

SPECIFICATIONS

**Fort Gibson National Cemetery
Fort Gibson, OK**

NEW AND REPLACEMENT SIGNAGE

Prepared by:

**Memorial Service Network III
Department of Veterans Affairs**
March 31, 2015

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**SECTION 01 00 00
GENERAL REQUIREMENTS**

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**SECTION 01 00 00
GENERAL REQUIREMENTS**

1.1 GENERAL INTENTION

- A. Contractor Shall furnish all labor, material, tools, equipment, and supervision necessary for Project 789CM3915, "New and Replacement Signage", as required by the contract drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Cemetery Director.
- C. Prior to commencing work, general contractor shall provide proof that a OSHA certified "competent person" (CP) (29 CFR 1926.20(b)(2) will maintain a presence at the work site whenever the general or subcontractors are present.

1.2 STATEMENT OF BID ITEM(S)

- A. ITEM I, GENERAL CONSTRUCTION: Work includes all labor, material, tools, equipment, and supervision necessary to fabricate and install eleven (11) new granite burial section markers (Type D); four (4) new identification signs (Type C); four (4) informational signs (Type G), refurbish seven (7) existing floral vase container lids and provide new signage (Type L), replace the floral regulation signage on five (5) existing floral vase container lids (Type L), and to reset/realign thirty-nine (39) existing granite burial section markers at Fort Gibson National Cemetery in accordance with the accompanying drawings, associated contract specifications, and per applicable standards and requirements.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. AFTER AWARD OF CONTRACT, 1 set of specifications and drawings will be furnished. These drawings and specifications will consist of those returned by prospective bidders.
- B. Additional sets of drawings may be made by the Contractor, at Contractor's expense.

1.4 FIRE SAFETY

- A. Applicable Publications: Publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
 - 1. American Society for Testing and Materials (ASTM):
 - E84-2009.....Surface Burning Characteristics of Building Materials

2. National Fire Protection Association (NFPA):

- 10-2010.....Standard for Portable Fire Extinguishers
- 30-2008.....Flammable and Combustible Liquids Code
- 51B-2009.....Standard for Fire Prevention During Welding,
Cutting and Other Hot Work
- 70-2011.....National Electrical Code
- 241-2009.....Standard for Safeguarding Construction,
Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

- 29 CFR 1926.....Safety and Health Regulations for Construction

- B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to the Contracting Officer's Technical Representative (COTR) for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VA safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VA equipment, etc. Documentation shall be provided to the COTR that individuals have undergone contractor's safety briefing.
- C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with COTR.
- F. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to COTR.
- G. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.

- H. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- I. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- J. Dispose of waste and debris in accordance with NFPA 241. Remove from construction site daily.
- K. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

1.5 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the COTR. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the COTR and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

(FAR 52.236-10)

- D. Working space and space available for storing materials shall be as determined by the COTR.
- E. Workmen are subject to rules of Cemetery applicable to their conduct.

- F. Execute work so as to interfere as little as possible with normal functioning of Cemetery as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others.
1. Do not store materials and equipment in other than assigned areas.
 2. Schedule delivery of materials and equipment to immediate construction working areas in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Cemetery areas required to remain in operation.
- G. Utilities Services: Maintain existing utility services for Cemetery at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COTR.
1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COTR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Cemetery Director's prior knowledge and written approval.
 2. Contractor shall submit a request to interrupt any such services to COTR, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
 3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Cemetery.
 4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COTR.
 5. In case of a contract construction emergency, service will be interrupted on approval of COTR. Such approval will be confirmed in writing as soon as practical.
 6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction

- project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- H. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- I. To minimize interference of construction activities with flow of Cemetery traffic, comply with the following:
1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles. Wherever excavation for new utility lines cross existing roads, at least one lane must be open to traffic at all times.
 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the COTR.
- J. Coordinate the work for this contract with other construction operations as directed by COTR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.
- K. Coordination of Construction with Cemetery Director: The burial activities at a National Cemetery shall take precedence over construction activities. The Contractor must cooperate and coordinate with the Cemetery Director, through the COTR, in arranging construction schedule to cause the least possible interference with cemetery activities in actual burial areas. Construction noise during the interment services shall not disturb the service. Trucks and workmen shall not pass through the service area during this period:
1. The Contractor is required to discontinue his work sufficiently in advance of Easter Sunday, Mother's Day, Father's Day, Memorial Day, Veteran's Day and/or Federal holidays, to permit him to clean up all areas of operation adjacent to existing burial plots before these dates.
 2. Cleaning up shall include the removal of all equipment, tools, materials and debris and leaving the areas in a clean, neat condition.

1.6 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COTR in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both, to the Contracting Officer. This report:
 - 1. Shall note any discrepancies between drawings and existing conditions at site.
 - 2. Shall designate areas for working space, materials storage and routes of access to areas where alterations occur and which have been agreed upon by Contractor and COTR.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COTR, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COTR together shall make a thorough re-survey of the areas involved. They shall furnish a report on conditions then existing, as compared with conditions of same as noted in first condition survey report:
 - 1. Re-survey report shall also list any damage caused by Contractor, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:
 - 1. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.

1.7 DISPOSAL AND RETENTION

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
 - 1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government

shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COTR.

2. Items not reserved shall become property of the Contractor and be removed by Contractor from Cemetery.

1.8 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, that are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(FAR 52.236-9)

1.9 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COTR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COTR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.10 LAYOUT OF WORK

- A. The Contractor shall lay out the work from Government established base lines and bench marks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the COTR. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the COTR until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the COTR may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.
(FAR 52.236-17)
- B. Establish and plainly mark lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each such structure are in accordance with lines and elevations shown on contract drawings.

1.11 AS-BUILT DRAWINGS

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the COTR's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the COTR within 15 calendar days after each completed phase and after the acceptance of the project by the COTR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.12 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Cemetery property and, when authorized by the COTR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.13 TEMPORARY TOILETS

- A. Contractor may have for use of Contractor's workmen, such toilet accommodations as may be assigned to Contractor by Cemetery. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workmen. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.

1.14 AVAILABILITY AND USE OF UTILITY SERVICES

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the COTR, shall install and maintain all necessary temporary connections and distribution lines. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, and associated paraphernalia.
- C. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the Cemetery electrical distribution system. Electricity is available at no cost to the Contractor.
- D. Water (for Construction and Testing): Furnish temporary water service.
1. Obtain water by connecting to the Cemetery water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.
 2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at COTR's discretion) of use of water from Cemetery's system.

1.15 HISTORIC PRESERVATION

Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the COTR verbally, and then with a written follow up.

SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- 1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2. For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
 - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
 - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract-required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.
- 1-5. Submittals will be reviewed for compliance with contract requirements by the MSN III Engineer, and action thereon will be taken by the Contracting Officer's Technical Representative (COTR) on behalf of the Contracting Officer.
- 1-6. Upon receipt of submittals, the COTR will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

- 1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and MSN III Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and MSN III Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
- A. Submit samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
 - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Cemetery, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
 - 1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 - 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Cemetery, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.

3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- D. Approved samples will be kept on file by the COTR at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
 1. For each drawing required, submit one legible photographic paper or vellum reproducible.
 2. Reproducible shall be full size.
 3. Each drawing shall have marked thereon, proper descriptive title, including Cemetery location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
 4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
 5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
 6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
 7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10. Shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to:

VA National Cemetery Administration
MSN III General Engineer
155 Van Gordon Street, Suite 510
Denver, Colorado 89225-0126

1-11. At the time of transmittal to the MSN III Engineer, the Contractor shall also send a copy of the complete submittal directly to the COTR.

1-12. Samples for approval shall be sent to:

COTR, Fort Gibson National Cemetery
1423 Cemetery Road
Fort Gibson, OK 74434

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SECTION 03 45 00
PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes the performance criteria, materials, production, and erection of architectural precast concrete units. The work performed under this section includes all labor, material, equipment, related services, and supervision required for the manufacture and erection of the architectural precast concrete work shown on the contract drawings and includes the following:

1. Sign posts.

1.2 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that complies with PCI MNL 117 and is experienced in producing units similar to those indicated for this Project and with a record of successful in-service performance:
 1. Participates in any nationally recognized Plant Certification program at the time of bidding.
 2. Has sufficient production capacity to produce required units without delaying the work.
- B. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide units and connections capable of withstanding: self weights and weights of materials supported or attached, for the conditions indicated.
 1. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, applicable to types of units indicated.
 2. Design for handling, transportation and erection stresses.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Retain quality control records and certificates of compliance for 5 years or period of warranty, whichever is greater.
- B. Design Mixes: For each concrete mix along with compressive strength and water-absorption tests.
- C. Shop (Erection) Drawings: Detail fabrication and installation of units.
 1. Indicate member locations with distinctive marks that match marks placed on the posts. Provide plans, elevations, dimensions, corner

- details, shapes, cross sections and relationships to adjacent materials including special reinforcement and lifting devices necessary for handling and erection.
2. Indicate aesthetic intent including joints, reveals, and extent and location of each surface finish.
 3. Indicate separate face and backup mix locations, and thicknesses. Indicate locations, extent and treatment of dry joints if two-stage casting is proposed.
 4. 5. Indicate locations, tolerances and details of anchorage devices to be embedded in or attached to other construction.
- D. Samples for each facing unit required, showing the full range of color and texture expected. Supply sketch of each corner or special shape with dimensions. Supply sample showing color and texture of joint treatment.
1. Precast units will be inspected at the site. Units which demonstrate lesser quality than accepted samples (outside the ranges established by the submitted and approved samples) shall not be acceptable.
 2. Submit non-shrink grout and sealants and caulk to be used with approved cap stones and obtain approval before manufacture of cap stones starts.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
1. Concrete strengths and mix designs.
- F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.
1. Concrete materials.
 2. Reinforcing materials.
 3. Admixtures.
 4. Anchors.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Product handling requirements of PCI MNL 117 shall be followed at the plant and project site.
- B. Deliver all units to the project site in such quantities and at such times to assure compliance with the agreed project schedule and proper setting sequence so as to limit unloading units temporarily on the ground.
- C. Lift and support units only at designated points shown on the Shop Drawings.
- D. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

- E. Carefully handle, transport, and store precast members to prevent damage of any kind. Broken, chipped, stained, or damaged units will be subject to rejection unless permission to repair such defects is obtained in writing from the Owner's designated representative. Members may be shipped after attaining 90% of specified ultimate compressive strength, but not before reaching an age of 7 days.
- F. Units damaged after erection shall be either repaired or replaced as determined by the Owner's designated representative. No repairs shall be made until the damaged unit has been examined by the Owner's designated representative and a proposed repair procedure has been submitted to, and accepted by, the Owner's designated representative in writing. The Owner's designated representative may require that repairs be made by the manufacturer. Costs for repair work shall be borne by the Contractor.
- G. Cover precast units to protect from soiling or damage by subsequent building operations, using reinforced building paper or other material acceptable to the Owner's designated representative.

1.6 WARRANTY

- A. Warranty of precast concrete work, including anchorage, joint treatment and related components to be free from defects in materials and workmanship, including cracking and spalling.
- B. After erection, completed work will be weathertight, subject to terms of Article "Warranty of Construction" FAR clause 52.246-21, except warranty period is extended to five years.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A27/A27M-08.....Steel Castings, Carbon, for General Application
 - A36/A36M-08.....Carbon Structural Steel
 - A47/A47M-99(R2009)...Ferritic Malleable Iron Castings
 - A82-07.....Steel Wire, Plain, for Concrete Reinforcement
 - A108-07.....Steel Bar, Carbon and Alloy, Cold-Finished
 - A123/A123M-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - A153/A153M-09.....Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
 - A184/A184M-05.....Fabricated Deformed Steel Bar Mats for Concrete Reinforcement

- C40-04.....Organic Impurities in Fine Aggregate for Concrete
- C150-09.....Portland Cement
- C260-06.....Air-Entraining Admixtures for Concrete
- C330-09.....Lightweight Aggregates for Structural Concrete
- C373-88(R2006).....Test Method for Water Absorption, Bulk Density,
Apparent Porosity, and Apparent Specific Gravity
of Fired Whiteware Products
- C494/C494M-10.....Chemical Admixtures for Concrete
- C618-08a.....Coal Fly Ash and Raw or Calcined Natural Pozzolan
for Use as a Mineral Admixture in Concrete
- C881/C881M-02.....for Epoxy-Resin-Base Bonding Systems for Concrete
- C979-05.....Pigments for Integrally Colored Concrete
- C989-09.....Ground Granulated Blast-Furnace Slag for Use in
Concrete and Mortars
- C1017/C1017M-07.....Chemical Admixtures for Use in Producing Flowing
Concrete
- C1107-08.....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- C1218/C1218M-99(R2008)Test Method for Water-Soluble Chloride in Mortar
and Concrete
- C1240-05.....Silica Fume Used in Cementitious Mixtures
- D412-06ae2.....Test Methods for Vulcanized Rubber and
Thermoplastic Elastomers—Tension
- D2240-05.....Test Method for Rubber Property—Durometer Hardness
- F436/F436M-09.....Hardened Steel Washers
- F568M-07.....Carbon and Alloy Steel Externally Threaded Metric
Fasteners
- F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs
- F844-07a.....Washers, Steel, Plain (Flat), Unhardened for
General Use
- C. American Concrete Institute (ACI):
- ACI 211.1-91.....Selecting Proportions for Normal, Heavyweight and
Mass Concrete (Reapproved 2002)
- ACI 318/318M-08 (318R/318RM-08)Building Code Requirements for
Structural Concrete
- D. American Association of State Highway and Transportation Officials
- AASHTO LRFD-2010.....LRFD Bridge Design Specifications, U.S., 5th
Edition
- AASHTO M251-06.....Elastomeric Bearings
- E. Precast/Pre-stressed Concrete Institute (PCI):
- MNL-117-96.....Quality Control for Plants and Production of
Architectural Precast Concrete Products

- MNL-120-04.....Design Handbook - Precast and Prestressed Concrete
- MNL-124-04.....Design for Fire Resistance of Precast Prestressed Concrete.
- MNL-127-99.....Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products
- MNL-135-00.....Tolerance Manual for Precast and Prestressed Concrete Construction
- TR-6-03.....Interim Guidelines for the Use of Self-Consolidating Concrete
- F. Military Specifications (MIL. Spec):
- MIL-C882E-89.....Cloth, Duck, Cotton or Cotton-Polyester Blend Synthetic Rubber, Impregnated, and Laminated, Oil Resistant.
- G. Structural Steel Painting Council (SSPC):
- SSPC-Paint 20 (2002).Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic).

PART 2 - PRODUCTS

2.1 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; non-reactive with concrete and suitable for producing required finishes:
1. Mold-Release Agent: Commercially produced liquid-release agent.
- B. Reinforcement dowels and connections shall be securely and accurately placed as shown on the Drawings. Connection hardware shall be rigidly attached to the forms, or otherwise positively prevented from moving in any direction. Means of support shall be subject to the approval of the Owner's designated representative.
- C. In general, forms may be designed with a draft of 1/8" in 12", and all forms may have 1/8" radius corners to facilitate removal and reduce breakage.

2.2 REINFORCING MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- B. Weldable Reinforcing Bars: ASTM A706/A706M, deformed.
1. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I or III.
- B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33, with coarse aggregates complying with Class 5S

Fine aggregate: ASTM C33; Washed, inert sand with color characteristics to produce concrete of a color which exactly matches the designated sample (silica sands required).

- C. Admixtures: Admixtures containing calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture are not permitted.
 - 1. Coloring Admixture: ASTM C979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable and non-fading.
 - 2. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
 - 3. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 - 4. Retarding Admixture: ASTM C494/C494M, Type B.
 - 5. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
 - 6. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 7. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 - 8. Plasticizing Admixture for Flowable Concrete: ASTM C1017/C1017M.

2.4 GROUT MATERIALS

- A. Non-metallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, Grade A for drypack and Grades B and C for flowable grout and of a consistency suitable for application within a 30-minute working time.

2.5 CONCRETE MIXES

- A. Prepare design mixes to match COTR's sample for each type of concrete required.
 - 1. Limit use of fly ash and granulated blast-furnace slag to 20 percent replacement of Portland cement by weight.
- B. Design mixes shall be prepared by a qualified independent testing agency or by qualified precast plant personnel at fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested in accordance with ASTM C1218/C1218M.
- D. Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 34.5 MPa (5000 psi).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.

- 3. Release Strength at Transfer of Prestress: 24.1 MPa (3500 psi).
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.

2.6 MOLD FABRICATION

- A. Molds: Accurately construct and maintain molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement and temperature changes.
 - 1. Form joints are not permitted on faces exposed to view in the finished work.
 - 2. Edge and Corner Treatment: As indicated
 - 3. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during placing of concrete.
 - 4. Coat contact surfaces of molds with release agent.

2.7 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in units as indicated.
- D. Cast-in openings larger than 250 mm (10 inches) in any dimension.
- E. Reinforcement: Comply with recommendations in PCI MNL 117 for fabrication, placing, and supporting reinforcement.
 - 1. Place reinforcing steel to maintain at least 19 mm (3/4 inch) minimum concrete cover. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete.
 - 2. Built-In Items: Provide slots, holes, and other accessories in units to receive dowels and other similar work as indicated.

3. Anchorages: Provide loose dowels and other miscellaneous steel shapes not provided by other trades, necessary for securing precast units to supporting and adjacent members.
- F. Mix concrete according to PCI MNL 117 and requirements in this Section. After concrete batching, no additional water may be added.
- G. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units. Comply with requirements in PCI MNL 117 for measuring, mixing, transporting and placing concrete.
- H. Identify pickup points of units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each unit on a surface that will not show in finished structure.
- I. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture.
- K. Repair damaged units to meet acceptability requirements of PCI MNL 117 and the RE/COTR.

2.8 FABRICATION TOLERANCES

- A. Fabricate units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. In addition to tolerances of individual elements required by American Concrete Institute Publication 533.3R, erection tolerances shall be as follows:
 1. Variation of anchors and fasteners from dimensions specified.....1/8-inch
 2. Variation in overall dimensions of precast element (height and width).....1/8-inch
- C. Fabricate architectural trim units such as sills, lintels, coping, cornices, quoins, medallions, bollards, benches, planters, and pavers, with tolerances meeting PCI MNL 135.

2.9 FINISHES

- A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight and sharp. Finish exposed-face surfaces of units to match approved design reference sample and as follows:
 1. Face-Down Finishes (Exterior Exposed Surface) All surfaces with exterior exposure shall be cast face-down.

- a. Smooth, As-Cast Finish: Where panel face is smooth, cast panel to produce a surface free of pockets, sand streaks, and honeycombs. Produce a surface appearance of uniform color and texture.
- b. Form-Liner Finish: Where panel face is fluted texture, cast panel over form liners placed, secured, and sealed over casting slab to produce a textured surface free of pockets, streaks, and honeycombs. Produce a surface appearance of uniform color and texture.

2.10 SOURCE QUALITY CONTROL

A. Quality-Control Testing:

- 1. Test and inspect precast concrete according to Section 01 45 29, TESTING LABORATORY SERVICES and PCI MNL 117 requirements respectively.
- 2. If using self-consolidating concrete also test and inspect according to PCI TR-6.
- 3. Strength of precast panels must meet the requirements of ACI 318.

B. Testing: If there is evidence that the concrete strength of precast concrete units may be deficient, Precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to PCI MNL 117:

- 1. Test results will be made in writing on the same day that tests are performed, with copies to COTR, Contractor, and precast concrete fabricator. Test reports will include the information required in Section TESTING LABORATORY SERVICES and the following:
 - a. Identification mark and type of precast concrete units represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

C. Defective or Damaged Work: Units that do not comply with acceptability requirements, including concrete strength, manufacturing tolerances, and color and texture range are unacceptable. Chipped, spalled or cored units may be repaired, if repaired units match the visual mock-up. The COTR reserves the right to reject any unit if it does not match the accepted samples and visual mock-up. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to installation of any of the work in this section, Contractor shall inspect the planned installation locations to insure that conditions are not significantly different from those indicated on the contract drawings. All materials shall be inspected prior to installation to insure

compliance with the contract documents and to insure there is no damage. Should conditions be different from those indicated on the contract documents, contractor shall immediately notify the Owner's designated representative.

- B. All Material must be checked upon receipt at the job site prior to installation to check for any damage that may have occurred during transport.

3.2 ERECTION

- A. Erect level, plumb and square within the specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units.

3.3 ERECTION TOLERANCES

- A. Erect units level, plumb, square, true, and in alignment.

3.4 FIELD QUALITY CONTROL

- A. Repair or remove and replace work that does not comply with specified requirements.

3.5 REPAIRS

- A. Repairs will be permitted provided structural adequacy of units and appearance are not impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 6 m (20 feet).
- C. Remove and replace damaged units when repairs do not meet requirements.

3.6 CLEANING

- A. Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to shipping.
- B. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

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**SECTION 10 14 00
EXTERIOR SIGNAGE**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the work required to furnish and install the indicated and specified exterior cemetery site signage systems, including posts. The signage systems to be provided include all those shown on the drawings including: identification signs, directional signs, section marker, traffic regulatory signs, directory, and warning/informational signs.
- B. Signs shall be products of manufacturers regularly engaged in manufacturing signs of types specified.
- C. Signs included are as follows:
 - 1. Double post & panel signs.
 - 2. Single post traffic regulatory signs.
 - 3. Single post non-traffic regulatory signs.
 - 4. Directory signs.

1.2 RELATED WORK

- A. Precast Architectural Concrete Posts: Section 03 45 00 PRECAST ARCHITECTURAL CONCRETE.

1.3 MANUFACTURER'S QUALIFICATIONS

Sign manufacturer shall regularly and presently manufacture signs similar to those specified as one of their principal products. Sign manufacturer shall submit qualifications demonstrating a minimum of three years of experience manufacturing the qualifying signs and shall, if possible, demonstrate the successful manufacturing of exterior site signs installed at one or more State or National Veteran Cemeteries.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Submit 3 sets. One set to the Contractor, one set to the Contracting Officer's Technical Representative (COTR) and one set to the MSN III Engineer.
 - 1. Post & panel sign mock-up, not less than 8" by 10", shall be constructed and submitted, showing typical color, texture and fonts shown on Contract Drawings. Mock-up shall show typical fabrication methods, including panel to post(s) connection. Sample shall be capable of demonstrating how the face panels can be removed, for

- repair or replacement, from the mounted location between the posts, for a two post sign system. Mock-ups of all other sign systems for post mounted signs shall be capable of demonstrating how the sign panels are to be removed and replaced from the posts, or mounting support system attached to the posts, without moving the posts. Post shall include typical post cap secured with tamperproof screws. Top surface of the sign panel shall not contain screws or metal joints that could trap or allow water to enter the sign assembly.
2. Square tube post, 150 mm (6") length, showing typical color and finish.
 3. Aluminum samples showing full range of finish colors available.
 4. Color samples of each color, 150 mm x 150 mm (6 inches x 6 inches). Show anticipated range of color and texture.
 5. Sample of typeface, arrow and symbols in a typical full size layout.
 6. Directory panels and frames, with letters and symbols, each type.
- C. Shop Drawings: All signs showing material, finish, colors, size of members, details of construction, letter spacing, size and type, numbers, symbols or image details, and mounting details. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
- D. Full size layout in full color of the Sign Panels.
- E. Manufacturer's Literature and Data (Mark literature to indicate items proposed to be furnished): Signs, each type. Manufacturer's printed specifications, anchorage details, installation and maintenance instructions. Manufacturer's recommendations for mounting the Sign Panels shall be provided.
- F. Manufacturer's Certificates: Provide certification from the coating installer, that they prepared the aluminum and applied the coating(s) to the specified thickness(es).

1.5 DELIVERY AND STORAGE

- A. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.
- B. Deliver signs only when the site, mounting materials, and equipment are ready for installation work to proceed.
- C. Store products in dry condition inside enclosed facilities.

1.6 WARRANTY

- A. Sign Manufacturer shall guarantee text and symbols application to aluminum for an extended warranty period of five years.

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Americans with Disabilities Act - 1990
- C. Federal Highway Administration
Manuals on Uniform Traffic Control Devices for Street and Highways. Single Post Traffic Regulatory Signs:
- D. American Society for Testing and Materials (ASTM):
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
B221-07.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
B449-93(2004).....Standard Specification for Chromates on Aluminum
- E. American Architectural Manufacturer's Association (AAMA):
AAMA 2604.....Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum extrusions and Panels.
- F. Federal Specifications (Fed. Spec.):
MIL-P-8184E Plastic Sheet, Acrylic, Modified.
MIL-P-46144C Plastic Sheet, Polycarbonate

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Aluminum, Extruded: Fed. Spec. QQA-200-9, alloy 6063-T5, applicable as material.
- B. Aluminum, Sheet and Plate: ASTM B209
- C. Aluminum, Extrusions and Tubing: ASTM B221
- D. Zinc Chromate Primer: Fed. Spec. TT-P-645.

2.2 GENERAL

- A. Signs shall be of type, size and design shown on the drawings and as specified.
- B. Signs shall be complete with lettering, framing, and related components for a complete sign installation.

- C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
- D. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Resident Engineer to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.
- E. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.
- F. All aluminum sign panels and frames shall match "Victor Stanley - Bronze".

2.3 SIGN STANDARDS

- A. Typography:
 - 1. Type Style: Times New Roman. Initial caps or and lower case as indicated in Site Signage Plan, unless otherwise indicated.
 - 2. Arrow: See graphic standards in drawings.
 - 3. Letter spacing: See graphic standards on drawings.
 - 4. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text shown in drawings are for layout purposes only; final text for signs shall be as approved in the shop drawings.
- B. Sign Colors and Finishes: As specified and approved in the Shop Drawing & Submittal process.

2.3 SIGNS TYPES

- A. General: The exterior sign system shall be comprised of sign type families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family, as indicated below:
 - 1. Type A - Traffic Regulatory Signs, both non-traffic code type as shown on the drawing details.

2. Type B - Directional Signs, shall be as shown on the drawing details and shall be coated aluminum signs with integral mounting frame and letters, numbers and arrows as indicated.
3. Type C - Identification Signs, shall be as shown on the drawing details and shall be coated aluminum signs with integral mounting frame and letters and symbols as indicated in the detail drawings.
4. Type D - Section Marker Signs shall be as shown on the drawing details and shall be coated aluminum signs with numbers or symbols as indicated in the detail drawings.
5. Type G - Prohibition Signs, General Information Signs.

B. Text and Graphics:

1. Types A, B, C, D, and G:
 - a. Surface applied reflective white opaque vinyl letters, numbers and graphics shall be of a quality and life expectancy equal to or exceeding that for Engineering Grade 3M Scotchlite, unless otherwise noted. Color shall be selected from the manufacturer's standard selection, during the submittal process. Font Type Style shall be Helvetica Medium, unless otherwise approved during design review for the specific project.

C. Post and Panel Signs:

1. Sign shall be constructed of aluminum tubing system utilizing 25 mm x 50mm x 3mm (1-inch by 2-inch by 1/8") tubular aluminum frame system and 3 mm (1/8 - inch) aluminum panels anchored to the tubing, with all corners mitered and welded and ground smooth. Mounting holes for attaching the sign panel and frame to the posts shall be pre-drilled before the coating system is applied. The entire sign panel and frame system shall be coated with the indicated powder coating, as indicated on the drawings.
2. Insulating sleeves, gaskets, bolts and concrete anchors shall be provided and signs anchored to sign posts as indicated on the drawings and approved shop drawings.
3. Signs to be installed with direct burial precast architectural concrete shall be installed and mounted at the locations as indicated on the drawings.

2.4 FABRICATION

- A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling,

excessive opening of joints or over stressing of adhesives, welds and fasteners.

- B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.
- C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.
- D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.
- E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.
- F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.
- G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.
- H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.
- I. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.
- J. Movable parts, including hardware, are be cleaned and adjusted to operate as designed without binding or deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
- K. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- L. Aluminum plate recesses and all exposed surfaces shall receive the acid etch finish. Aluminum plates installed in post recesses shall be installed prior to delivery to the site. Protect all surfaces from damage.

- M. No signs are to be manufactured until final sign message schedule and location review has been completed by the Resident Engineer & forwarded to contractor.

2.5 PROTECTION OF ALUMINUM

- A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze or other metals compatible with aluminum by one of the following:
 - 1. Painting the dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - 2. Placing an approved caulking compound, or a non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
- B. Paint aluminum in contact with or built into mortar, concrete, or other masonry materials with bituminous paint or zinc chromate primer.

2.6 DOUBLE-POST-PANEL SIGNS

- A. Sign panel assembly shall be constructed with extruded aluminum support channels and fasteners that secure a removable powder-coated aluminum sign panel assembly. Aluminum sign panel faces shall be 1/8" minimum thick. The design for the sign panel system shall be such that the sign panels can be removed and replaced, if damaged, without having to move the posts that secure the sign panel assembly. The sign panel assembly shall be constructed so there are no gaps or holes in the assembly that could let insects enter and construct nests or otherwise become a nuisance. The top of the sign panel assembly shall be constructed such that it is water tight from above and shall not have unsealed joints where water can collect or enter the assembly. The sign configuration and mounting shall be as depicted in the drawings.
- B. Lettering shall be as indicated on the "Site Details" Contract Drawing.
- C. Exposed fasteners shall be aluminum, tamper-proof type, and shall be colored to match the color for the sign panels.
- D. Finishes of exposed aluminum surfaces:
 - 1. Pretreatment: Before the finish is applied, a five-stage pretreatment must be applied to assure maximum adhesion and corrosion resistance:
 - a. Stage 1: High alkaline cleaner to prepare the surface
 - b. Stage 2: Water rinse
 - c. Stage 3: Combination of chromic, phosphoric and hydrofluoric acids that produce the chrome-phosphate conversion coating for maximum adhesion and corrosion resistance.

- d. Stage 4: Water rinse
 - e. Stage 5: Water rinse
2. Coating: After pretreatment, the metal is dried and paint is then applied. The aluminum shall have an electrostatically applied baked-on flexible acrylic finish that meet or exceeds industry standard tests, achieving a 75 - 125 micron (3.0 - 5.0 mil) thickness, super-tough finish with maximum exterior durability and superior adhesion characteristics. Color as indicated on the drawings and approved submittal.
3. Tests:
- a. AAMA 2604 (covers Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum extrusions and Panels)
 - b. ASTM D2247 (Humidity resistance of 1,000 hours)
 - c. ASTM B117 (Salt spray resistance of 1,000 hours)
 - d. Accelerated weathering for 500 hours under Method 6152 of Federal Test Method 141 shall show no adhesion loss, with only slight fading, chalking and water staining.
 - e. Outdoor weathering shall show no adhesion loss, checking or crazing, with only slight fade and chalk when exposed for one year in Florida facing south at a 45 degree angle.
 - f. Minimum hardness of 2H using ASTM D3363.
 - g. Color of exposed portions of fastenings shall match sign panel being attached.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set work accurately, in alignment and where shown. Signs shall be plumb, level, free of rack and twist and set parallel or perpendicular as required to line and plane the surface.
- B. Signs shall be installed with direct burial of post into concrete or crushed stone as shown on Contract Drawings.
- C. Protect aluminum in contact with dissimilar metals or mortar as specified in Paragraph 2.4.
- D. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors or sleeves to be built into construction. Provide temporary bracing for such items until permanent anchors are set.

- E. Provide anchoring devices and fasteners as shown and as necessary for securing signs to construction as specified.
- F. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign being installed. This blank glass back up is to be the same size as sign being installed.
- G. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.
- H. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

3.2 CLEANING

- A. After installation, all items shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.

3.3 PROTECTION

- A. Protect finished surfaces from damage during fabrication, erection and after completion of the work.

- -END- - -