the completion of the unit, a plastic surface approximately horizontal. Forms for walls or other thin sections of considerable height shall be provided with openings, or other devices, which will permit the concrete to be placed in a manner that will avoid accumulations of hardened concrete on the forms or metal reinforcement. Under no circumstances shall concrete that has partially hardened be deposited in the work.
3. Concrete shall be consolidated to the maximum practical density, without segregation, by vibration or puddling so that it is free from pockets of coarse aggregate and closes against all surfaces and embedded materials. Vibration of concrete should be done with immersion-type vibrators operated at speeds of at least 8,000 rpm when immersed in concrete. Vibrators shall be inserted vertically at

close enough intervals so that the zones of influence overlap. The vibrators shall be inserted to the full depth of the layer being treated. When concrete is being placed in layers, the tip of the vibrator shall extend approximately 4 inches into the underlying layer. Vibrators shall not be used to move concrete horizontally.

4. The temperature of concrete when being placed shall be:  
Not less than 40° F in moderate weather; Not less than 50° F in weather during which the mean daily temperature drops below 40° F; No greater than 90° F during hot weather.

Provisions shall be made to conform with the above requirements, but if it is impossible to do so, the following precautions should be made: After the first frost, and until the mean daily temperature in the vicinity of the work falls below 40° F for more than one day, the concrete shall be protected against freezing for not less than 48 hours after it is placed. Whenever the mean daily temperature in the vicinity of the work falls below 40° F for more than one day, the concrete shall be maintained at a temperature not lower than 50° F for at least 72 hours after it is placed, and shall be protected against freezing for 5 days immediately following the 72 hours of protection at 50° F.

Discontinuance of protection against freezing shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40° F in 24 hours. When the mean daily temperature rises above 40° F for more than three successive days, the specified 72 hour protection at a temperature not lower than 50° F may be discontinued but the concrete shall be protected against freezing for not less than 48 hours after placing. When artificial heat is employed, special care shall be taken to prevent the concrete from drying.

5. Concrete shall be deposited continuously and as rapidly as practical until the unit of operation is completed. Before depositing new concrete on or against concrete, which has set, the forms shall be retightened, the surface of the concrete shall be roughened, thoroughly cleansed of foreign matter and laitance, and saturated with water. The cleaned and saturated surfaces of the hardened concrete, including vertical and inclined, shall first be slushed with a coating of neat cement grout against which the new concrete shall be placed before the grout has attained its initial set.
6. All exposed concrete shall be properly cured for seven days by moist curing using wetted burlap, covered with Kraft paper or polyethylene sheet to prevent evaporation or by spray application of a liquid membrane-forming compound conforming to ASTM C309, Type 1 (latest date). Surface defects shall be filled prior to application of membrane curing compound. All concrete surfaces on which

membrane compound has been applied shall be adequately protected for the duration of the curing period from any cause, which will disrupt the continuity of the curing membrane. No membrane curing compound shall be used on surfaces of construction joints or on surfaces requiring subsequent bonding.

7. Foundations used to support steel structures and electrical equipment shall not be poured to final height unless so shown on the drawings. After the equipment is placed and leveled, the remaining space shall be filled with grout so as to provide a uniform bearing surface.

#### G. Joints

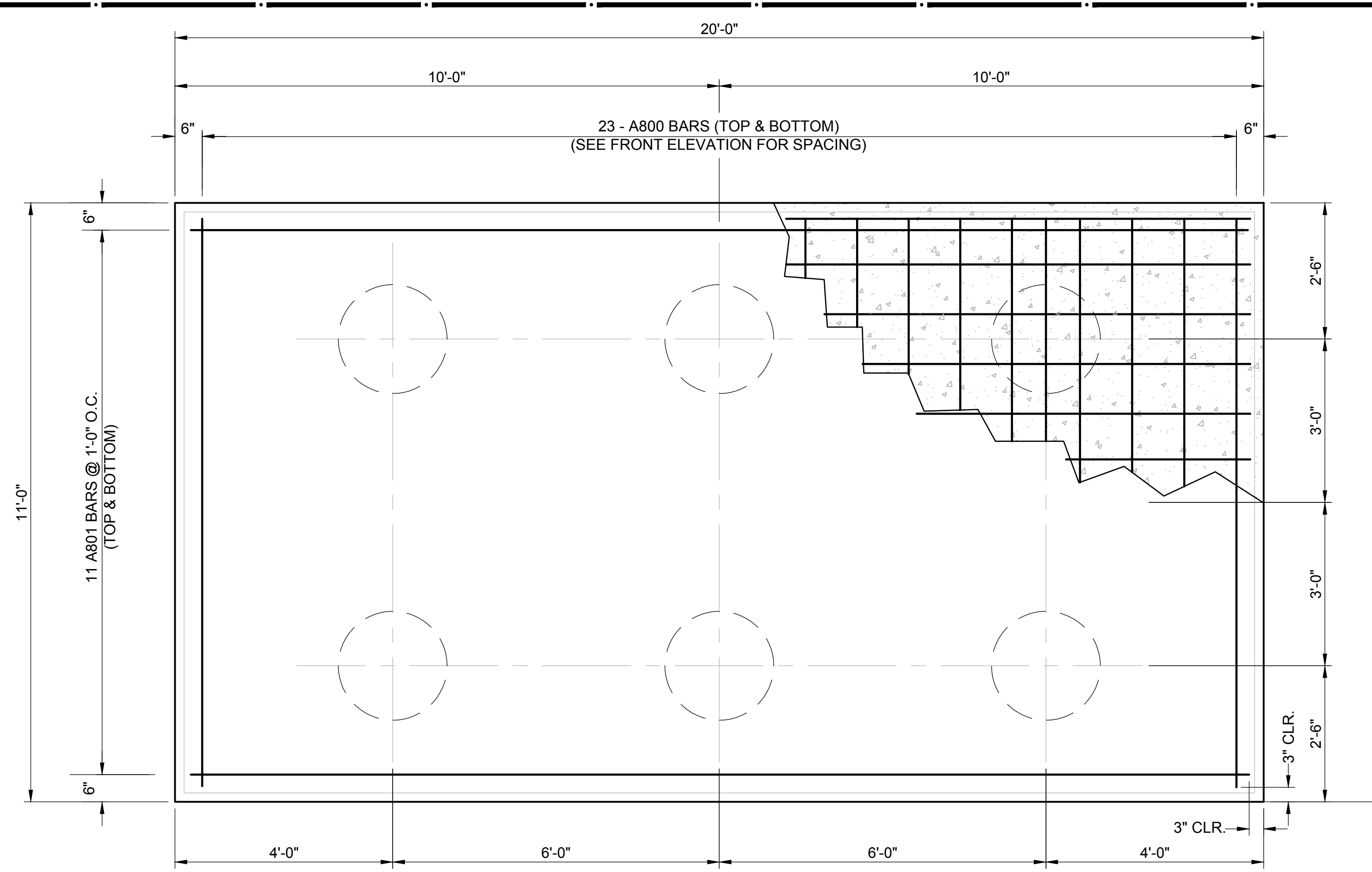
1. Construction joints shall not be used unless shown on the drawings. After depositing the concrete, the excess water shall be removed from the surface forming the joint. Surfaces of contact shall be cleansed and wetted before depositing is resumed, and any laitance shall be removed. Where additional resistance to horizontal shear is required, mortises or keyways shall be formed in the concrete.
2. Construction joints may be permitted subject to the approval of the Owner/Engineer.

#### H. Surface Finish

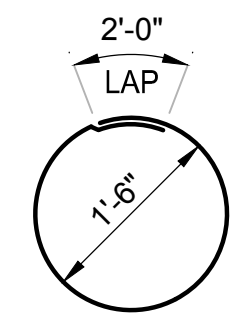
1. Concrete that is to have an exposed face shall be placed and worked so as to secure a uniform distribution of the aggregates, freedom from void spaces, and a uniform texture. Face forms shall be removed as soon as practicable in order to facilitate effective repair of void spaces or broken corners before the surface has dried.
2. As soon as the face forms are removed, any fins or other projections shall be carefully removed and offsets leveled. Any voids or damaged places shall immediately be saturated with water and filled with a mixture of the same proportions as that used in the surface, and brought even with the surface by means of a wooden float. A steel trowel shall not be used to finish the surface.
3. Immediately after the forms are removed, the exposed surface shall be wetted and rubbed with a carborundum brick until even and smooth and of uniform appearance without applying any cement or other coating. The surface shall then be washed to remove all loose cement or sand. Top surfaces not subject to wear shall be smoothed with a wood float and be kept wet for several days. Care shall be taken to avoid an excess of water in the concrete and to drain or otherwise promptly remove any water that comes to the surface. Dry cement, or a dry mixture of cement and sand, shall not be sprinkled directly on the surface.

**END OF SECTION**

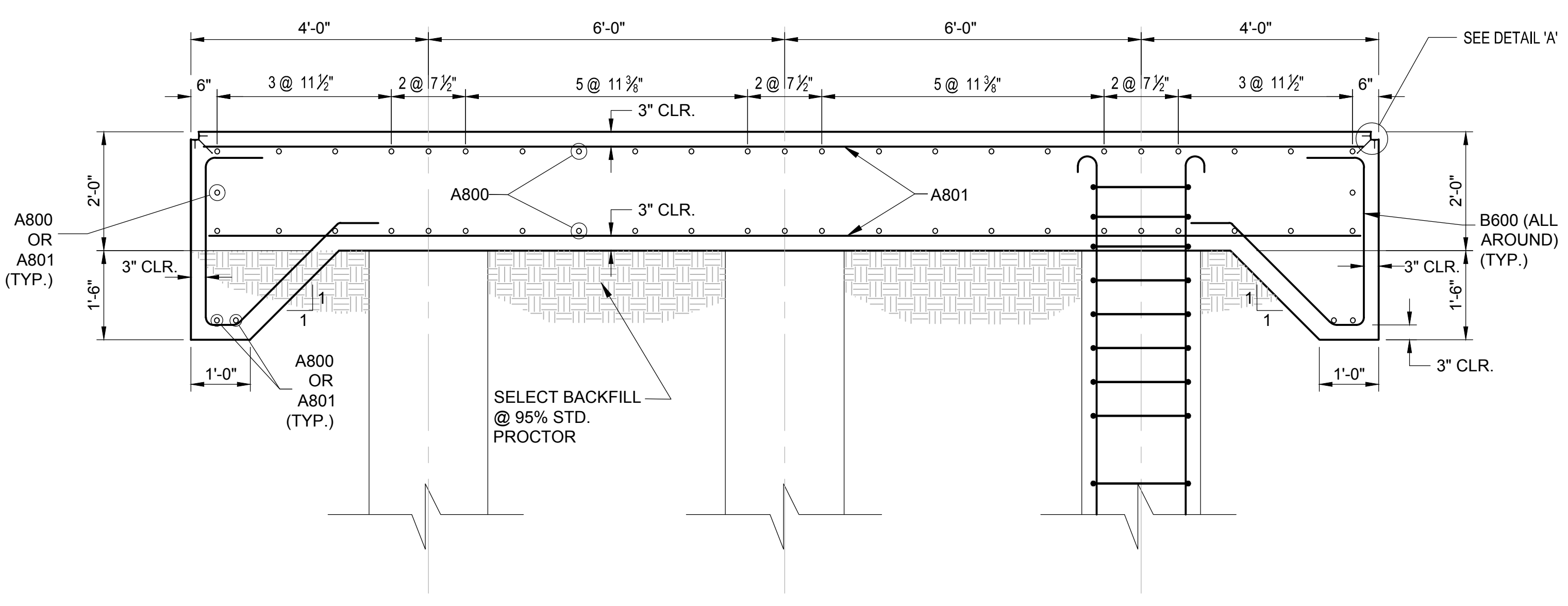
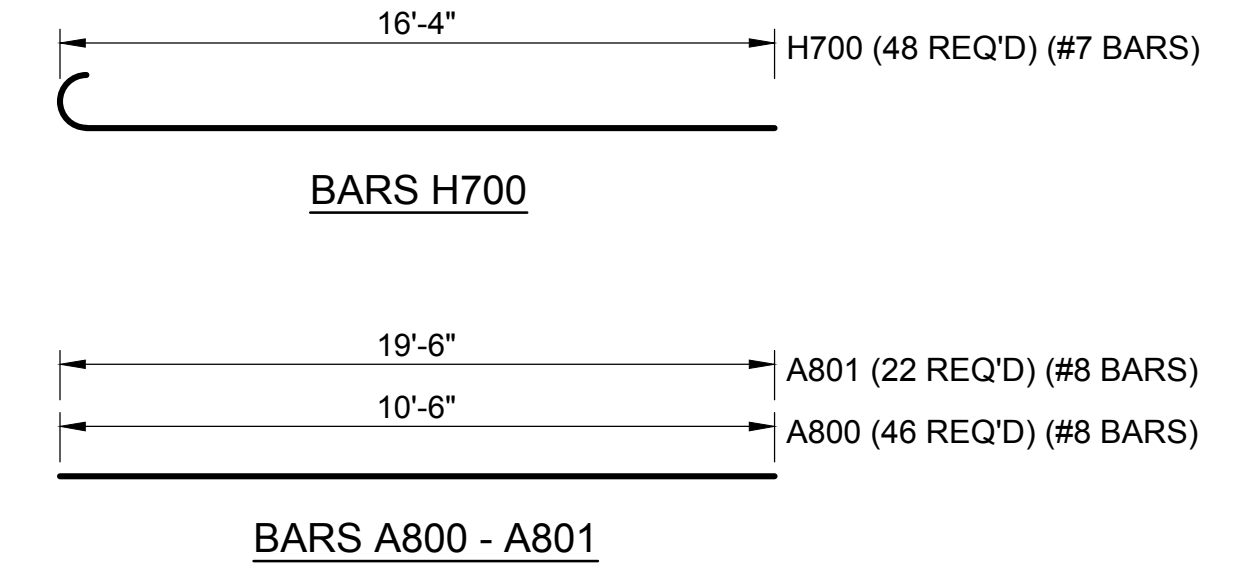
Copyright 2016, Fisher & Arnold, Inc., all rights reserved.  
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 Plotted: Wednesday, July 27, 2016 - 10:53 am  
 By: BSW/RS



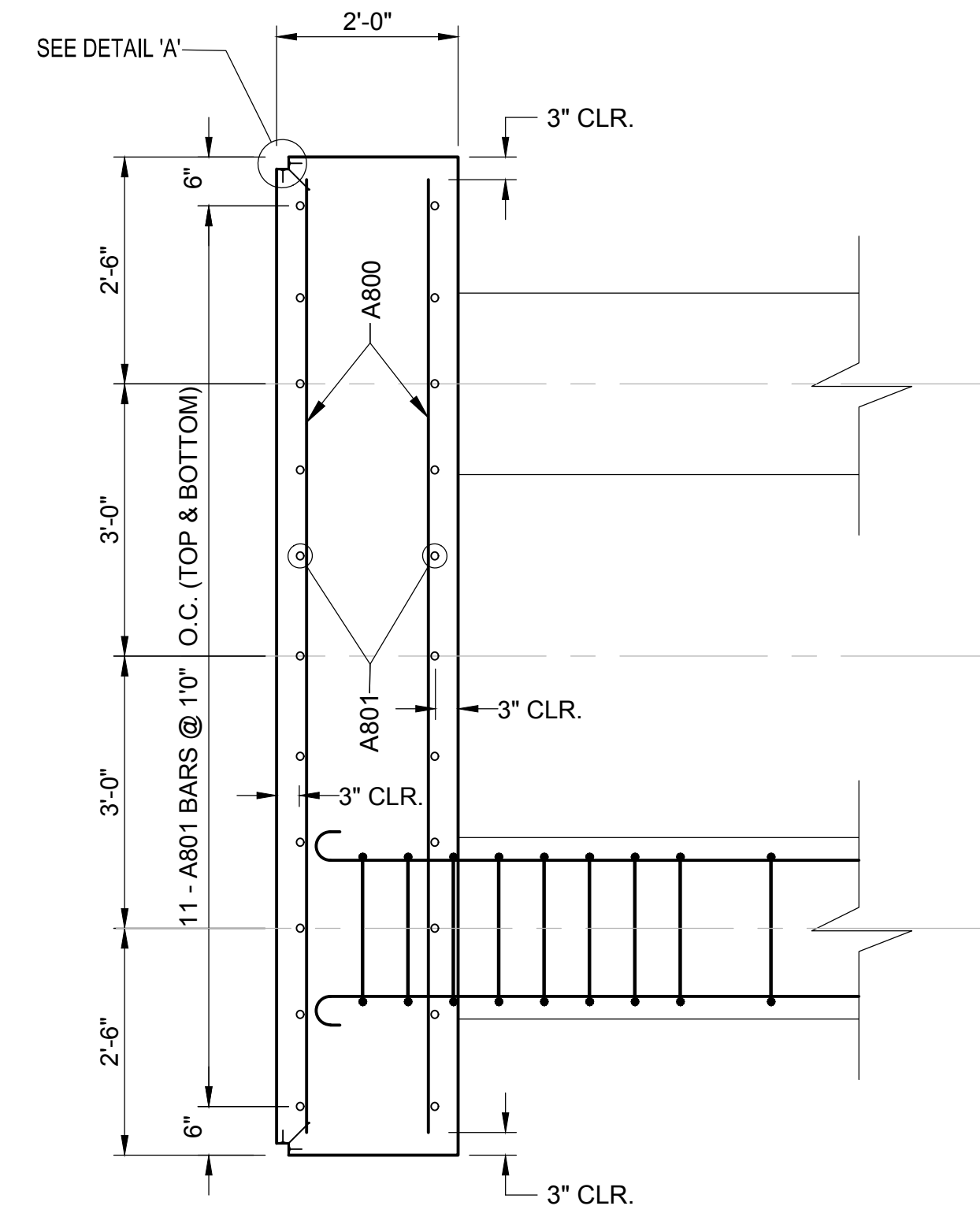
PLAN VIEW



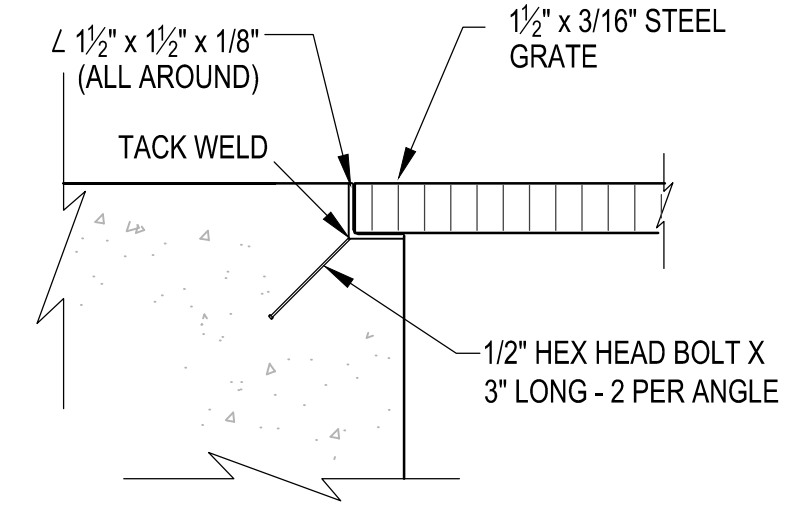
(120 REQ'D.) #4 BARS, 6'-9" LONG  
BARS C400



FRONT ELEVATION



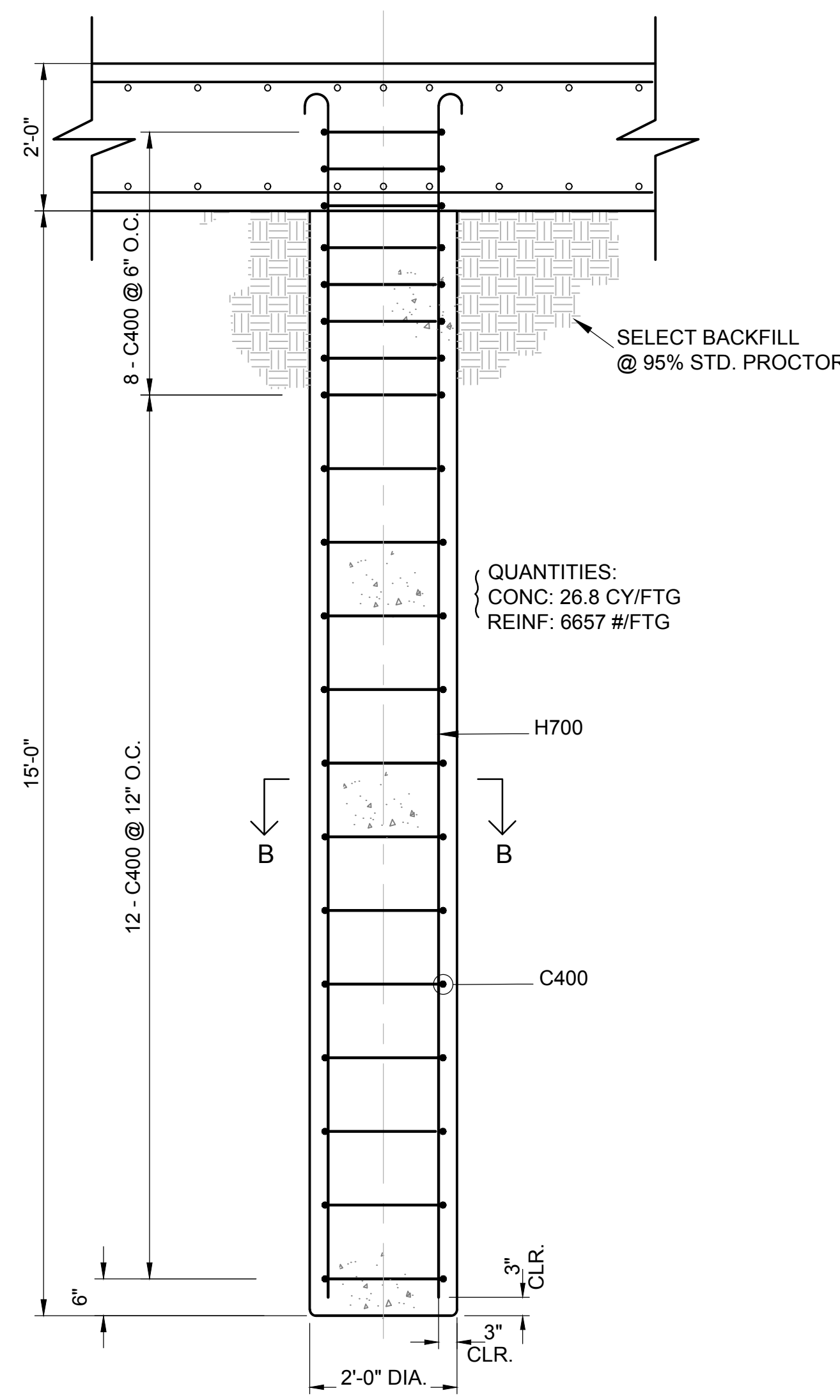
SIDE ELEVATION



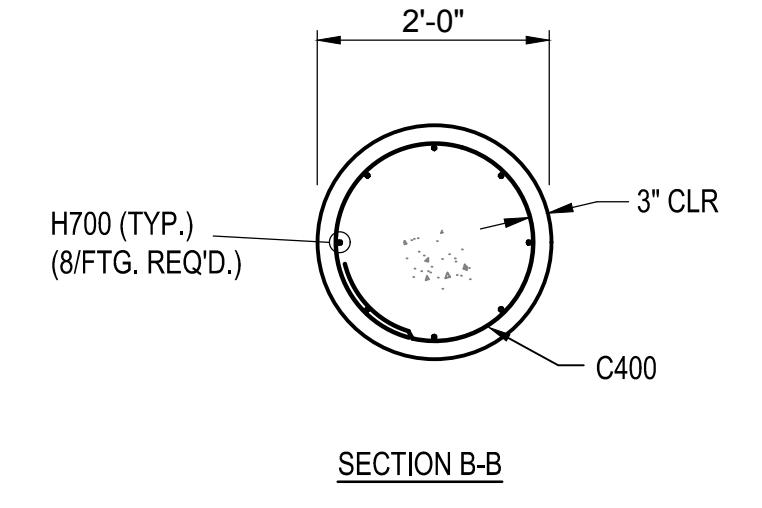
DETAIL 'A'

NOTE:  
 MINIMUM 28 DAY COMPRESSIVE STRENGTH SHALL BE 4,000 PSI OR GREATER, IN ACCORDANCE WITH SECTION 03300.2.05.J, OF THE SPECIFICATIONS.

NOTE:  
 3" CLEARANCE TYPICAL BETWEEN REBARS AND CONCRETE SURFACES

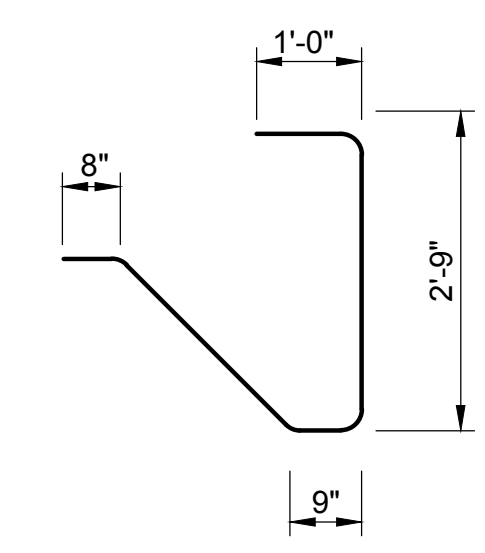


PILE SECTION (6 REQ'D)



SECTION B-B

QUANTITIES:  
 CONC: 26.8 CY/FTG  
 REINF: 6657 #/FTG



BARS B600

**BID DOCUMENT**

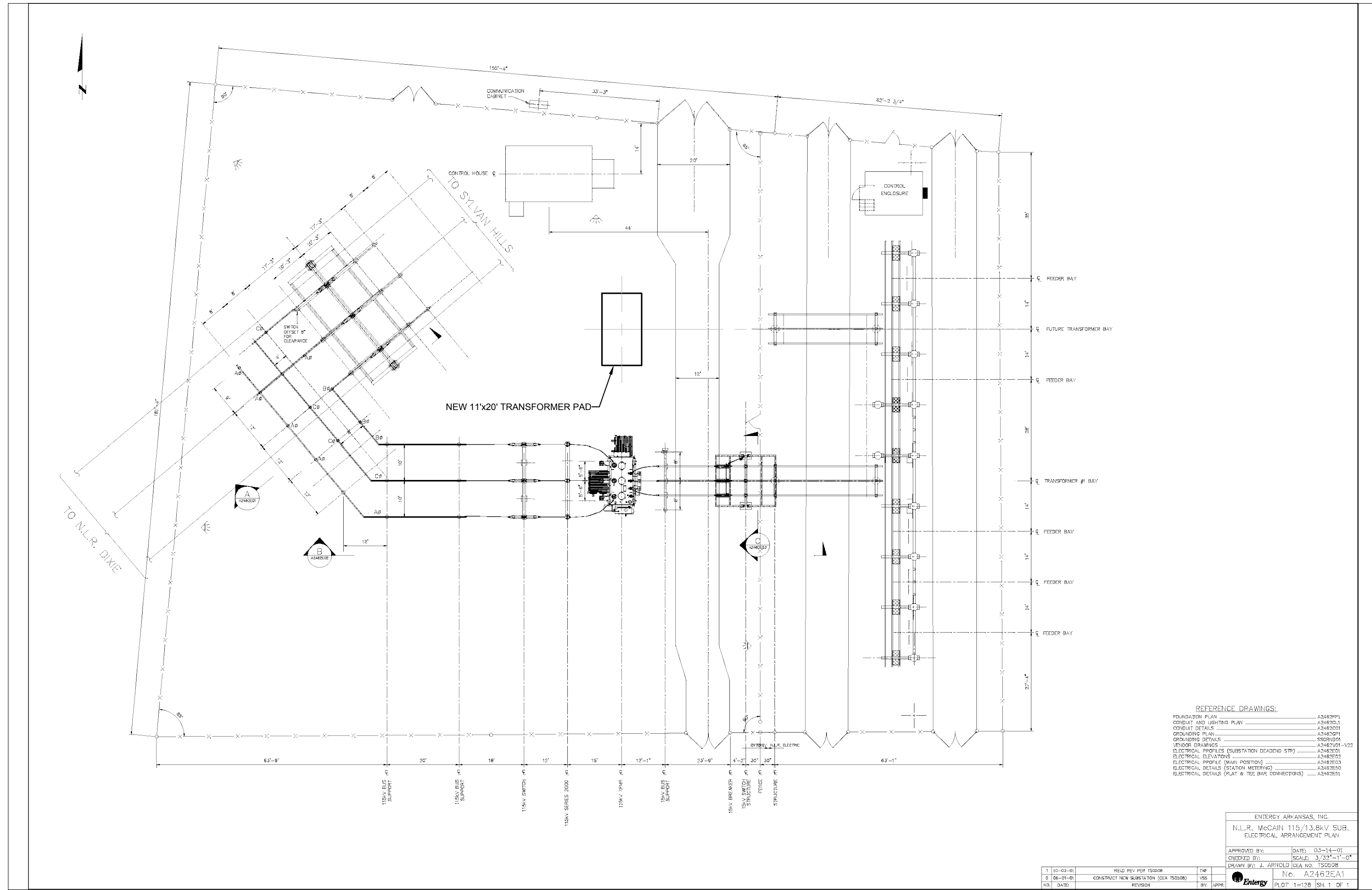
Rev.	Date	Revision Description

Seal

Issue Date: JULY 2016  
 Project No: H9275  
 Dwg File: 9275-S1-Transf-Indm  
 Drawn By: B.S  
 Checked By: G.H.M.

TRANSFORMER FOUNDATION PLAN

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 Filename: W:\9275\Electrical\plans\9275-S2-Transf-fndn.dwg  
 Layout Name: Section  
 Plotted: Wednesday, July 27, 2016 - 7:33 am  
 By: baward



**NOTES:**

**A. REINFORCING STEEL**

1. ALL REINFORCING STEEL TO BE GRADE 60 (ASTM A615), DEFORMED.
2. REINFORCING STEEL TO BE FREE OF RUST, DIRT, OILS, OR OTHER COATINGS THAT WILL DESTROY OR REDUCE THE BOND.
3. BAR LAPS ARE TO BE A MINIMUM OF THIRTY (30) DIAMETERS.
4. ALL REINFORCEMENT SHALL BE SUPPORTED AND FASTENED TOGETHER TO PREVENT DISPLACEMENT BY CONSTRUCTION LOADS OR FROM PLACING OF CONCRETE. NO WELDING OF REINFORCING IS ALLOWED.

**B. FORMS**

1. THE FORM WORK SHALL BE ADEQUATE FOR THE LOADS AND LATERAL PRESSURES OUTLINED IN CHAPTER 1 OF "RECOMMENDED PRACTICE FOR CONCRETE FORM WORK, ACI 347", AND SHALL HAVE SUFFICIENT RIGIDITY TO MAINTAIN THE TOLERANCE SPECIFIED BELOW.
2. FORMS SHALL BE SUFFICIENTLY TIGHT TO PREVENT LEAKAGE OF GROUT OR CEMENT PASTE.
3. FORMS SHALL BE COATED TO PREVENT THEM FROM STICKING TO THE CONCRETE.
4. FORMS SHALL BE REMOVED AS SOON AS THE CONCRETE HAS HARDENED SUFFICIENTLY TO RESIST ANY DAMAGE TO IT, BUT NO EARLIER THAN 24 HRS. AFTER PLACEMENT.
5. ALL LOOSE SOIL, MUD, AND TRASH SHALL BE REMOVED FROM AREAS WHERE CONCRETE IS TO BE PLACED.

**C. TOLERANCE**

1. LENGTH:  $\pm 3/16"$
2. THICKNESS:  $\pm 1/8"$
3. TOP OF SUPPORTS:  $\pm 1/16"$  SPECIFIED ELEVATION.

**D. CONCRETE**

1. MINIMUM 28 DAY COMPRESSIVE STRENGTH SHALL BE 4,000 PSI OR GREATER.
2. ALL CONCRETE SHALL BE VIBRATED IN PLACE AND THOROUGHLY CONSOLIDATED.
3. ALL HONEYCOMBED CONCRETE, DEFECTIVE CONCRETE AND TIE HOLES SHALL BE REPAIRED WITH PATCHING MORTAR.
4. CONCRETE SURFACES SHALL BE SPRAYED WITH A CURING AND SEALING COMPOUND AS SOON AS CONCRETE SETS UP.
5. BEVEL ALL EXPOSED EDGES 1".

**E. FOOTING AND SOIL REMOVAL**

1. REMOVED SOIL MUST BE HAULED OFF FROM THE SITE AND IS THE RESPONSIBILITY OF THE CONTRACTOR.
2. PRIOR TO PLACING NEW FOUNDATIONS CONTRACTOR SHALL INSURE THAT THE EXISTING FOUNDATIONS ARE ADEQUATELY PROTECTED FROM UNDERMINING AND INSTABILITY DUE TO ADJACENT NEW EXCAVATION.
3. CONTRACTOR SHALL FINISH GRADE THE AREA TO INSURE ADEQUATE DRAINAGE.
4. CONCRETE REINFORCING STEEL AND ANCHOR BOLTS SHALL BE INSTALLED PER THESE SPECIFICATIONS AND DRAWINGS.
5. AUGERED HOLES SHALL BE CLEAN AND SIDES SHALL BE FREE STANDING BEFORE PLACING CONCRETE.
6. CONTRACTOR IS RESPONSIBLE FOR CASING THE AUGERED HOLES IF GROUNDWATER OR POOR INSITU SOIL CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION.
7. TOP OF FOUNDATION ELEVATION IS TO MATCH EXISTING ADJACENT FOUNDATIONS.
8. BACKFILL SHOULD BE PLACED IN LIFTS OF UNIFORM THICKNESS TO NOT EXCEED 6 INCHES. EACH LIFT SHOULD BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY THE STANDARD PROCTOR TEST. MOISTURE CONTENT SHOULD BE CONTROLLED TO WITHIN  $\pm 2\%$  OF OPTIMUM.

**BID DOCUMENT**

**FISHER ARNOLD**  
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North Little Rock Electric Dept.  
 McCain Substation Improvements  
 North Little Rock, Arkansas

Rev.	Date	Revision Description

Seal
Issue Date: JULY 2016
Project No: H9275
Dwg File: 9275-S2-Transf-fndn
Drawn By: B.S
Checked By: G.H.M.

SITE PLAN  
 &  
 FOOTING  
 DETAIL NOTES

S-2  
 SHEET 1 OF 1