

# **CAMP HELEN STATE PARK DAY USE RESTROOM SPECIFICATIONS**

02/26/2025



**FDEP Contract Number: CN539  
FDEP Project Number: 61037C - N3803**

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*Client*  
*Prime/Civil Engineer*  
*Architect*  
*MEP Engineer*  
*Structural Engineer*

### *spec section firm author*

*FDEP – Bureau of Design and Construction*  
*George & Associates Inc. (G&A)*  
*Dodstone Architects*  
*McGinnis and Flemming (MFE)*  
*Bliss & Nyitray. Inc. (BNI)*

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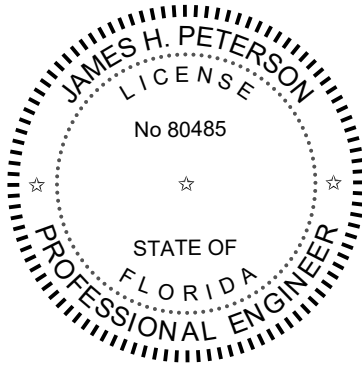
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**NOTES:****1. ADDITIONAL GOVERNING SPECIFICATIONS:**

- a. Inlet Beach Water System, Inc.'s Standard Design and Construction Specifications and

## Standard Details

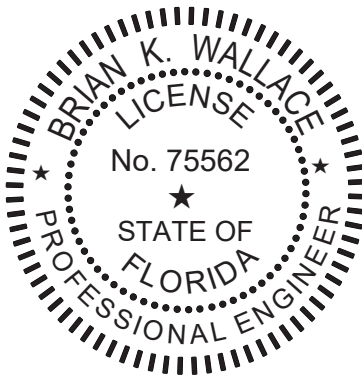
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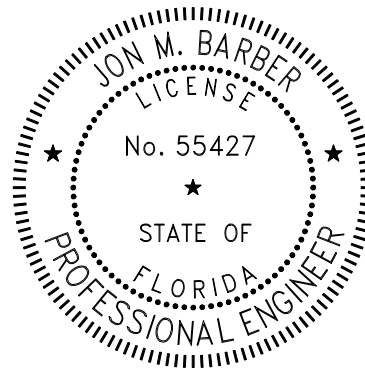
GEORGE & ASSOCIATES CONSULTING ENGINEERS, INC.  
1967 COMMONWEALTH LANE, SUITE 200  
TALLAHASSEE, FL 32303  
CERTIFICATE OF AUTHORIZATION: 7879  
JAMES H. PETERSON, P.E. NO. 80485

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY  
JAMES H. PETERSON, P.E. ON THE DATE ADJACENT TO THE SEAL.

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## **SECTION 02 02 05 - DEMOLITION**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The work includes demolition and removal of all civil and site related materials and debris within the limits of construction. Materials resulting from demolition work shall become the property of the Contractor and shall be removed from the limits of the property and disposed of in a manner which is legal and in keeping with local codes. Unless owner has requested to salvage specific material or items. Contractor is required to coordinate with all Utility Agencies Owners (UA)) for the removal and or relocation of infrastructure to ensure existing utilities are abandoned or relocated in accordance UAO's design standards.

#### **1.2 PROTECTION**

- A. Protect contiguous and nearby structures from danger by temporary covers, shoring, bracing, and supports. Repair or replace items damaged during the performance of the work.
- B. Where pedestrian or vehicle driver safety is endangered in the area of the demolition and removal work, erect barricades with flashing lights. Provide flagmen for traffic control, if required.

#### **1.3 SUBMITTAL**

- A. The Contractor shall prepare a detailed description and schedule of his proposed procedure to accomplish the demolition and removal of demolished materials and debris and submit to the Owner for approval before work is started. The procedures shall provide for careful removal and disposition of material specified to be salvaged, coordination with other work in progress and a disconnection schedule of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operation.

#### **1.4 EXPLOSIVE**

- A. Use of explosives will not be permitted.

### **PART 2 - PRODUCTS**

(NOT USED)

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Disconnection of utility services as required, shall be coordinated with the Utility Agency Owner responsible for the service before the start of work.

### **3.2 DEMOLITION**

- A. The entire structure shall be demolished including the foundation, utilities, and basement.
- B. When utility lines are encountered, Contractor shall contact utility owner to arrange for removal if necessary.
- C. Salvage materials shall be removed from the owner's property daily. Materials of value shall not be sold at this site. All materials shall be fully and completely removed, no materials shall be buried at the site.
- D. Debris and rubbish shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas. All regulations and fees for disposal are the responsibility of the Contractor.

### **3.3 RESTORATION OF SITE**

- A. After the demolition is complete. The Contractor shall insure all trash and debris resulting from the demolition activities have been removed and the area thoroughly policed for litter.
- B. The construction shall restore all damaged areas to the original site conditions. If the Owner does request that additional fill dirt be brought in, then the Contractor shall bring in the required quantity of select fill dirt and compact and test the backfill in accordance with Section 310220. The area shall then be graded smooth and level and stabilized in accordance with the construction documents.

**END OF SECTION 020205**

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SECTION 02 36 00 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and product certificates for each type of product indicated. Include the EPA-Registered Label.
- B. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by bait-station system manufacturer to install manufacturer's products.
- C. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- D. Continuing Service: Provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity.

PART 2 - PRODUCTS

2.1 TERMITE CONTROL PRODUCTS

- A. Soil Treatment Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution.
- B. Wood Treatment with Borate: Provide an EPA-registered borate complying with requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.
- B. Soil Treatment Application: Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.
  - 1. Below slabs where concrete is being removed and then replaced after accessing existing piping, installing new drains, etc.

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- 2. Apply around the building in a ten-foot swath.
- 3. Below new slab-on-grade floors below enclosed interior spaces.
- C. Post warning signs in areas of soil treatment application.
- D. Reapply soil termiticide treatment solution to areas disturbed by subsequent excavation or other construction activities following application.
- E. Wood Treatment Application: Provide quantity of borate solution required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.

END OF SECTION 02 36 00



## **SECTION 03 03 20 – CONCRETE WORK-GENERAL**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The work under this section includes all materials, equipment, and labor and performing all operations for constructing the concrete work including lightweight concrete as shown on the drawings, called for herein, or necessary for the proper completion of the work in accordance with these specifications and to the lines, notes, and dimensions indicated on the drawings or specified herein. Concrete work specifically intended for building and other structural foundations shall refer to the foundation specifications specifically intended for those elements.

#### **1.2 GENERAL REQUIREMENTS**

- A. Whenever a standard, regulation, code, specification, or other publication is referenced herein, it shall be applicable on all matters not in conflict with these specifications as if fully set forth herein and as provided in the General or Special Conditions for referenced specifications. Except where a particular edition is called for, such referenced publications shall be the latest edition on the date of the Contract Documents and abbreviations used in the titles thereof are as follows:
  - 1. ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103.
  - 2. ACI: American Concrete Institute, Box 19150, Detroit, Michigan, 48219.
- B. All concrete shall be proportioned, mixed, placed, finished, and cured in accordance with the requirements of ACI 301 "Specifications for Structural Concrete for Buildings", as modified herein, except that concrete for pavement, including sidewalks, driveways, and curb and gutter shall be placed, finished, and cured in accordance with ACI 316.

#### **1.3 MATERIALS - GENERAL**

- A. Except where specifically noted otherwise, all concrete shall be readymix, normal weight, as produced by a plant acceptable to the Engineer. Job-mix concrete may be used for small quantities upon specific approval of the Engineer.

### **PART 2 - MATERIALS**

#### **2.1 CEMENT**

- A. Cement shall be a single brand of approved American made Portland cement conforming to ASTM C150. All cement shall be gray in color including cement for concrete to receive special finishes.
- B. Air-entraining admixtures are allowable.
- C. Unless otherwise noted, Type I (normal) cement shall be used only in precast prestressed elements: lightweight concrete; concrete cradles; encasements and thrust blocks; concrete fill other than in tanks containing sewage; concrete cast-in-place piling; concrete pavement, sidewalks, curbs, gutters and driveways.
- D. Unless otherwise specified, Type II (sulfate-resistant) Portland cement shall be used in all other concrete and may be used where Type I is specified.

- E. Type III (high-early-strength) cement may be used only with the written permission of the Engineer, but no additional payment will be made to the Contractor for the use thereof.
- F. In addition to the requirements of ASTM C150, cements to be used in exposed concrete shall exhibit no efflorescence when tested in accordance with ASTM C67.
- G. All cement to be used in the work shall be subject to testing to determine conformity to the requirements of the specifications. The methods of testing shall conform to the appropriate specifications but the place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular conditions of this project. If required by the Engineer, the Contractor shall furnish sworn certificates of mill tests of cement, in triplicate, at least 7 days before the cement will be used. The Owner reserves the right to make such independent tests as he may deem necessary at any time.
- H. Cement which is partially set or which is lumpy or caked shall not be used and the entire contents of the sack of cement or the container of bulk cement which contains damaged, partially set, or lumps of caked cement will be rejected for use.

## 2.2 AGGREGATES

- A. All aggregates shall be fine washed, natural sand, conforming to ASTM C33.
- B. When directed, the Contractor shall furnish clearly labeled samples of aggregates to the Engineer for approval.

## 2.3 ADMIXTURES

- A. Admixtures causing accelerates setting of cement in concrete or containing chloride ions shall NOT be used.
- B. Admixtures to provide air entrainment shall conform to ASTM C260.
- C. No other admixture shall be used except with the specific approval of the Engineer.

## 2.4 WATER

- A. Mixing water for concrete shall be clean, fresh, and suitable for drinking and shall not contain injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. Water from any source other than a municipal water supply shall be shown by test to comply with Florida DOT requirement for mixing water.

## 2.5 CONCRETE QUALITY

- A. Concrete shall have the following minimum compressive strengths when tested at 28 days in accordance with ASTM C172, ASTM C31 and ASTM C39:
  - 1. Class A 4,000 psi
  - 2. Class C 2,500 psi
- B. Unless otherwise specified or noted, class of concrete shall be as follows:
  - 1. Sidewalks, curb and gutter, splash blocks, pipe cradles and encasements, thrust blocks, and other non-structural concrete as approved by Engineer -----  
Class C
  - 2. All other concrete ----- Class A

3. Class A concrete may be used at the option of the Contractor wherever Class C is specified, but at no additional cost to the Owner.
- C. Concrete, when placed, shall be of a plastic consistency such that it can be readily worked into all parts of the forms and around embedded items without segregation of materials or accumulation of free water on the surface. Except as specified otherwise for special finishes, slump as measured in accordance with ASTM C143 shall be as follows:
- | <u>Class</u> | <u>Not Less Than</u> | <u>Not More Than</u> |
|--------------|----------------------|----------------------|
| A            | 1-1/2 inches         | 3-1/2 inches         |
| C            | 2 inches             | 5 inches             |
- D. Air entrainment, as determined in accordance with ASTM C173 of not less than 4 nor more than 6 percent by volume, shall be provided in Class A concrete and Class C concrete exposed to weather, frost, or groundwater.

## 2.6 CONCRETE PROPORTIONS

- A. Materials used in concrete shall be proportioned in accordance with ACI 211.1 and approved by the Engineer as provided in Paragraph 9.2. Class A concrete shall be proportioned to provide a water/cement ratio not to exceed 0.45 and a cement content of not less than 564 pounds per cubic yard.
- B. Submit to the Engineer for approval not less than 7 days before concrete is to be placed, in duplicate, a report certified by an independent testing laboratory containing the following:
  1. Recommended proportions of materials to be used in concrete.
  2. Result of the testing of all materials in accordance with ASTM specification including sieve analysis, specific gravity, and dry-rodded weight of aggregates.
  3. Result of testing laboratory trial batches in accordance with ASTM C39 and C192.
- C. All testing and analyses of materials shall have been done not more than 4 months prior to the date of submission and the certified report shall state the date thereof.
- D. Proportions of materials shall be based on accurate measurements thereof by weight taken separately.
- E. Costs of the services of the independent testing laboratory in testing materials and determining mix proportions shall be borne by the Contractor.

## 2.7 PLANT APPROVAL

- A. The Engineer, or his authorized representative, shall have the right and shall be afforded any facility to inspect the plant where concrete is batched including materials used and methods of proportioning, mixing, and delivery of concrete; all of which shall be in accordance with the specifications and meet the approval of the Engineer. No ready-mixed concrete shall be ordered until the Engineer has given his approval thereof.

## 2.8 MIXING AND DELIVERY

- A. Ready-mixed concrete shall be used. All mixing requirements specified herein shall be enforced and the Owner's laboratory representative and the Engineer shall have free

access to the mixing plant at all times. Except for material and/or procedure otherwise specified herein, ready-mixed concrete shall be mixed and delivered in accordance with the requirements of ASTM C94. No water shall be added to the concrete after it leaves the plant except as specifically approved by the Engineer and it shall be so noted on the batch ticket.

- B. Neither the speed of any mixer nor the quantity of material loaded into any mixer shall exceed the recommendations of the manufacturer. Excessive mixing, requiring additions of water to preserve the required consistency, shall be cause for rejection of the batch. Concrete shall not remain in a transit mixer or agitator truck more than 90 minutes after the water is introduced (and not more than 45 minutes if an approved retarding agent is not used). Minimum mixing time shall be 50 revolutions of drum at rated speed.
- C. Equipment necessary to determine and control the actual amounts of all materials entering the concrete shall be provided by the concrete manufacturer. All materials shall be measured by weight, except that water may be measured by volume calculated at 8-1/3 pounds per gallon. One bag of cement will be considered as 94 pounds in weight.
- D. Accompany each batch of concrete delivered to the site shall be a trip ticket that shall indicate the following information: (1) time mix was batched stamped on ticket, (2) brand and type of cement, (3) bags of cement per cubic yard of concrete, (4) planned slump, (5) admixture, and (6) name of supplier. These tickets shall be given to the Engineer when the truck arrives on the job.
- E. Attention is directed to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting. Concrete shall be discharged into forms according to the time limits below after water was first added to the mix and shall be mixed at least 5 minutes after all water has been added.

1. Time Schedule

<u>Ambient Temperature</u>	<u>Time Limit</u>
Less than 85 degrees F	90 minutes
85 degrees F or greater	

2.9 FORMS

- A. Forms shall be securely braced, substantial and unyielding, and of sufficient strength to hold the concrete without bulging between supports, or without deviation from the neat lines as shown on the drawings. Forms shall be mortar tight and shall be constructed of pre-fabricated metal, plywood, or dressed lumber of uniform thickness, with or without a form liner. Where concrete structures are circular or are otherwise shown to have curved surfaces, forms shall be constructed to provide such curvature and shall not consist of a series of flat surfaces.
- B. The spacing of joists and wales shall be such as to prevent warp and bulging and to produce true and accurate surfaces. All form facing shall be free from knot holes, loose knots, cracks, splits, warps, or other defects affecting its strength or the appearance of the finished concrete surface. Fiber board or other manufactured material, approved by the Engineer, may be used as a lining for forms. Where a grout finish is specified, form facing shall be of plywood or other approved material with the number of seams kept to a practical minimum and arranged in an orderly and symmetrical manner.
- C. The interior surfaces of forms shall be adequately oiled, greased, or soaped to prevent

adhesion of mortar. Form oil for exposed work shall be non-staining. Before placing of concrete the forms shall be cleaned of all dirt, sawdust, shavings, or other debris and the surfaces shall be dampened.

- D. Special care shall be exercised to secure smooth and tight-fitting forms which can be rigidly held to line and grade and removed without injury to the concrete. All corners in the finished work shall be true, sharp, and clean cut. Alignment of forms and grade of top chamfer strips shall be checked immediately after the placing of concrete in the forms.
- E. Forms shall not be removed until the product of the elapsed number of days after placement and the average daily air temperature at the surface of the concrete equals 100 for walls and vertical surfaces and 500 for slabs and beam soffits and other parts that support the weight of the concrete.
- F. In addition to the above, shores under beams and slabs shall not be removed until the concrete has attained at least 60 percent of the specified cylinder strength and also sufficient strength to support safely its own weight and the construction live loads upon it. Shores under cantilevers shall remain in place at least 14 days after concrete is placed.
- G. Round forms may be constructed of spirally laminated plies of fiber. Total wall thickness shall be as specified by manufacturer with 6 inch (minimum) wide plies. Provide polyethylene coating on interior surface. Approved: A-Coated Sonotube.
- H. Chamfer strips made from dressed dimensional 1 inch by 1 inch lumber cut on the diagonal shall be installed at the top of the forms on all exposed edges of walls, slabs, beams, exposed outside corners, and other structures above grade.
- I. Drip edge shall be made from wood quarterround and installed where shown. Extruded plastic fillets shall be used where detailed.

## 2.10 REINFORCING STEEL

- A. In general, reinforcing steel shall conform to the specifications set forth in ACI-301. All reinforcing shall be furnished substantially free from mill scale, rust, dirt, grease or other foreign matter. Reinforcing bars shall conform to the requirements of ASTM A615, Grade 60. All bars number 3 and larger shall be deformed bars.
- B. Reinforcing steel shall be detailed, fabricated and placed according to the methods and standards recommended in the Specifications for Structural Concrete for Buildings, ACI 301.
- C. Splices in reinforcing mats shall be staggered. Horizontal mats shall be supported on metal chairs with all sills or pads below subgrade. Spacers shall be provided for wall and column steel and shall be removed as the concrete is placed.
- D. Wire fabric, unless otherwise shown or specified, shall be 6 inches by 6 inches - No. 10 woven or electrically welded wire fabric conforming to the requirements of ASTM A185.

## 2.11 EMBEDDED ITEMS

- A. All sleeves, inserts, hangers, anchor bolts, dowels, nailing strips, or other embedded items shall be accurately set and firmly held in place while the concrete is deposited. Anchors and ties for masonry shall be provided as shown on the drawings or called for in the masonry specifications.

1. All ferrous metals embedments shall be hot dip galvanized after fabrication.
  2. All aluminum embedments shall be coated with an approved coating to protect them from direct contact with the concrete.
- B. Pipes, conduits, and other items embedded in the concrete shall be so placed and held that they do not displace the reinforcing or weaken the concrete at points of maximum stress or where the concrete section is not sufficient to permit the reduction of area caused by the embedment.
- C. Waterstops shall be 9 inch hollow bulb dumb-bell type PVC for expansion joints, 6 inch flat dumb-bell type for construction joints. All waterstops shall have a minimum thickness of 1/4 inch. Waterstop material shall be continuous with joints made completely waterproof by fusion or solvent welding; welding shall develop 50 percent of the mechanical strength of the section and shall permanently retain its flexibility.
1. All joints below grade shall have waterstops.
  2. All joints in hydraulic structures shall have waterstops to a point two feet above the design overflow level.
  3. All expansion joints shall be full height of the wall.
- D. All embedded items shall be thoroughly cleaned removing all rust, scale, oil, or other foreign matter prior to placing concrete. Drains, pipes, hollow inserts, and similar items shall be protected as approved by the Engineer to prevent the intrusion of concrete.

## PART 3 - EXECUTION

### 3.1 PLACING CONCRETE

- A. Concrete shall be placed in accordance with ACI 301.
- B. All concrete shall be placed during daylight hours allowing sufficient time for adequately finishing the concrete surfaces during daylight hours. The Contractor shall give the Engineer twenty-four (24) hours notice of intent to place concrete to enable prior inspection of forms and of conditions incidental to the pour. No concrete shall be placed until the forms have been approved by the Engineer and until all the reinforcement is in place and has been inspected and approved by the Engineer. No concrete shall be placed in water and forms shall be free from water, dirt, debris, or any foreign matter when concrete is placed. Normal weather limitations for placing concrete shall be adhered to and no concrete shall be exposed to the action of water before final setting.
- C. The method and manner of placing concrete shall be such as to avoid the possibility of segregation or separation of the aggregates. If the quality of concrete as it reaches its final position is unsatisfactory, the method of placing shall be discontinued or adjusted until the quality of the concrete as placed is satisfactory. Open troughs or chutes shall be of metal or metal-lined. Where steep slopes are required, the chutes shall be equipped with baffles or shall be in short lengths that reverse the direction of movement. Where placing operations would involve dropping the concrete freely more than five feet, it shall be deposited through pipes of sheet metal or other approved material. Troughs, chutes, or pipes with a combined length of more than 30 feet shall be used only on written authority from the Engineer. All troughs, chutes, and pipes shall be kept clean and free from coatings of hardened concrete by being thoroughly flushed with water after each run or in its final position. Depositing a large quantity at any point and running or working it

along the forms shall not be done. Special care shall be taken to fill each part of the forms and to work the coarse aggregate back from the face and to force the concrete under and around the reinforcing bars without displacing them. The concrete consistency as measured by slump shall be as specified herein.

- D. Concrete shall be consolidated in accordance with ACI 309 in a manner acceptable to the Engineer. Vibration shall be done by experienced operators under close supervision and the duration shall be held to the minimum necessary to produce thorough compaction without segregation. Where vibrators are not used, all thin section 6 inch maximum thickness work shall be thoroughly worked with a steel slicing rod. All faces shall be well spaded and the mortar flushed to the surface by continuous working with a concrete spading implement acceptable to the Engineer.
- E. In all cases where, on account of the obstructions produced by reinforcing metal, shapes or forms, or any other uncontrollable conditions, difficulty is encountered in puddling the concrete adjacent to the forms, the mortar content of the mix shall be brought into proper contact with the interior surfaces by vibrating the forms. The vibrations shall be produced by striking the outside surfaces of the form with wooden mallets or by other means satisfactory to the Engineer.
- F. No concrete placing shall begin or continue without the express approval of the Engineer each day for each location if the ambient air temperature is less than 40 degrees Fahrenheit, or is predicted to fall below 36 degrees Fahrenheit during the next 24 hours, or 32 degrees Fahrenheit during the next 72 hours. Temperature of concrete when placed shall not be less than 55 degrees Fahrenheit. Chemicals to lower freezing temperature of concrete shall not be used.
- G. When the ambient air temperature is 90 degrees Fahrenheit or above, the Engineer may require pre-cooling of aggregates with water sprays and scheduling of placing successive layers of concrete so as to cause maximum release and dissipation of the heat of setting, or other protective measures. In no case shall temperature of the concrete, forms, or reinforcing exceed 90 degrees Fahrenheit when concrete is being placed and, if necessary, forms and reinforcing shall be cooled by water spray prior to pouring concrete.

### 3.2 TEST SAMPLES

- A. The Contractor will retain an independent testing laboratory to perform the sampling and testing of concrete furnished. Cost of the services of the laboratory will be borne by the Contractor with payment therefor made directly to the laboratory. The laboratory's representatives shall have free access to all points where concrete materials are stored, proportioned, mixed, or placed and the Contractor shall provide on-site facilities as needed by the laboratory to secure and store samples.
- B. For each 100 cubic yards or portion thereof of each class of concrete placed each day, the laboratory shall take a sample from a batch of its selection as the concrete is being placed. No water shall be added or other change made in any batch after it has been sampled. In addition to other tests, the laboratory will make a set of 4 standard compression cylinders from each sample, one of which will be tested at 7 days, two tested at 28 days and one held in reserve. The Engineer will be furnished with a report of each test made. Testing of concrete at other times as needed by the Contractor will be at his expense and the Engineer shall be furnished with a report of all such tests made.
- C. The Contractor shall advise the Engineer with 24 hours advance notice of the time and location of all concrete placing and make arrangements with the laboratory for the testing.

- D. Compressive strength of a sample shall be determined by the average of the two cylinders tested at 28 days. Compliance with the strength requirements of these specifications shall be verified if the average compressive strength of three consecutive samples is not less than the specified strength for the class of concrete, provided no individual sample shall have a strength test result that falls below the specified strength by more than 500 psi.
- E. Concrete which fails to meet strength requirements may be further tested as provided in ACI 318 at the expense of the Contractor or shall be removed as determined by the Engineer.
- F. If tests indicate that concrete delivered to the site does not comply with these specifications, the Engineer may reject such concrete and order changes in materials or proportioning for subsequent work. Rejected concrete shall be removed from the job and replaced as directed by the Engineer.
- G. The Engineer may waive testing requirements on small quantities or concrete elements where strength is not critical.

### 3.3 CURING AND PROTECTION

- A. All concrete work shall be protected against damage from the elements and defacement of any nature during construction operations.
- B. Water shall not be permitted to rise on concrete within 24 hours after it is placed, nor shall running water be allowed to flow over completed concrete within four days after it has been placed.
- C. All concrete shall be cured in accordance with ACI 308 and shall be treated immediately after concreting or cement finishing is completed to provide continuous moist curing for at least seven days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap or kept moist by other approved means. Horizontal surfaces, slabs, etc., shall be ponded to a depth of 1/2" wherever practicable or kept continuously wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other approved means. The Contractor may, at his option, use a membrane curing compound approved by the Engineer in lieu of water curing of concrete, provided such compounds shall not be used on surfaces that are to receive additional concrete, paint, tile, or other materials that require a positive bond, unless it has been demonstrated that the membrane can satisfactorily serve as a base for such additional applications. The compound shall comply with ASTM C309 and be compatible with floor hardeners used, shall be delivered to the job in the manufacturer's containers, and shall be applied in strict accordance with the manufacturer's printed instructions.
- D. Curing compound for exposed surfaces shall be non-staining.
- E. For at least seven days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 50 degrees Fahrenheit.
- F. No manure, salt, or other chemicals shall be used for protection.
- G. The above mentioned seven-day periods may be reduced to three days in each case if high-early- strength cement, as described in Paragraph 2.1.E., is used in the concrete.
- H. Wherever practicable, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.



### 3.4 FINISHING - GENERAL

- A. Unless otherwise noted, strike off concrete surfaces to elevations and profiles indicated and finish with wood or cork float or steel trowel as hereinafter specified, even and true, free from cracks, pockets, or other imperfections. Discontinue as soon as water appears on surface. Finishes, except at warped surfaces, shall be such that irregularities shall not exceed 1/4" as measured by a 10' straight edge.
- B. Following removal of forms, thoroughly wet all surfaces to remain exposed. Fill all honeycombs, tie rod holes, and areas damaged in form removal with grout composed of one part Portland cement to two parts of sand, with water as required, and rub with abrasive stones to smooth, uniform surface.
- C. Any work not formed as indicated on the drawings or that is not of alignment or level or shows a defective surface shall be corrected in a manner satisfactory to the Engineer.
- D. It is expected that forms, concrete, and workmanship shall be such that the quantity of trimming and repair work is kept to a minimum. Defective concrete shall be cut normal to the surface until sound concrete is reached, but not less than 1" deep; the remaining concrete shall be thoroughly roughened and cleaned.
- E. All exposed concrete surfaces, except troweled surfaces and the interior surfaces more than 6 inches below low water level of all concrete tanks, channels, and conduits (both open and covered) which will contain or transmit water, sewage, or sludge, shall be given a grout finish application. Exterior walls shall be so finished to a point 12" below final grade. This operation shall not be undertaken until all the concrete work for the particular structural unit is completed and all mortar splatter and soil stains have been removed.
- F. The grout finish shall be 1:1 by volume cement-sand grout using sand passing the No. 16 sieve. The surface shall be cleaned, thoroughly wetted, and the grout mixed to creamy consistency shall be scrubbed into the surface with a stiff brush. Defective or loose concrete shall be removed and repaired to the satisfaction of the Engineer prior to grouting. Grout shall be cured a minimum of three (3) days by keeping continuously moist with wet burlap or water spray.
- G. Unless otherwise specified, all surfaces not built against forms, such as surfaces of pit floors or tank bottoms and similar surfaces, shall be accurately screened to the required form, wood floated, and steel troweled to a hard even finish. All slabs, walks, and pavement shall be lightly broomed after troweling. The brooming shall be sufficient to mark the surface without appreciably disturbing the troweled finish. Slabs to be painted shall not be broomed.
- H. Unless otherwise directed, all edges and corners which will be exposed to the finished work shall be beveled or rounded by the use of appropriate forms or form inserts, and care shall be taken to prevent chipping or cracking of finished edges.

### 3.5 NON-SHRINK GROUT

- A. Grout, where called for on the drawings, shall be non-shrink grout. Non-shrink grout shall be a proprietary type grout composed of pre-mixed grouting cement, aggregates, and appropriate additives to which only water needs to be added at the site to produce the finished product. Amount of water to be added shall be the minimum required for the intended purpose (depending on whether it is a dry-pack or self-leveling application) and it shall be in accordance with the manufacturer's instructions. The grout shall be specially formulated to make it absolutely non-shrink and the supplier shall be able to furnish test data from an independent testing laboratory proving their grout to be non-shrink under the conditions of usage anticipated. It shall also be a grout that will have a seven day strength not less than 4,000 psi. The grout shall be placed in a manner that will insure complete filling in of holes under base plates and complete contact with the plates. Exposed surfaces of the non-shrink grout shall be such that it is not subject to corrosive erosion or staining, due either to pertaining to them, and methods of installation shall be submitted for approval to the Engineer during the shop drawing submittal period. Approved for this material are Embeco 636 Grout and/or Masterflow 713 Grout, as manufactured by the Master Builders Company, or equal.

**END OF SECTION 030320**

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SECTION 04 81 00 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
  - 1. Samples for decorative concrete masonry units and colored mortar.
  - 2. Samples of decorative block with and without the specified clear sealant applied to demonstrate any change in color.
  - 3. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements.
- B. Comply with ACI 530-05/ACI 530.1-05/TM-5-809-3.
- C. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing required by authorities having jurisdiction.

1.2 SUMMARY

- A. This sections includes
  - 1. Concrete masonry units
  - 2. Split-faced concrete masonry units
  - 3. Mortar and grout
  - 4. Embedded flashing
  - 5. Miscellaneous masonry accessories
  - 6. Clear water repellant to be applied onto exterior face of block.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s)
- B. Reinforced Unit Masonry: Masonry containing reinforcement steel in grouted cells.

1.4 PERFORMANCE AND PRECONSTRUCTION TESTING REQUIRMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28-days. Contractor shall determine the net-area compressive strength of masonry based on 1.4B or 1.4C. Mortar for unit masonry shall comply with ASTM C270. Contractor shall meet ASTM C270 requirements based on the Property or Performance Specification.
- B. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  - 1. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

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- a. Concrete Masonry Unit Test (Property and Proportion Specification): For each type of unit required, according to ASTM C140 for compressive strength.
- b. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- c. Mortar Test (Property Specification): For each mix required, according to ASTM C109 for compressive strength.
- d. Mortar Test (Property Specification): For each mix required, according to ASTM C780 for compressive strength.
- e. Grout Test (Compressive Strength) (Property and Performance Specification): For each mix required, according to ASTM C1019.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
  - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
  - 1. Grout mixes complying with material and compressive strength requirements of ASTM C476 for fine grout. Include description of type and proportions of grout ingredients and design slump.
- D. Copy of manufacturer's technical bulletins and MSDS for the clear repellent.
- E. Quality Control Submittal: Provide protection plan of surrounding areas and non-work surfaces related to application of clear water repellent.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency
- B. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include material test reports substantiating compliance with requirements.
    - b. Include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer.
  - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 4. Grout mixes. Include description of type and proportions of ingredients
  - 5. Reinforcing bars.
  - 6. Joint reinforcement.
  - 7. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

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1. Test according to ASTM C109 for compressive strength, ASTM C1506 for water retention, and ASTM C91 for air content.
  2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirements.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.
- B. Masonry Standard: Comply with the Florida Building Code, 7th Edition and ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- C. Perform work in accordance with ACI 30 and ACI 530.1.
- D. Water Repellant requirements
1. Manufacturer Qualifications:
    - a. Company with minimum 15 years of experience in manufacturing of specified products and systems.
    - b. Company shall be ISO 9001-2000 Certified.
  2. Applicator Qualifications: Company with minimum of 5 years of experience in application of specified products and systems on projects of similar size and scope and is approved by the manufacturer in certificate form.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- F. Deliver water repellent materials according to manufacturer's instructions and lead-time requirements to avoid construction delays. Deliver in manufacturer's original, unopened, undamaged containers with identification labels intact. Store in unopened containers in a cool,

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dry area. Keep material from freezing in the container. Do not store below 35 degrees Fahrenheit or above 100 degrees Fahrenheit.

### 1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- F. Apply water repellent in conditions approved by manufacturer
  - 1. Minimum temperature is 40 degrees and rising.
  - 2. Do not apply in rain or when inclement weather is expected within 12 hours.
  - 3. Do not apply when temperatures are below 40 degrees Fahrenheit or when temperatures are expected to fall below 40 degrees Fahrenheit within 4 hours.

### 1.10 FIELD SAMPLE

- A. Install on inside face of block wall at vending area.
  - 1. Conduct RILEM test on cured field sample. Allow product to fully cure 7 days before testing. Adjust application until required repellent performance is achieved.
  - 2. Apply material in strict accordance with manufacturer's written application instructions.

## PART 2 - PRODUCTS

### 2.1 MASONRY UNITS

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- A. Concrete Masonry Units: ASTM C 90; Weight Classification, Normal Weight.
  - 1. Integral Water Repellent: Sika Watertight Concrete Powder Permeability Reducing Admixture
  - 2. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
- B. Decorative Concrete Masonry Units: ASTM C 90; Weight Classification, Normal Weight.
  - 1. Finish: Exposed faces with split-face finish. Provide special shapes as required for corners, jambs, sashes, control joints, lintels, bond beams, and other special conditions.
    - a. Exterior exposed surfaces to be split-face finish.
    - b. Jambs at windows and doors to smooth.
    - c. Interior exposed surfaces to be smooth.
  - 2. Color: Grey range. Submit samples for selection by architect or DEP's designated representative. (Note: two colors will be selected).
  - 3. Integral Water Repellent: Sika Watertight Concrete Powder Permeability Reducing Admixture
  - 4. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
  - 5. Nominal sizes: 16 inches long x 8 inches high x 8 inches thick or as required/indicated on the drawings.
- C. Concrete Lintels: Precast units matching concrete masonry units and with reinforcing bars indicated or required to support loads indicated.

2.2 MORTAR AND GROUT

- A. Mortar: ASTM C 270, proportion specification.
  - 1. Masonry Cement: Do not use masonry cement or plastic cement.
  - 2. Do not use calcium chloride in mortar.
  - 3. For masonry below grade or in contact with earth, use Type S.
  - 4. For reinforced masonry, use Type S.
  - 5. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions, and for other applications where another type is not indicated, use Type S.
  - 6. Colored Mortar: For decorative concrete masonry units, use colored cement or cement-lime mix of color selected by architect or DEP's designated representative (gray range).
  - 7. Water-Repellent Additive: For mortar used with concrete masonry units made with integral water repellent, use product recommended by manufacturer of units.
  - 8. Comply with ASTM C476 with a minimum compressive strength of 2500 psi in 28 days.
    - a. Use fine grout with a slump of 8 to 10 inches as measured according to ASTM C143.
- B. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C207, Type S.

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- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Mortar Cement: ASTM C1329.
- F. Aggregate for Mortar: ASTM C144
- G. Aggregate for Grout: ASTM C404 for fine grout.
- H. Water: Potable.
- I. Refractory Mortar: Ground fireclay mortar or other refractory mortar that passes ASTM C 199 test and is acceptable to authorities having jurisdiction.

2.3 REINFORCEMENT, TIES, AND ANCHORS

- A. As indicated on the structural drawings.

2.4 EMBEDDED FLASHING MATERIALS

- A. Sheet Metal Flashing: Stainless steel, 0.0156 inch (0.4 mm) thick.
- B. Laminated Flashing: Copper sheet 3 oz./sq. ft. (0.9 kg/sq. m], bonded with asphalt between 2 layers of glass-fiber cloth.
- C. Rubberized Asphalt Sheet Flashing: Pliable and highly adhesive rubberized asphalt compound, 26 mils (0.7 mm) thick, bonded to a polyethylene film, 4 mils (0.1 mm) thick, to produce an overall thickness of 30 mils (0.8 mm).
- D. Single-wythe cmu flashing system: System of CMU cell flashing plans and interlocking CMU web covers made from UV-resistant, high density Polypropylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar. Attached web covers will span from pan to pan providing protection over the web and the joints of the CMU.
  - 1. Basis-of-design Product: Subject to compliance with requirements, provide Mortar Net Solutions; BlockFlash or architect approved equal.
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded strips complying with ASTM D 1056, Grade 2A1.
- B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; made from styrene-butadiene rubber or PVC.
- C. Mortar Net: High density polyethylene (HDPE), 90% open mesh, dovetail shape. Size as required for cavity opening.



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- D. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth, 1/8" (3mm) less than depth of outer wythe.
  - 1. Color to be selected by architect from manufacturer's standard to match mortar joints.
- E. Proprietary Acidic Masonry Cleaner: Product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units.

2.6 CLEAR WATER REPELLANT

- A. Manufacturers
  - 1. Subject to compliance with requirements, provide products from the following manufacturer:
    - a. BASF Building Systems  
889 Valley Park Drive  
Shakopee, MN 55379  
Customer Service: 800-433-9517  
Technical Service: 800-243-6739  
Direct Phone: 952-496-6000  
Internet : [www.BASFbuildingsystems.com](http://www.BASFbuildingsystems.com)
  - 2. Specifications and Drawings are based on manufacturer's proprietary literature from BASF Building Systems. Other manufacturers shall comply with minimum levels of material, color selection, and detailing indicated in Specifications or on Drawings. Architect will be sole judge of appropriateness of substitutions.
- B. Materials
  - 1. A water-based, clear, silane/siloxane sealer designed to provide protection for masonry brick, split-faced, lightweight and standard CMU.
    - a. Basis-of-Design: MasterProtect H 185
  - 2. Water repellent material shall have the following minimum performance:
    - a. Flash point: > 212 degrees F (> 100-degree C) per ASTM D 3278.
    - b. VOC content: < 2.50 lb/gal (< 300 g/L) per EPA Method 24.
    - c. Water repellency in water absorption: 95 percent reduction in weight gain per ASTM C 140.
    - d. Water repellency in leakage on block wall: 99 percent reduction in weight gain per ASTM C 514.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

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- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Cut masonry units with saw. Install with cut surfaces and, where possible, cut edges concealed.
- B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.
- C. Stopping and Resuming Work: Rack back units; do not tooth.
- D. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- E. Build non-load-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.
- F. Tool exposed joints slightly concave when thumbprint hard, unless otherwise indicated.
- G. Keep cavities clean of mortar droppings and other materials during construction.

### 3.3 TOLERANCES

- A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

- B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
- 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

- C. Joints:

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1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100 mm) horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 LINTELS

- A. Install lintels where indicated.
- B. Minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

3.6 FLASHING AND WEEP HOLES

- A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.
  1. Extend flashing 4 inches (100 mm) into masonry at each end and turn up 2 inches (50 mm) to form a pan.
- C. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

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- D. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Attached web covers will span from pan to pan providing protection over the web and joints of the CMU.
- E. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.7 SURFACE PREPARATION FOR CLEAR WATER REPELLANT APPLICATION

- A. Surfaces shall be clean, structurally sound, and fully cured (28 days). Remove all dust, dirt, bitumens, efflorescence, oil, pollution deposits, and curing, forming, and parting compounds.
- B. Treat and remove alkali and efflorescence with proper neutralizing compound recommended by concrete or brick supplier or distributor.
- C. Protect plan tile and surfaces to remain uncoated during application. Use drop cloths or masking as required.
- D. Cover windows during application of sealer or follow requirements in Cleaning article.

3.8 APPLICATION OF CLEAR WATER REPELLANT

- A. Surface, vapor, and material temperatures shall be 40 degrees Fahrenheit or above prior to and during the application. Do not apply if rain is expected within 6 hours following application.
- B. Stir product thoroughly prior to and periodically during use. Do not dilute.
- C. Apply by low-pressure, non-atomizing spray starting from the bottom up.
- D. Apply mist coat immediately prior to application to help break surface tension, ensuring maximum penetration of the sealer.
- E. Flood surfaces to saturation by applying from the bottom up with a controlled 8 to 10 inches material rundown to ensure maximum penetration into substrate.

3.9 CLEANING

- A. Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly cured, clean exposed masonry.
  - 1. Wet wall surfaces with water before applying acidic cleaner, then remove cleaner promptly by rinsing thoroughly with clear water.
  - 2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
  - 3. Verify compatibility of all products used with manufacturer of clear water repellant.
- C. Cleaning water repellant equipment and tools with hot soapy water. Overspray can be cleaned immediately with hot, soapy water. Dried residue can be cleaned with citrus degreaser.

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- D. Wipe windows, louvers, and doors with a dampened cloth or sponge immediately following application of sealer.
- E. Clean up and properly dispose of debris remaining on Project site related to water repellent application.

END OF SECTION 04 81 00

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Dimensional Wood Lumber
- B. Plywood sheathing

1.2 SUMMARY

- A. Extent of rough carpentry for wood framing, wood nailers and blocking, and wood sheathing is indicated on the Drawings, including schedules, notes and details.
- B. Where conflicts arise between this specification and those noted on the structural drawings, the more stringent requirement will govern.
- C. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
  - 2. Section 06 20 00 "Finish Carpentry"
  - 3. Section 07 27 00 "Vapor Barrier"

1.2 DESCRIPTION OF WORK

- A. Definition: Rough Carpentry includes structural components of dimensional lumber, composite lumber, and structural panels constructed at the project site as part of the load bearing system.
- B. The extent of rough carpentry is shown on drawings, including schedules, notes and details to show size and location of members, typical connections and treatments required.
- C. Coordination: It is the responsibility of every subcontractor to cooperate with the Contractor and other subcontractors to prepare coordinated drawings in areas of congestion and to apprise themselves of the requirements of other trades that affect their work.
- D. Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of nailers, blocking, and similar supports to allow attachment of other work.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Handling and Storage: Handle and store lumber with care, and in accordance with manufacturer's instructions and APA recommendations to avoid damage from moisture and other causes.
- B. Delivery: Time delivery of lumber products to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow.

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1. Park personnel will not sign for or handle any project related materials.

### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's current technical literature for each component.

## PART 2 - PRODUCTS

### 2.1 LUMBER AND PANELS PRODUCTS, GENERAL

- A. Lumber Standards: PS 20 "American Softwood Lumber Standard" and applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Grade Stamps: Factory-mark each piece of lumber with grades stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- C. Sizes: Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20 for moisture content specified for each use.
  1. Provide dressed lumber, S4S, seasoned to 19 percent maximum moisture content at time of dressing and shipment.
- D. Dimension Lumber: For light framing (2" to 4" wide) provide Construction Grade lumber of any species unless noted otherwise on the structural drawings.
- E. Plywood Construction Panels: Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood panels and, for products not manufactured under PS 1 provisions, with American Plywood Association (APA) "Performance Standard and Policies for Structural-Use Panels," Form No. E445.
  1. Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.
  2. Minimum Requirements for plywood used for the interior wood floor: Pressure treated, tongue-and-groove, exposure 1. Thickness to match existing subfloor. Support all edges of the plywood with pressure treated blocking.
  2. Minimum Requirements for plywood used for roof sheathing: match existing depth, using CDX or better materials. See structural drawings for additional requirements.
  3. Minimum Requirements for plywood used for interior wall sheathing: match existing depth, using materials suitable for use under tile and/or to match existing where painted.

### 2.2 MISCELLANEOUS MATERIALS

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- A. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.
1. Provide type 316 stainless steel fasteners and anchorages, unless otherwise noted. If a product is not available, submit a substitution for review and approval that is suitable for use in a salt-water environment.
- a. **Note: Failure to order materials sufficiently in advance will not be grounds for substitutions to be accepted.**
- C. Blocking: Provide blocking in walls for all wall-mounted equipment, grab bars, coat hooks, baby changing station, roll-down doors, lavatories, mirrors, etc.

### 2.3 WOOD TREATMENT BY PRESSURE PROCESS

- A. Preservation Treatment: Where lumber or plywood is indicated as "PT" or "Treated," or is specified herein to be treated, comply with applicable requirements of American Wood Preservers' Association (AWPA) Standards C2 (Lumber) and C9 (Plywood) and of AWPA Standards listed below. Mark each treated item with the AWPA Quality Mark Requirements. Lumber not in contact with ground and not exposed to the weather may be treated according to AWPA C31 with inorganic boron (SBX).
1. Use treatment containing no arsenic or chromium, except as follows: Use CCA-treated wood for work within 60 feet of water (shore) and ACQ-treated wood for work greater than 60 feet from water (shore). (CCA: chromated copper arsenate; ACQ: ammoniacal copper quat.)
2. AWPA standards shall be used for determining pressure treatment of wood used in the project. Pressure treatment retention for wood shall be as follows:
- a) Above-ground: 0.25 pcf.
- b) Ground contact: 0.40 pcf.
- c) Piling in ground: 0.80 pcf.
- d) Marine piling: 2.5 pcf.
3. If Wolmanized (Copper Azole – Type B, CA-B) wood treatment is used, the pressure treatment retention for wood shall be as follows:
- a) Above-ground: 0.10 pcf.
- b) Ground contact: 0.21 pcf.
- c) Piling: Not to be used.



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- B. Pressure-treat all designated dimension lumber materials with water-borne preservatives to comply with AWPAC LP-2. After treatment, kiln-dry lumber to a maximum moisture content, respectively, of 19 percent.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. All fasteners to preservative-treated materials shall be stainless steel (Grade 316).
- E. All exposed wood to be pressure treated.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.
- B. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.

#### 3.2 NAILERS AND BLOCKING

- A. Provide wherever shown and where required for attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
  - 1. Provide blocking as required for all restroom accessories to support loading indicated by the manufacturer.
  - 2. Blocking for ADA grab bars must be provided to withstand design pressures as required by code.

#### 3.3 WOOD FRAMING, GENERAL

- A. Provide framing members of sizes and on spacings shown, and frame openings as shown, or if not shown, comply with recommendations of "Manual for House Framing" of National Forest Products Association (N.F.P.A.).
- B. Anchor and nail as shown, and to comply with "Recommended Nailing Schedule" of "Manual for House Framing" and "National Design Specifications for Wood Construction" published by N.F.P.A.
- C. Stud Framing, General: Provide stud framing of size and spacing indicated. Arrange studs so wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using 2" thick

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members with widths equaling that of studs; except single top plate may be used for non-loading-bearing partitions. Nail or anchor plates to supporting construction.

3.4 INSTALLATION OF CONSTRUCTION PANELS

- A. General: Comply with applicable recommendations contained in Form No. E 30F, "APA Design/Construction Guide - Residential & Commercial," for types of construction panels and applications indicated.
- B. Fastening Methods: Fasten sheathing panels by nailing to framing.

END OF SECTION 06 10 00

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SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Interior standing and running trim.
  - 2. Wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed with other construction before woodwork installation.
  - 3. Shop finishing of wood trim.
- B. Related Sections
  - 1. Section 06 10 00 "Rough Carpentry"
  - 2. Section 07 46 00 "Cementitious Siding and Accessories"
  - 3. Section 09 90 00 "Painting"

1.2 SUBMITTALS: Product data for each type of product.

1.3 FIELD CONDITIONS

- A. Weather limitations for Exterior Work: Proceed with installation of exterior trim only when existing and forecasted weather conditions permit work to be performed.
- B. Environmental Limitations for Interior Work: Do not deliver or install interior wood trim until the building is enclosed, work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

2.2 INTERIOR AND EXTERIOR TRIM

- A. Interior standing and running trim:
  - 1. Grade: Clear paint grade
  - 2. Wood Species: Poplar.
  - 3. All interior wood in contact with concrete or cmu to be kiln dried pressure treated.

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4. Where drawings call for cementitious trim, provide cementitious trim. See section 07 46 00 for additional information.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
  1. Use type 316 stainless steel fasteners as recommended by the trim and/or lumber manufacturer for specific conditions encountered.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer.
  1. Use waterproof resorcinol glue for exterior applications.

PART 3 - EXECUTION

3.1 Preparation

- A. Before installation, condition interior wood trim to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. General:
  1. Follow manufacturer's best practices.
  2. Edge treatment: Caulk, paint or prime all field cut edges.
- B. Install wood trim level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut wood trim to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Preservative-Treated wood: Where cut or drilled in field, treat end cuts and drilled holes according to AWPAC M4.
- E. Anchor wood trim to anchors or blocking built in or directly attached to substrate. Secure with fastening, countersunk and filled flush with woodwork.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces to greatest extent possible. Do not use pieces less than 36 inches long except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

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- G. Install standing and running trim with no more variation from a straight line than 1/8 inch in 98 inches.

END OF SECTION 06 20 00

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SECTION 06 61 10 – SOLID SURFACE FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Millwork countertops with sinks and cove backsplashes.

B. Related Sections

1. Section 06 10 00 "Rough Carpentry"
2. Section 06 20 00 "Finish Carpentry"
3. Section 07 92 00 "Joint Sealants"

C. Definitions

1. Solid Surface: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

D. References

1. ASTM C920-14a - Standard Specification for Elastomeric Joint Sealants
2. ASTM D638-10 - Standard Test Method for Tensile Properties of Plastics
3. ASTM D785-08 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
4. ASTM D5420-10 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
5. ASTM E84-14 - Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E228-11 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer.
7. ASTM G21-13 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
8. ASTM G22-76(96) - Standard Practice for Determining Resistance of Plastics to Bacteria.
9. NFPA 255-06 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
10. SCAQMD Rule 1168 - Adhesive and Sealant Applications (amended January 2005).
11. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.2 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: Indicate Product description including solid surface sheets, sinks, bowls and illustrating full range of standard colors, fabrication information and

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compliance with specified performance requirements. Submit Product data with resistance to list of chemicals.

2. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 013000. Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in solid surface.
3. Coordination Drawings: Submit coordination drawings indicating plumbing and miscellaneous steel work indicating locations of wall rated or non-rated, blocking requirements, locations and recessed wall items and similar items. Show details for mounting countertops, and sinks.
4. Samples: Submit samples in accordance with Section 013000 for Department & Architect review. Submit minimum 2" x 2" samples. Colors to be selected from manufacturer's full range.

### B. Closeout Submittals

1. Submit manufacturer's care and maintenance data to owner, including repair and cleaning instructions. Include in Project closeout documents.
2. Provide a commercial care and maintenance kit and video. Review maintenance procedures and warranty details with Owner upon completion.

### C. Quality Assurance

1. Qualifications:
  - a. Contractor to provide work of this Section executed by competent installers with minimum five (5) years of experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

### D. Delivery Storage & Handling Requirements

1. Deliver no components to Project site until areas are ready for installation.
2. Store components indoors prior to installation.
3. Handle materials to prevent damage to finished surfaces.

## 1.3 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's standard warranty for material only for period of 10 years from Substantial Completion date, against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Architect and at no expense to Owner.

## PART 2 - PRODUCTS

### 1.4 MANUFACTURERS

- A. Corian® by DuPont; [www.corian.com](http://www.corian.com)

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- B. Samsung Chemical USA; [www.staron.com](http://www.staron.com)
- C. Wilsonart Contract; [www.wilsonartcontract.com](http://www.wilsonartcontract.com) (Basis of Design)
- D. Architect Approved Equal

1.5 MATERIALS, GENERAL

- A. Description: 1/2" Solid Surface Countertop w/ 1/8" radiused edges unless specified otherwise in the drawings.

- B. Performance/Design Criteria

	Property	Requirement (min or max)	Test Procedure
1.	Solid Surface Based Products:		
2.	Tensile Strength	6000 psi min	ASTM D638
3.	Tensile Modulus	1.5 x 10 <sup>6</sup> psi min	ASTM D638
4.	Tensile Elongation	0.4% min.	ASTM D638
5.	Flexural Strength	10000 psi min	ASTM D790
6.	Flexural Modulus	1.2 x 10 <sup>6</sup> psi min	ASTM D790
7.	Hardness	>85-Rockwell "M" scale min.	ASTM D785
8.	Thermal Expansion	2.2 x 10 <sup>-5</sup> in./in./°F	ASTM E228
9.	Fungi and Bacteria	Does not support microbial growth	ASTM G21 & G22
10.	Microbial Resistance	Highly resistant to mold growth	UL 2824
11.	Ball Impact	No fracture - 1/2 lb. Ball: 6 mm slab - 36" drop 12 mm slab - 144" drop	NEMA LD 3, Method 3.8
12.	Weatherability	ΔE*94<5 in 1,000 hrs	ASTM G155
13.	Flammability		ASTM E84, NFPA 255 & UL 723

All Colors			
	6 mm	12 mm	
14.	Flame Spread	<25	<25
15.	Smoke Developed	<25	<25
16.	Class Code	A	A
			NFPA 101®, Life Safety

- C. Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment; not coated, laminated or of composite construction; meeting following criteria:
- D. Flammability: Class 1 and A when tested to UL 723.
- E. Counter Perimeter Frame: Ensure 3/4" thick, moisture resistant cores for counter tops in wet areas having sinks or lavatories are 3/4" thick exterior grade plywood with waterproof adhesive, Fir or Poplar plywood, veneer core only.



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- F. Lavatory Tops: 1/2" thick countertop of solid polymer, 100% acrylic, or polyester-acrylic blend solid surfacing material, cast to desired profiles and sizes having edge details as indicated on Drawings conforming to CSA B45.5/IAPMO Z124, Provide countertops complete with backsplashes of size shown on Drawings. Ensure countertop and backsplash coved.
  - 1. Color as indicated in the drawings.
- G. Counter Brace
  - 1. Metal as indicated on the drawings
  - 2. ADA compliant

1.6 FABRICATION

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid polymer manufacturer requirements. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
- B. Where indicated, thermoform corners and edges or other objects to shapes and sizes indicated on Drawings, prior to seaming and joining. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.
- C. Ensure no blistering, whitening and cracking of components during forming.
- D. Fabricate backsplashes from solid surfacing material with optional radius cove where counter and backsplashes meet as indicated on Drawings. Backsplashes for most colors may be fabricated by traditional means discussed in K-25294 *Backsplashes*. Colors with metallic/mica particle or veined colors creating directional aesthetics (K-26833 *Directional Aesthetics*) may require the techniques in Technical Bulletin K-28235 *Thermoformed Backsplash*.
- E. Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 50 mm (2") wide reinforcing strip of solid polymer material under each joint. Reinforcing strip of solid polymer material is not required when using DuPont™ Joint Adhesive 2.0.
- F. Provide holes and cutouts for plumbing and bath accessories as required.
- G. Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.
- H. Finish: Ensure surfaces have uniform finish:
- I. Matte, with a 60° gloss rating of 5 - 20.
- J. Fabrication Tolerances:
- K. Variation in Component Size: +/-1/8".

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- L. Location of Openings: +/-1/8" from indicated location.

## PART 2 - EXECUTION

### 2.1 VERIFICATION OF CONDITIONS

- A. Contractor to examine substrates and conditions, for compliance with requirements for installation tolerances per manufacturer's recommendations and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify actual site dimensions and location of adjacent materials prior to commencing work.
- C. Examine braces and frame upon which counter tops are to be installed. Verify they are level to within 1/8" in 10' - 0".
- D. Verify all necessary blocking is in place within the walls.
- E. Notify Architect in writing of any conditions which would be detrimental to installation.

### 2.2 INSTALLATION

- A. General:
  - 1. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.
  - 2. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.
  - 3. Route radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer's written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.
  - 4. Install countertops with no more than 1/8" sag, bow or other variation from a straight line.
  - 5. Adhere undermount/submount/bevel mount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.
  - 6. Adhere topmount sinks/bowls to countertops using manufacturer recommended adhesives and color-coordinated silicone sealant. Secure seam mount bowls and sinks to counter tops using color matched joint adhesive.
  - 7. Seal between wall and components with joint sealant as specified herein and in Section 079200, as applicable.
  - 8. Provide backsplashes and endsplashes as indicated on Drawings. Adhere to countertops using a standard color-coordinated silicone sealant. Adhere applied sidesplashes to countertops using a standard color-matched silicone sealant. Provide coved backsplashes and sidesplashes at walls and adjacent millwork.

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Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on reviewed Shop Drawings. Adhere to countertops using manufacturer's standard color-coordinated joint adhesive.

9. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.
10. Coordinate connections of plumbing fixtures with notes and specifications on the plumbing drawings. Make plumbing connections to sinks in accordance with note and specifications on the plumbing drawings.

### 2.3 REPAIR

- A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's "Technical Bulletins".

### 2.4 SITE QUALITY CONTROL

- A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Architect at no cost to Owner.

### 2.5 PROTECTION AND CLEANING

- A. Provide protective coverings to prevent physical damage or staining following installation for duration of the Project.
- B. Protect surfaces from damage until Substantial Completion of the Work.
- C. Remove excess adhesive and sealant from visible surfaces.
- D. Clean surfaces in accordance with manufacturer's "Care and Maintenance Instructions".

END OF SECTION 06 61 10

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SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Installer Qualifications: Authorized, approved, or licensed by waterproofing manufacturer.

PART 2 - PRODUCTS

2.1 WATERPROOFING MATERIALS

- A. Rubberized-Asphalt Sheet: 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side.
  - 1. Products: Grace "Ice and Water Shield" or Department-approved equal.
  - 2. Products: Grace "Vycor self-adhered Window and Door Flashing" or Architect approved equal.
- B. Auxiliary Materials: Primer, surface conditioner, liquid membrane, substrate patching membrane, sheet strips, mastic, adhesives, tape, and metal termination bars recommended by waterproofing manufacturer.
  - 1. Primer: Liquid waterborne primer recommended for substrate.
  - 2. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Clean, prepare, and treat substrates. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Remove oil, form-release agents, curing compounds, and other contaminants or coatings.
- C. Remove projections and fill honeycomb, aggregate pockets, holes, and other voids.

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- D. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks.
- E. Apply primer to substrates at required rate and allow it to dry.
- F. Install self-adhering sheet waterproofing according to manufacturer's written instructions and recommendations in ASTM D 6135.
- G. Apply and firmly adhere sheets. Accurately align sheets and maintain uniform 2-1/2-inch minimum lap widths and end laps. Overlap and seal seams and stagger end laps.
- H. Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
- I. Prepare, treat, and seal surfaces at terminations, penetrations, drains, and protrusions according to ASTM D 6135.
- J. Repair tears, voids, and lapped seams not complying with requirements. Slit and flatten fish mouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.
- K. When in use with existing vapor barriers, verify compatibility of self-adhering membrane with existing system.

END OF SECTION 07 13 26

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SECTION 07 27 00 – VAPOR BARRIER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings as specified herein, but not limited to the following:
  - 1. Commercial weather barrier assemblies
  - 2. Self-Adhered air and vapor barrier
  - 3. Flexible flashing.
  - 4. Weather barrier accessories.

1.2 SUBMITTALS

- A. Product data for each type of product:
  - 1. Physical properties, performance criteria, compliance reports, material compatibility, product limitations, and recommendations.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods including details of weather barrier at terminations, openings, and penetrations.
- B. Installer Qualifications: Authorized, approved, or licensed by manufacturer.

1.3 DEFINITIONS

- A. Vapor Barrier: A combination of materials and accessories that do the following:
  - 1. Prevent the accumulation of water as a water-resistive barrier.
  - 2. Minimize the air leakage into or out of the building envelope as a continuous air barrier.
  - 3. Provide sufficient water vapor transmission to enable drying as a vapor-permeable membrane.
- B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly per International Building Code Section 1403.2.
- C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 section 5.4.3.1.

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- D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).
- E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96 per definition in International Building Code. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

#### 1.4 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
  - 1. AMMA 2400-02, Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
  - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
  - 3. ASTM E1677, Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
  - 4. ASTM D1970, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
  - 5. ASTM E2112, Standard Practice for Installation of Exterior Windows, Doors and Skylights
  - 6. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials
- C. National Fire and Protection Agency (NFPA):
  - 1. NFPA 285 - Standard Fire Test Method for Evaluation Of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Store in accordance with the manufacturer's instructions in clean, dry location protected from exposure to direct sunlight. Material that has been unwrapped shall be covered with opaque, light colored tarp or re-wrapped in manufacturer's packaging.
- C. Handle materials to avoid damage.
- D. Do not store near heat source or open flame.
- E. Store rolled materials on end.

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1.6 WARRANTY

- A. Manufacturer's Product Warranty: To repair or replace weather barrier product that fails in materials within specified warranty period.

1. Warranty Period: 8 years from date of Substantial completion.

PART 2 - PRODUCTS

2.1 VAPOR BARRIERS

- A. Commercial Building Wrap:

1. Basis-of-Design Product:
  - a. Subject to compliance with requirements provide DuPont Tyveck "Commercial Wrap D".
  - b. Architect approved equal.
2. System Description
  - a. Single-Layer drainable weather barrier with integral drainage, including flashing and sealing of penetrations and seams.
  - b. Drainability: 90% or greater when test in accordance with ASTM E2273.
  - c. Air Permeance, Product: Not more than 0.004 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested in accordance with ASMT E2178.
  - d. Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested in accordance with ASMT E2178 and evaluated ABAA.
  - e. Water Penetration Resistance, Product: Hydrostatic head resistance greater than 22 inches (55 cm) in accordance with AATCC 127.
  - f. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E2357 to water resistance in accordance with ASTM E331 to 6.24 lbf/ sq. ft.
  - g. Water-Vapor Permeance: Not less than 23 perms per ASTM E96/E96M, Desiccant Method (Procedure A) or not less than 28 perms per ASTM E96/E96M, Water Method (Procedure B).
  - h. Allowable UV Exposure Time: Not less than 9 months (270 days) when tested in accordance with ASTM G155 (Accelerated Weathering).
  - i. Flame Propagation Test: Materials and construction shall be tested in accordance with NFPA 285.
  - j. Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
    - 1) Peak Heat Release: 13,217 Btu/sq. ft.
    - 2) Total Heat Release: 1762 Btu/sq. ft.
    - 3) Effective Heat of Combustion: 7744 Btu/lb.

- B. Self-Adhered Flashing Tape

1. Basis-of-Design Products:
  - a. Subject to compliance with requirements provide DuPont FlexWrap.
  - b. Subject to compliance with requirements provide DuPont StraightFlash.
  - c. Architect approved equal.



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2. Self-adhered composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg. F. for seven days.
  - a. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
  - b. Water Penetration: No leakage at 15 psf per ASTM E331.
  - c. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. at 25 deg. F as Class A without primer use.

C. ACCESSORY PRODUCTS

1. Building Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek® Tape
  - b. Architect approved equal.
2. Closed-Cell Polyurethane Foam Insulation: Low-pressure, low-expansion, single-component polyurethane foam, with maximum flame-spread and smoke-developed indexes of 15 and 25, respectively, per ASTM E84.
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; DuPont™ Great Stuff Pro
  - b. Architect approved equal.
3. Fasteners with Self-Gasketing Washers: Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with **1-inch- (25-mm)** diameter, high-density polyethylene cap washers with UV inhibitors.
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek® Wrap Caps
  - b. Architect approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
  1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Notify the contractor in writing of any unsatisfactory conditions.

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- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
  - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

### 3.3 COMMERCIAL BUILDING WRAP INSTALLATION

- A. General: Comply with weather barrier manufacturer's written installation guidelines and warranty requirements.
- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed.
  - 1. Maintain continuity of air and water barrier assemblies.
  - 2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
  - 3. Install weather barrier horizontally starting at lower portion of wall surface.
  - 4. Provide minimum 6 inches (150 mm) overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.
- C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.
  - 1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
- D. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according to weather barrier manufacturer's installation guidelines.
  - 1. Do not use temporary fasteners to permanently attach weather barrier.
  - 2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
  - 3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
- E. Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings in accordance with weather barrier manufacturer's installation guidelines.
  - 1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.

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2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
3. Install flashing in accordance with weather barrier manufacturer's installation guidelines.

3.4 WEATHER BARRIER FLASHING INSTALLATION

- A. Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
  1. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
  2. Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
  3. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
  4. Lap weather barrier flashing a minimum of 2 inches (50 mm) onto weather barrier.
  5. Apply pressure over entire surface using roller or firm hand pressure
- B. Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
  1. Apply **9-inch- (230-mm)** wide conformable weather barrier flashing at door and window sills.
  2. Ensure that sill flashing does not slope to the interior.
  3. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
  4. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
  5. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
  6. Use strip flashing with wrap cap screws to secure head flap of the windows.
- C. Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.
  1. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.
- D. Terminations: Provide minimum 2 inches (50 mm) overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.
  1. Secure weather barrier with fasteners and weather barrier flashing.

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3.5 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material with grooves or channels running vertically in compliance with manufacturer's written instructions.
- B. Seal end of day and permanently exposed reverse laps with building envelop sealant.
- C. Refer to Vapor Barrier Manufacturer detail drawings for installation procedures including, but not limited to, the following:
  - 1. Changes in substrate
  - 2. Control joints
  - 3. Crack treatment
  - 4. Inside corners
  - 5. Outside corners
  - 6. Penetrations
  - 7. Rough openings
  - 8. Sheathing Joints

3.6 CLEANING

- A. Immediately remove release paper and scrap from work area and dispose of material in a legal fashion.

3.7 PROTECTION

- A. Protect installed weather barrier from the following:
  - 1. Damage from cladding, structure, or a component of the structure (for example, window, door, or wall system).
  - 2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
  - 3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
  - 4. UV exposure in excess of products' stated limits.

**END OF SECTION 07 27 00**

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## SECTION 07 41 13 - METAL ROOF PANELS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Mechanically-seamed, standing seam metal roof panels, with related metal trim and accessories.

#### 1.2 RELATED REQUIREMENTS

- A. Division 07 Section "Building Insulation" for thermal insulation installed under metal panels.
- B. Division 07 Section "Weather Barriers" for air barriers within roof assembly and adjacent to roof assembly.
- C. Division 07 Section "Flashing and Sheet Metal" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.
- D. Division 07 Section "Joint Sealants" for field-applied Joint Sealants.

#### 1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): [www.aamanet.org](http://www.aamanet.org):
  - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
  - 2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE): [www.asce.org/codes-standards](http://www.asce.org/codes-standards):
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): [www.astm.org](http://www.astm.org):
  - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
  - 3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - 4. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 5. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 6. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
  - 7. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
  - 8. ASTM D 2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

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9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
10. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
11. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
12. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
13. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
14. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.

D. FM Global (FM): [www.fmglobal.com](http://www.fmglobal.com):

1. ANSI/FM 4471 - Approval Standard for Class 1 Panel Roofs.

E. Underwriters Laboratories, Inc. (UL): [www.ul.com](http://www.ul.com):

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies
2. UL 2218 - Impact Resistance of Prepared Roof Covering Materials.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.
1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
    - a. Product data, including certified independent test data indicating compliance with requirements.
    - b. Samples of each component.
    - c. Sample submittal from similar project.
    - d. Project references: Minimum of five installations not less than five years old, with Owner and Architect contact information.
    - e. Sample warranty.
    - f. IAS AC 472 certificate.
    - g. Florida State Product Approval meeting design pressures listed on the structural drawings.
- C. Installer Qualifications: Experienced Installer with minimum of five years of experience with successfully completed projects of a similar nature and scope.

### 1.5 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings,

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penetrations, roof accessories, and special details. Make distinctions between factory and field assembled work.

1. Indicate points of supporting structure that must coordinate with metal panel system installation.
2. Include data indicating compliance with performance requirements.
3. Include structural data indicating compliance with requirements of authorities having jurisdiction.
4. Include sealant location and denote those that are factory and field applied.

- C. Samples for Verification: Provide 6-inch- (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.
- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.
- D. **Florida State Building Code Certificate.**
- E. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
  2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

### 1.9 COORDINATION

- A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

### 1.10 WARRANTY

- A. No dollar limit, non-prorated weathertight warranty for five (5) years from date of Substantial Completion.

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- B. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.
- C. **Special Weathertightness Warranty:** On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks, with without monetary limitation within 10 years from date of Substantial Completion.
- D. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 25 years from date of Substantial Completion, including:
  - a. Color fading in excess of 10 Hunter units per ASTM D 2244.
  - b. Chalking in excess of No. 6 rating per ASTM D 4214.
  - c. Failure of adhesion, peeling, checking, or cracking.
  - d. **Warranty to cover Coastal Application and must be signed and executed by the Roofing System manufacturer.**

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design Manufacturer: Snap-Clad Panel by Peterson Aluminum or architect approved equal.
  - a. Gauge: 0.040 aluminum
  - b. Rib spacing: 12" o.c., with pencil ribs.
  - c. Rib height: 1-3/4 inches
  - d. Finish: Galvalume plus
  - e. UL-2218 Impact resistance rated.
- B. Any substitutions must be submitted and approved during the Bidding phase. Only products accepted prior to Bid award will be accepted.
  - 1. Substitutions requests must include valid FL approval number meeting design pressures listed on the structural drawings. Requests without this data will not be reviewed.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
- B. System Performance: Comply with ASTM E 1514 and requirements of this Section.
- C. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:
  - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
    - a. Wind Uplift Testing: Certify capacity of metal panels by actual testing of proposed assembly per ASTM E 1592.
  - 2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/240 of the span with no evidence of failure.



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- 3. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."
- D. Wind Uplift Resistance: Comply with UL 580 for wind-uplift class UL-30 unless listed otherwise on the structural drawings.
- E. **Florida State Building Code Compliance:** Comply with requirements of Florida State Building Code. [www.floridabuilding.org/pr/pr\\_app\\_srch.aspx](http://www.floridabuilding.org/pr/pr_app_srch.aspx)
- F. Air Infiltration, ASTM E 1680: Maximum 0.09 cfm/sq. ft. (0.457 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
- G. Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 12 lbf/sq. ft. (575 Pa).
- H. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

### 2.3 METAL ROOF PANELS

- A. Mechanically-seamed, continuous interlock, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.
  - 1. Basis of Design Snap-Clad Panel by Peterson Aluminum or architect approved equal.
    - a. Gauge: 0.040 aluminum
    - b. Rib spacing: 12" o.c., with pencil ribs.
    - c. Rib height: 1-3/4 inches
    - d. Finish: Galvalume plus
    - e. Joint Type: Mechanically seamed/continuous interlock.
    - f. UL-2218 Impact resistance rated.
- B. Face Sheet Material: Aluminum Gage .040" per ASTM B209
  - 1. Aluminum shall be tension leveled (temper passed and stretcher leveled) with a camber a maximum of 1/4" in 20 feet

### 2.4 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in profiles as indicated. Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet in 12 feet maximum lengths. Trim to be erected in overlapped condition. Miter conditions shall be factory welded material to match the sheeting. Trim shall be formed only by the manufacturer or their approved dealer.
- C. Panel Clips: Provide panel clip of type specified, at spacing indicated on approved shop drawings. Use 300 Series stainless steel as recommended by the roofing manufacturer.

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- D. Panel Fasteners: Stainless steel, self-tapping screws and other acceptable fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply long life fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. Closures: Use composition or metal profiled closures at top of each elevation to close ends of the panels. Metal closures to be made in the same material and finish as face sheet.
- F. Zees: Where required by design of primary structural framing system, shall be used to span between beams and/or joists. Thermally responsive base and top clips shall be fastened to the zeos on 12" centers.
- G. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
  - 1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
  - 2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.

### 2.5 SEALANTS

- A. Provide one of the following systems:
  - 1. Two-part polysulfide class "B" non-sag type for vertical and horizontal joints, recommended by roofing manufacturer.
  - 2. One-part polysulfide not containing pitch or phenolic extenders recommended by roofing manufacturer.
  - 3. Exterior grade silicone sealant recommended by the roofing manufacturer.
  - 4. One-part non-sag, gun grade, exterior type polyurethane recommended by roofing manufacturer.

### 2.6 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.
- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

### 2.7 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- B. Galvalume Plus.

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## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, recommendations and installation instructions for substrate verification, preparation requirements and installation.
  - 1. Strippable Film: Remove manufacturer's protective film, if any, from surfaces of roofing panels.
- B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instruction.
  - 1. Verification of Conditions:
    - a. Panel support systems are ready for construction activities of this section and within specified tolerances.
    - b. Rough-in utilities are in correct locations.

### 3.2 EXAMINATION

- A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.
  - 1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
  - 2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:
    - a. 1/4 inch (6 mm) in 20 foot (6.1 m) in any direction.
    - b. 3/8 inch (9 mm) over any single roof plane.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

### 3.3 PREPARATION

- A. **Miscellaneous Supports:** Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.
- B. Coordination: Coordinate metal roofing with other work to provide a noncorrosive and leak-proof installation.
  - 1. Install substrate boards, hat channels, purlins, or furring channels in accordance with manufacturer's recommendations.
  - 2. Coordinate work, with installation of other associated work, to ensure quality application.
  - 3. Coordinate work with installation of associated metal flashings and building walls.
  - 4. Coordinate work to minimize foot traffic and construction activity on installed finished surfaces.
  - 5. Coordinate location of pipe penetrations to allow centering of pipe in panel.
  - 6. Coordinate location of roof curbs, to allow proper integration with roof panel.
  - 7. Coordinate work to minimize foot traffic and construction activity on installed finished. surfaces.

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8. Dissimilar Metals: Prevent galvanic action of dissimilar metals.

- C. Flashings: Install flashings to cover exposed underlayment per Section 07 62 00 "Sheet Metal Flashing and Trim."

### 3.4 METAL PANEL INSTALLATION

- A. Mechanically-Seamed, Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.
1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
  2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
  3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
  4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Field inspection of installed panel roof system by Metal Panel Manufacturer Factory-Approved/Authorized inspector will be required for the 25 Year Limited Weathertightness Warranty. Minimum of two (2) inspections by the Factory Inspector will be required with written reports of these inspections.
- D. Installation Tolerances:
1. Variation from Plumb: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).
  2. Variation from Level: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).
  3. Variation from True Plane: Maximum 1/4" (3.2 mm) in 20 feet (6.096 m).

### 3.5 ACCESSORY INSTALLATION

- A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
  2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
  3. Provide concealed fasteners except where noted on approved shop drawings.
  4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.
- B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.

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1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

**3.6 CLEANING AND PROTECTION**

- A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.
- C. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
- D. Remove construction debris from project site and legally dispose of debris.
- E. Remove strippable coating and perform dry wipe-down cleaning of panels as erected.
- F. Protect installed product's finish surfaces from damage during construction.
  1. Protect installed products from damage by subsequent construction activities.
  2. Replace products having damage other than minor finish damage.
  3. Repair products having minor finish damage to finish in accordance with panel manufacturer's recommendation.
  4. Architect shall be sole judge of acceptability of repair to damaged finishes; replace products having rejected repairs.

**END OF SECTION 07 41 13**

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SECTION 07 46 00 – CEMENTITIOUS SIDING & ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
  - 1. Submit research/evaluation reports from a model code organization acceptable to authorities having jurisdiction.
- B. Storage and Handling:
  - 1. Store products flat and keep dry and covered prior to installation.
  - 2. Protect corners and edges from breakage. Carry siding and soffit panels on edge.
- C. Warranties: Manufacturer's standard form in which siding manufacturer agrees to repair or replace siding that fails in materials or workmanship within 20 years. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

1.3 WARRANTY

- A. Product Warranty: Limited, non-pro-rated product warranty.
  - 1. HardiePlank HZ10 lap siding for 30 years.
  - 2. HardiPanel HZ10 vertical siding for 30 years.
  - 3. HardieSoffit HZ10 panels for 30 years.
  - 4. HardieShingle HZ10 siding for 30 years.
  - 5. HardieTrim HZ10 boards for 15 years.
- B. Finish Warranty: Limited product warranty against manufacturing finish defects.
  - 1. When used for its intended purpose, properly installed and maintained according to Hardie's published installation instructions, James Hardie's ColorPlus finish with ColorPlus Technology, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.

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PART 2 - PRODUCTS

2.1 SIDING

- A. Vertical Siding: HardiePanel HZ10 siding as manufactured by James Hardie Building Products, Inc.
  - 1. Type: Smooth Vertical siding panel 4 feet by 8 feet (1219 mm by 2438 mm).
  - 2. Type: Smooth Vertical siding panel 4 feet by 9 feet (1219 mm by 2743 mm).
- B. Soffit Panels: HardieSoffit HZ10 soffit panel, factory sealed on 5 sides as manufactured by James Hardie Building Products, Inc.
  - 1. Type: Smooth non-vented, 12 inches (305 mm) by 12 feet (3658 mm).
  - 2. Type: Smooth non-vented, 16 inches (406 mm) by 12 feet (3658 mm).
  - 3. Type: Smooth non-vented, 24 inches (610 mm) by 8 feet (2438 mm).

2.2 TRIM

- A. Acceptable Manufacturer:
  - 1. James Hardie (Basis-of-Design)
  - 2. Department or architect approved equal.
- B. Exterior Corner Trim, Siding & Soffit Trim, Vertical Battens, and Window and Louver Trim: Fiber-Cement Trim: Made from fiber-cement board that complies with ASTM C 1186, Type A, Grade II; is classified as noncombustible according to ASTM E 136; and has a flame-spread index of 25 or less according to ASTM E 84. Factory-primed.
  - 1. HardieTrim HZ10 board
    - a. Sizes:
      - 1) Batten boards, 2-1/2 inch width
      - 2) 4/4 Boards: 3/4" thick. See drawings for locations and widths
      - 3) 5/4 Boards: 1" thick. See drawings for locations and widths.
    - b. Texture: Smooth
    - c. Finish: Factory Primed

2.3 FASTENERS

- A. Fasteners must be corrosion resistant, stainless steel. Use 0.089 inch shank x 1-1.4 inch long with 0.221 inch head diameter nails for blind nailing of siding. Use stainless steel 4d common nails for soffit panel installation. Space fasteners as recommended by the panel/trim manufacturer.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fiber-cement siding, soffit, trim, and accessories according to ASTM D 4756 and manufacturer's recommendations. See NER-405 Tables 2a and 2b – maximum wind speeds.
- B. Soffit board and vertical siding panel installation:
  - 1. Install materials in strict accordance with manufacturer's installation instructions.
  - 2. Block framing between studs where HardiePanel siding horizontal joints occur. All edges must be supported by framing.
  - 3. Install metal Z flashing and provide a 1/4 inch (6 mm) gap at horizontal panel joints.
  - 4. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
  - 5. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
  - 6. Maintain clearance between siding and adjacent finished grade.
  - 7. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.
  - 8. Make field cuts when required in accordance with manufacturer's best method recommendations. Paint edges that do not occur at panel butt joints where H-jointer strips are required using touch-up paint.
  - 9. Touch up nicks, scrapes, and nail heads using manufacturer's recommended touch-up paint to match soffit panel color.
- C. Trim installation:
  - 1. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
  - 2. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
  - 3. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
  - 4. Maintain clearance between trim and adjacent finished grade.
  - 5. Trim inside corner with a single board trim both side of corner.
  - 6. Outside Corner Board: Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
  - 7. Allow 1/8 inch gap between trim and siding.
  - 8. Seal gap with high quality, paint-able caulk.
  - 9. Shim frieze board as required to align with corner trim.
  - 10. Install HardieTrim Fascia boards to rafter tails or to sub fascia.



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3.2 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 46 00

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SECTION 07 60 00 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following sheet metal flashing and trim:
  - 1. Formed wall flashing, counterflashing and trim.
  - 2. Roof flashing to match roof.
- B. Related Sections include the following:
  - 1. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
  - 2. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Fabricate and install roof edge flashing capable of resisting the design pressures as listed on the structural drawings.
- C. Thermal movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Range: 120 degrees Fahrenheit, ambient surface temperature: 180 degrees Fahrenheit.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

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1. Identify material, thickness, weight, and finish for each item and location in Project.
  2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
  3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
  4. Details of expansion-joint covers, including showing direction of expansion and contraction.
  5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashing as applicable.
- C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
    - a. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
    - b. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
    - c. Accessories and Miscellaneous Materials: Full-size Sample.
    - d. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
- D. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

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- E. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish warranty Period: 10 years from date of Substantial Completion.

1.8 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Aluminum Sheet: ASTM B 209, Alloy 3003, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
  1. Anodized Finish: Apply the following coil-anodized finish:
    - a. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - a. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene

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fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil (0.038 mm); complying with AAMA 2605.

- b. Color: As selected by Architect from manufacturers full range to match adjacent work/materials.
- B. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
  - 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - 1) Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil (0.038 mm); complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
      - a) Humidity Resistance: 2000 hours.
      - b) Salt-Spray Resistance: 2000 hours.
- C. Use stainless steel or aluminum flashing as indicated on drawings. Where not indicated on drawings or in the specifications, use material that will be least likely to rust in the given application.
  - 1. Aluminum flashing and trim shall include roof drip edge, window head and sill flashing, base of siding flashing, ridge flashing and caps, and misc. roof closer pieces.
  - 2. Provide end dams in flashing used at heads or sills of openings within walls.

## 2.2 UNDERLAYMENT MATERIALS

- A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.
- B. Slip Sheet: Rosin-sized paper, minimum 5 lb/100 sq. ft.

## 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

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1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
  2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
  3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, non-staining tape.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than 20 gauge.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

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- D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric or butyl sealant (as recommended by manufacturer) concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
  - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.5 WALL SHEET METAL FABRICATIONS

- A. Openings Flashing in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high end dams. Fabricate from the following material:
  - 1. Aluminum: 0.0320 inches thick.

2.6 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Fabricate from sheet aluminum
  - 1. ASTM B209, alloy 3003, temper H14, AA-C22A41 clear anodized finish
  - 2. 0.032 inch thick (20 gauge).

2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
  - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
  - 1. Coat side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
  - 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.



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- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
  - 1. Galvanized or Pre-painted, Metallic-Coated Steel: Use stainless-steel fasteners.
  - 2. Aluminum: Use aluminum or stainless-steel fasteners.
- H. Seal joints with sealant as required for watertight construction.
  - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F .
  - 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.
- J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.
- K. Roof-Edge Flashings: Secure metal flashings at roof edges according to FMG Loss Prevention Data Sheet 1-49 for the specified wind zone.

3.3 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Openings Flashing in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings. Provide end dams where appropriate (as determined by the architect).

3.4 MISCELLANEOUS FLASHING INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.
- B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

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3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 60 00

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SECTION 07 92 00 - JOINT SEALERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Extent of each form and type of joint sealer is indicated on drawings and schedules.
- B. This Section includes joint sealers for the following locations:
  - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below.
    - a. Silicone sealants:
      - 1) Expansion joints of precast concrete panels.
      - 2) Expansion joints of brick masonry.
      - 3) Sheetmetal flashing to concrete or masonry.
      - 4) Sheetmetal flashing at metal roof and wall panels.
      - 5) Joints between different materials listed above.
      - 6) Perimeter joints between aluminum frame of windows and masonry, precast concrete or metal wall panels.
      - 7) Other joints as indicated.
    - b. Urethane sealants:
      - 1) Joints between concrete, stucco, and masonry panels specifically indicated to be sealed with urethane sealant, or coated with elastomeric waterproof coating.
      - 2) Perimeter joints between materials listed above and metal flashings associated with bituminous roofing system.
  - 2. Exterior joints in horizontal traffic surfaces as indicated below:
    - a. Control, expansion, and isolation joints in cast-in-place concrete slabs for floors and paving.
    - b. Other joints as indicated.
  - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
    - a. Perimeter joints of exterior openings where indicated.
    - b. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    - c. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - d. Perimeter joints of toilet fixtures.
    - e. Other joints as indicated.
  - 4. Fire Stopping sealant
- C. Sealing joints related to flashing and sheet metal for roofing is specified in

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Division-7 Section: "Flashing and Sheet Metal."

1.3 SYSTEM PERFORMANCES:

- A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.4 SUBMITTALS:

- A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.
- B. Samples for verification purposes of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers.
- C. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.
- D. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project name, addresses, names of Architects and Owners, plus other information specified.

1.5 QUALITY ASSURANCE:

- A. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.
  - 1. Testing will not be required when joint sealer manufacturer is able to submit joint preparation data required above which is acceptable to Architect and DEP's Designated Representative and is based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- B. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
  - 1. Conduct field tests for each application indicated below:
  - 2. Test Method: Test joint sealers by hand pull method described below:
  - 3. Install joint sealants in 5-foot joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
  - 4. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 inch from top of 2 inch piece.
  - 5. Use fingers to grasp 2 inch piece of sealant just above 1 inch mark; pull firmly down at a 90 degree angle or more while holding a ruler along side of

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sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.

6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants which fail to adhere to joint substrates during testing.

### 1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

### 1.7 PROJECT CONDITIONS:

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
  1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F (4.4 deg C).
  2. When joint substrates are wet due to rain, frost, condensation, or other causes.
- B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

### 1.8 SPECIAL PROJECT SEALANT WARRANTIES

- A. Special Project Warranties: Provide written warranties by the Contractor and his authorized installer, agreeing to replace/repair defective materials and workmanship. Provide written warranty by the manufacturers of the sealant material agreeing to replace defective or failed materials within the specified warranty period. Repairs and replacements required because of events beyond the Contractor's/Installer's/Manufacturer's control (and which exceed performance requirements) shall be completed by Contractor/Installer and paid for by the Owner.

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1. Manufacturer's sealant warranty period is 20 years for silicone sealants. The manufacturer's sealant warranty period is 10 years for urethane sealants.
2. The Contractor and Installer's warranty period is two years after date of substantial project completion with no dollar limit and no penal sum.

1.9 SEQUENCING AND SCHEDULING

- A. Installation of joint sealer with other products (water repellent and coating) as recommended by manufacturer of sealant, and other products. Submit manufacturer's recommendation of sequence.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL:

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect and DEP's Designated Representative from manufacturer's standard colors.

2.2 ELASTOMERIC JOINT SEALANTS:

- A. Elastomeric Sealant Standard: Provide manufacturer's standard neutral curing, elastomeric sealant of base polymer indicated which complies with requirements of Federal Specifications TT-S-00230C, Type II, Class A, and with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.
- B. Single Part Neutral Curing Silicone Sealants for concrete, aluminum and glass joints, and other joints specifically indicated; use NT; Type S, Grade NS, Class 25, and uses NT, M, A, and O.
  1. Product: Subject to compliance with the requirements, provide one of the following products:
    - a. Dow Corning 790 Silicone Sealant.
- C. Minimum Performance Criteria:  
Colors - Min. 10 standard colors  
L-S-8802 Tack-Free Time, 50% RH, hours - 1  
Curing Time RH @ 25 deg.C. (77 deg.F), days - 7-14  
MIL-S-8802 Full Adhesion, days - 14-21  
Flow, Sag or Slump, in 3-inch wide joint - None

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Working Time, minutes - 10-20

As Cured, after 7 days at 25 deg.C (77 deg.F) and 50% RH  
ASTM D 2240 Durometer Hardness, Shore A, points - 5  
ASTM D 412 Ultimate Tensile Strength, max. elongation, psi100  
ASTM D 412 Elongation, percent maximum - 1600  
MIL-S-8802 Peel Strength, lbs/in. - 25  
ASTM C 1135 Tensile Adhesion  
With 25% extension - 15  
With 50% extension - 20  
TT-S-001543 Staining, after 14 days of 50% compression, at  
158 deg.F. on concrete, granite, limestone and brick - None  
Ozone Resistance - Good  
Weathering, after 6000 hours in Atlas Weatherometer  
Min. change in hardness  
Joint Movement Capabilities, percent,  
Extension – (+100)  
Compression – (-50)  
Fire Endurance, hours - 2

### 2.3 MISCELLANEOUS JOINT SEALANTS:

- A. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, non-skinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.
- B. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
  - 1. Acoustical Sealants for Concealed Joints:
    - a. "BA-98"; Pecora Corp.
    - b. "Tremco Acoustical Sealant"; Tremco Inc.

### 2.4 FIRE-RESISTANT JOINT SEALERS:

- A. General: Provide manufacturer's standard fire-stopping sealant, with accessory materials, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Foamed-In-Place Fire-Stopping Sealant: Two-part, foamed-in-place, silicone sealant formulated for use in a through-penetration fire-stop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.
- C. One-Part Fire-Stopping Sealant: One part elastomeric sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.

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- D. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

1. Foamed-In-Place Fire-Stopping Sealant:
  - a. "Dow Corning Fire Stop Foam"; Dow Corning Corp.
  - b. "Pensil 851"; General Electric Co.
2. One-Part Fire-Stopping Sealant:
  - a. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
  - b. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
  - c. "RTV 7403"; General Electric Co.
  - d. "Fyre Putty"; Standard Oil Engineered Materials Co.

2.5 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nongassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
1. Either open-cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.

2.6 MISCELLANEOUS MATERIALS:

- A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.
- C. Accessory Materials for Fire-Stopping Sealants: Provide forming, joint fillers, packing and other accessory materials required for installation of fire-stopping sealants as applicable to installation conditions indicated.

2.7 JOINT FILLERS FOR CONCRETE PAVING:

- A. General: Provide joint fillers of thickness and widths indicated.



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- B. Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:
  - 1. Asphalt saturated fiberboard.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
  - 1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.
  - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALERS:

- A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

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- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Solvent-Release-Curing Sealant Installation Standard: Comply with requirements of ASTM C 804 for use of solvent-release-curing sealants.
- D. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.
- E. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- F. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- G. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.
  - 2. Provide flush joint configuration per Figure 6B in ASTM C 962, where indicated.
    - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
- H. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.4 CLEANING:

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.5 PROTECTION:

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.

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If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07 92 00

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## SECTION 08 11 15 – ALUMINUM DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Aluminum Full and Half Louvered Doors
- B. Aluminum Door Frames.

#### 1.2 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry
- B. Section 07 92 00 Sealants
- C. Section 08 71 00 Door Hardware
- D. Section 09 90 00 Painting

#### 1.3 REFERENCES

- A. Aluminum Association (AA)
  - 1. AA 5005-H14 Sheet Architecture
  - 2. AA 6061-T6 Heavy Duty Structures
  - 3. AA DAF-45 Designation System for Aluminum Finishes
- B. American Architectural Manufacturers Association (AAMA)
  - 1. AAMA 2603-98 — Pigmented Organic Coatings (Polycron).
  - 2. AAMA 2605-98 — Superior Performing Organic Coatings (Kynar).
  - 3. AAMA 609 — Anodized Architectural Finishes Cleaning and Maintenance.
  - 4. AAMA 610-02 — Painted Architectural Products Cleaning and Maintenance.
  - 5. AAMA 611-98 — Anodized Architectural Standards.
  - 6. AAMA 701 — Pile Weather strip.
- C. American Society for Testing Materials (ASTM)
  - 1. A 123 — Zinc (Hot-Dip Galvanized) Coatings.
  - 2. C 728-97 — Insulation Board, Mineral Aggregate.
  - 3. E 330-97 — Structural Load Test.
  - 4. E 1996 — Wind Load Test.
  - 5. E 1886 — Impact Test Procedures (Inclusive of Large Missile Impact).
  - 6. E 1300 — Load Resistance of Glass in Building.
- D. Florida Building Code Compliant
  - 1. Florida Building Code #FL6336 (website address: [www.floridabuilding.org](http://www.floridabuilding.org))

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### 1.4 TESTING AND PERFORMANCE REQUIREMENTS

- A. Structural Test Unit: Minimum size of 3-feet (91.44 cm) by 7-feet (213.36 cm) with 24-inch (60.96 cm) by 34-inch (86.36 cm) vision light shall be evaluated compliant with ASTM E 330 testing method.
- B. Test Procedures and Performances:
  - 1. With door closed and locked, test unit in accordance with ASTM E 330 at static air pressure difference of 90.0 pounds per square foot (3.35 kPa) positive pressure and 90.0 pounds per square foot negative pressure.
  - 2. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanism, nor any other damage that would cause the door to be inoperable.
- C. Meet requirements for use in wind-borne debris regions per 1609.1.4 of the Florida Building Code as an impact resistant product.

### 1.5 SUBMITTALS

- A. Product Data: Manufacturer's descriptive literature for each type door and frame: include the following information:
  - 1. Fabrication methods.
  - 2. Finishing.
  - 3. Hardware preparation.
  - 4. Accessories.
- B. Florida Approval Numbers, or Certified Test Lab reports showing tested assemblies of all exterior doors, frames and hardware that meet the FBC requirements. Each opening is to be tested as an assembly with doors, frames and finish hardware. Submittals shall include door and frame elevations, internal reinforcements, finish hardware and installation instructions.
- C. All door openings must be listed on the door schedule. Include details on the following list of items:
  - 1. Frame elevations
  - 2. Door design elevations
  - 3. Frame sections
  - 4. Details of construction
  - 5. Anchorage
  - 6. Opening conditions
  - 7. Joints and connections
  - 8. Hardware locations
  - 9. Louver sizes and free area
- D. If any opening is not by the aluminum door manufacturer only the door opening number should be shown along with the type of material (alum, wood etc.).
- E. Any manufacturer submitting for approval on must include a current and valid Florida Approval Number that meet the FLORIDA BUILDING CODE wind load requirements and have been tested as an assembly with DEP approved hardware. Submit certified independent lab test or NOA report on each type of exterior opening specified. Only those manufacturers that have tested with this project's door and frame profile, elevations and hardware requirements will be considered.
  - 1. Basis of design is based upon Florida approval number FL6336.9

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### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing aluminum door and frame systems of the type required for this project, with minimum ten continuous years documented experience
- B. Product Qualifications: Wind-load test certification conforming to ASTM E 330 on samples of previous products shall be provided for the type of door to be used.
- C. Installer's Qualifications: Workmen skilled in handling aluminum door and frame systems of the type required for this project.
- D. Instruction: The manufacturer or his representative will be available for consultation to all parties engaged in the project, including instruction to installation personnel.

### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver doors and frames palletted, wrapped or individually crated. Doors shall be side protected with surrounding grooved 2-inch (50.8 mm) by 4-inch (101.6 mm) wood frame and covered with 275-pound (124.74 kg) test corrugated cardboard.
- B. Inspect delivered doors and frames for damage; unload and store with minimum handling. Repair minor damage if refinished items are equal in all respects to new work; otherwise, remove damaged items and replace with new.
- C. Store products of this section under cover in manufacturer's unopened packaging until installation.
- D. Place units on minimum 4-inch (101.6 mm) wood blocking.
- E. Avoid non-vented plastic or canvas covers.
- F. Remove packaging immediately if packaging becomes wet.
- G. Provide 0.25-inch (6.35 mm) air spaces between stacked doors.

### 1.8 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements of areas to receive aluminum frames; note discrepancies on submitted shop drawings.

### 1.9 SCHEDULING

- A. Ensure that all approvals and/or shop drawings are supplied or returned to the manufacturer in time for fabrication without affecting construction progress schedule.
- B. Ensure that templates and/or actual hardware requested by manufacturer are available in time for fabrication without affecting construction progress schedule.
- C. **Contractor should be aware that this is a long lead item and plan accordingly.**

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### 1.10 WARRANTY

- A. Manufacturer: Ten-year warranty against defects in workmanship and materials, including warping, rotting, decaying or bowing.
- B. Installer: Warrant installation procedures and performance for five years against defects due to workmanship and materials handling.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design: Model Series 100BE by Cline Aluminum Doors, Inc.
- B. Architect approved equal. Any substitution requests must meet ventilation requirements for the building, be impact resistant with current Florida Approval number, and be corrosive resistant. Steel doors will not be accepted.

### 2.2 COMPONENTS

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish.
- B. Aluminum Door Composite Components: Minimum 5-ply composite laminated construction to include:
  - 1. Facing: One-piece 0.040-inch (1.02 mm) smooth 5005-H14 stretcher-leveled aluminum alloy.
  - 2. Substrate: One-piece oil-tempered hardboard backer.
  - 3. Core: Organic materials shall be used to form a marine grade honeycomb core with high compression strength of 94.8 psi (ASTM C365), and internal aluminum hardware backup tube.
  - 4. Hardware Backup: The hardware backup tube shall be a minimum 4.25-inches (107.95 mm) in width, 1.375-inches (34.93 mm) in depth with a wall thickness of 0.125-inches (3.18 mm). Contiguous for the full perimeter of the door to allow for all specified and non-specified hardware reinforcement.
  - 5. Hardware Prep: Basic to include mortise lock edge prep or cylindrical lock prep; and pairs prepped for flush bolts, if required.
  - 6. Bonding Agent: Environmentally friendly adhesive with strength buildup of 350 pounds per square inch (24.6 kg/cm<sup>2</sup>).
  - 7. Perimeter Door Trim: Wall thickness of 0.050-inch (1.25 mm) minimum in 6063-T5 extruded aluminum alloy with special beveled edge cap design and integral weather stripping on lock stile.
  - 8. Replaceable Door Trim: Mechanically fastened to the hardware backup tube, allowing for replacement in the field, if damaged.
  - 9. Trim Finish: To have minimum of a Class I anodized finish.
  - 10. Weather stripping: Replaceable wool pile with nylon fabric, polypropylene backing meeting AAMA 701 standards. Applied weather striping not acceptable
  - 11. Materials: Only nonferrous, non-rusting members shall be acceptable, including tie rods, screws and reinforcement plates.
  - 12. Regulations: All components and agents to meet EPA standards.
- C. Door Louvers:

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1. Blades and Frames: 6063-T5 extruded aluminum alloy, 0.062-inch (1.57 mm) minimum thickness. Louver blades shall be inverted "Y" type.
2. Insect Screens: 14-18 mesh, 0.011-inch (0.28 mm) diameter alclad aluminum, set in 6063-T5 extruded aluminum alloy frame, 0.050-inch (1.25 mm) minimum thickness.
3. Louver shall have a minimum of 50-percent free airflow.

### D. Aluminum Frames:

1. Frame Components: Extruded channel (tubular) 6063-T5 aluminum alloy, minimum wall thickness 0.125-inch (3.18 mm); cut corners square and joinery shall be mechanical with no exposed fasteners.
2. Profile: Open Back with Applied Stop (OBS), 1¾ inches by 5 inches (44 x 127 mm).
3. Hinge and Strike Mounting Plates: Extruded aluminum alloy bar stock, 0.1875-inch (4.75 mm) thick mounted in a concealed integral channel with no exposed fasteners.
4. Replaceable Weather stripping: AAMA 701, wool pile with nylon fabric, polypropylene backing, at head and jambs.
5. Door Stop: No screw-on stops acceptable.
6. Frame Finish: Shall be anodized with Class II mechanical finish to match door finish.

### E. FINISH

1. Finish: High Performance Organic Coating: Kynar/Polyvinylidene Fluoride (PVDF) (AAMA605.2).
2. Color: As noted on the drawings.

## 2.3 FABRICATION

- A. General: Receive hardware if required by manufacturer.
- B. Aluminum Door Construction: Of type, size and design indicated:
- C. Minimum Thickness: 1.75-inches (44 mm), 5-ply composite laminate system.
- D. Door Size: Sizes shown are nominal; provide standard clearances as follows:
  1. Hinge and Lock Stiles: 0.125-inch (3.18 mm).
  2. Between Meeting Stiles: 0.25-inch (6.35 mm).
  3. At Top Rails: 0.125-inch (3.18 mm).
  4. Between Door Bottom and Threshold: 0.125-inch (3.18 mm).
- E. Aluminum Frames: Of shapes and contours indicated.
  1. Corners shall be cut square.
  2. Reinforce and secure mechanically.
  3. No exposed fasteners.

## 2.4 ACCESSORIES

- A. Fasteners: Aluminum, nonmagnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum products.
  1. Do not use exposed fasteners.
- B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, nonferrous stainless steel.
- C. Bituminous Coating: Cold applied asphaltic mastic, compounded for 30-mil (0.76 mm) thickness per coat.



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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.
- B. Verify that frames installed by other trades for installation of doors of this section are in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.

### 3.2 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions; do not damage sight-exposed finishes.
- B. Separate dissimilar metals to prevent electrolytic action between metals.

### 3.3 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings; set frames plumb, square, level, and aligned to receive doors.
- B. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.
  - 1. Seal metal-to-metal joints between framing members using good quality elastomeric sealant.
  - 2. Comply with all anchoring requirements per testing related to the Florida Approval number.
- C. Where aluminum surfaces contact with metals other than stainless steel, zinc or small areas of white bronze, protect from direct contact by one or more of the following methods.
  - 1. Paint dissimilar metal with one coat of heavy-bodied bituminous paint. This method can only be used where it is exposed from view.
  - 2. Apply good quality elastomeric sealant between aluminum and dissimilar metal.
  - 3. Paint dissimilar metal with one coat of primer and one coat of paint recommended for aluminum surface applications.
  - 4. Use non-absorptive tape or gasket in permanently dry locations.
- D. Hang doors with required clearances as follows:
  - 1. Hinge and Lock Stiles: 0.125 inch (3.18 mm).
  - 2. Between Meeting Stiles: 0.250 inch (6.35 mm).
  - 3. At Top Rails: 0.125 inch (3.18 mm).
  - 4. Between Door Bottom and Threshold: 0.125 inch (3.18 mm).
- E. Adjust doors and hardware to operate properly.
- F. See Specification section 087100 for installation of door hardware.

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3.4 CLEANING

- A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609.
- B. Do not use abrasive, caustic or acid cleaning agents.

3.5 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until substantial completion.
- B. Repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations.
- C. Replace damaged or defective products that cannot be repaired to Architect's acceptance.

END OF SECTION 08 11 15

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SECTION 08 62 23 - TUBULAR SKYLIGHTS

1.1 SECTION INCLUDES

- A. Tubular daylighting devices and accessories.

1.2 REFERENCES

- A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process.
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process.
- E. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- F. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.
- G. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- H. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System.
- I. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors.
- J. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference.
- K. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- L. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.
- M. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
- N. ASTM D 1929 - Test Method for Ignition Properties of Plastics.

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- O. ASTM D 2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
- P. ASTM F 1642 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading.
- Q. ASTM F 2912 - Standard Specification for Glazing and Glazing Systems Subject to Airblast Loading.
- R. AAMA/WDMA/CSA 101/I.S.2/A440 - Standard/Specification for Windows, Doors, and Unit Skylights; 2011.
- S. FM Standard 4431 - The Approval Standard for Skylights.
- T. FEMA P-361 - Safe Rooms for Tornadoes and Hurricanes.
- U. ICC 500 - Standard for the Design and Construction of Storm Shelters.
- V. UL 2108 - Low Voltage Lighting Systems.
- W. GSA-TS01-2003: Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
- X. Unified Facilities Criteria (UFC) 4-010-01, Change October 2013, DoD Minimum Antiterrorism Standards for Buildings.
- Y. CSA C22.2 No. 250.0 - Luminaires.
- Z. ICC-ES AC-16 - Acceptance Criteria for Plastic Skylights; 2008.
- AA. Florida Building Code TAS 201 - Impact Test Procedures.
- BB. Florida Building Code TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading.
- CC. Florida Building Code TAS 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- DD. IBC Section 1710 - Load Test Procedure for Wind Load Testing on Rooftop Daylight Collecting System - Structural Performance Testing - Devised by ATI PE); 2012.
- EE. IBC Section 2606.7.2 - Installation - Diffuser Fall Out Test (Devised by PE); 2012.
- FF. OSHA 29 CFR - 1910.23 (e)(8) (Guarding Requirements for Skylights); 1926 Subpart M (Fall Protection); 1926.501(b)(4)(i); 1926.501(i)(2); 1926.501(b)(4)(ii).
- GG. California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1).

1.3 PERFORMANCE REQUIREMENTS

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- A. Daylight Reflective Tubes: Spectralight Infinity with INFRAREDuction Technology combines ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields an average total- and specular-reflectance greater than 99.5 percent percent for the Visible Light spectrum (400 nm to 700 nm) providing maximized visible light transmission and less than 25 percent reflectance for Infrared (IR) heat wavelengths (750 nm to 2500 nm) for minimized heat transmission, resulting in a spectrally-selective Total Solar Spectrum (250 nm to 2500 nm) reflectance less than 37 percent, as measured using a Perkin Elmer Lambda 1050 spectrophotometer with a Universal Reflectance Accessory. Color:  $a^*$  and  $b^*$  (defined by CIE  $L^*a^*b^*$  color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
- B. BRIGHTEN UP 160 DS (Suspended or Open Ceilings)
1. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70 size tested 14 inch (350 mm), Type TDDCC.
    - a. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
    - b. Water Resistance Test:
      - 1) Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with ICC-ES AC-16, ASTM E 547 and ASTM E 331.
    - c. Uniform Load Test: All units tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
      - 1) No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 60 psf (2.87 kPa) in accordance with ICC AC-16 Section A, or Negative Load of 70 psf (3.35 kPa) if tested per ICC AC-16 Section B.
    - d. Hurricane Resistance:
      - 1) Meets Florida Building Code TAS, 201, TAS, 202 and TAS 203 for Impact and non-impact components.
      - 2) Meets ASTM E 1886 and ASTM E1996 for missile and cyclic pressure differential testing.
    - e. Fire Testing:
      - 1) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the International Building Code.
      - 2) Self-Ignition Temperature - Greater than 650 degrees F per ASTM D-1929.
      - 3) Smoke Density: Rating no greater than 450 per ASTM E 84 in way intended for use. Classification C.
      - 4) Rate of Burn and/or Extent: Maximum Burning Rate: 2.5 inches/min (64 mm/min) Classification CC-2 per ASTM D 635.

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- 5) Rate of Burn and/or Extent: Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D 635.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Data sheets showing roof dome assembly, flashing base, reflective tubes, diffuser assembly, and accessories.
  - 4. Installation requirements.
- B. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including rough opening and framing dimensions, anchorage, roof flashings and accessories.
- C. Verification Samples: As requested by Architect.
- D. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 20 years.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.
- B. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Solatube International, Inc.; 2210 Oak Ridge Way, Vista, CA 92081. Tel. Toll Free: 888-765-2882. Tel: (760) 477-1120. Fax: (760) 597-4488. Email: [commsales@solatube.com](mailto:commsales@solatube.com). Web: [www.solatube.com](http://www.solatube.com).

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- B. Substitutions: Architect approved equal.

2.2 TUBULAR DAYLIGHTING DEVICES

- A. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.
- B. Brighten Up Series: Solatube Model 160 DS, 10 Inch (250 mm) Daylighting System.
1. Model:
    - a. Solatube Model 160 DS used for daylighting systems with hard ceilings. AAMA Type TDDCC.
  2. Capture Zone:
    - a. Domes:
      - 1) Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
        - a) Outer Dome Glazing: Type DA, 0.125 inch (3 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
          - 1) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
        - b) Acrylic Dome Plus Shock Inner Dome Glazing: Type DAI, Inner Dome is 0.115 inch (2.9 mm) minimum thickness classified as CC1 material. High impact injection molded acrylic required for high velocity wind zones.
        - c) Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact acrylic; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
      - 2) Dome Seal: Polyethylene foam seal, black, 0.13 inch (3.3 mm) thick by 10.73 (272.5 mm) diameter, 2 PCF polyethylene foam.
      - 3) LightTracker Reflector, made of aluminum sheet, thickness 0.015 inch (0.4 mm) with Spectralight Infinity. Positioned in the dome to capture low angle sunlight.
    - b. Dome Options:
      - 1) Dome Edge Protection Band: Type PB, for fire rated Class A, B or C roof applications. Aluminized steel nominal thickness of 0.028 inches (0.7 mm).
    - c. Flashings:
      - 1) Roof Flashing Base:
        - a) One Piece: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M or ASTM A792/A 792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.

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- 1) Base Pitched: Pitched Type FP, 22.5 degrees slope from horizontal, 4 inches (102 mm) high.
- 2) Flashing Options:
  - a) Flashing Insulator: Type FI, thermal isolation material for use under flashing.
  - b) Metal Roof Flashing Kit: Type MR, includes Butyl tape, flashing screws, speed nuts, corner washers and polyurethane sealant.
  - c) Roof Flashing Turret Extensions: Provide manufacturer's standard extension tubes for field conditions.
3. Transfer Zone:
  - a. Extension Tubes: Aluminum sheet, thickness 0.015 inch (0.4 mm).
    - 1) Reflective Tubes:
      - a) Reflective angle adapter tube (standard Top and Bottom Tubes), providing up to a 30-degree angle adjustment.
      - b) Reflective extension tube, Type EXX and Type EL with total length of run as indicated on the Drawings.
      - c) Interior Finish: Spectralight Infinity with INFRAREDuction Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance.
    - 2) Extension Tube Options: Provide as required for field conditions.
      - a) Extension Tube Angle Adapter: Provide manufacturer's standard adapters for applications requiring:
        - 1) Type A1 one 0 to 90 degree extension tube angle adapter.
        - 2) Type A2 two 0 to 90 degree extension tube angle adapters.
4. Delivery Zone:
  - a. Ceiling Ring: Injection molded impact resistant acrylic. Nominal thickness is 0.110 inches (2.8 mm).
  - b. Ceiling Ring Seal: Polyethylene foam seal, white, 0.25 inch (6.4 mm) wide by 0.19 inch (4.8 mm) high, 2 PCF polyethylene foam with low-tack pressure sensitive adhesive.
  - c. Upper glazing: PET GAG plastic with EPDM low density sponge seal to minimize condensation and bug, dirt, and air infiltration per ASTM E283. The nominal thickness is 0.039 inches (0.99 mm).
    - 1) Natural Effect Lens: Type LN.
  - d. Round Diffusers/Decorative Fixtures: Dual Glazed Diffuser Assembly.
    - 1) Lower glazing with integral injection molded acrylic Dress Ring classified as CC2 material. Nominal thickness is 0.110 inches (2.8 mm)
      - a) JustFrost Decorative Fixture: Type L9, frosted acrylic plastic lens classified as CC2 material (nominal thickness is 0.16 inches (4 mm)), and decorative metal fasteners.

## 2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.



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- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions.
- C. If substrate and rough opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Coordinate requirements for power supply, conduit and wiring.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. Coordinate installation with substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing to ensure that each element of the Work performs properly and that finished installation is weather tight.
  - 1. Install flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.
  - 2. Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.
  - 3. Coordinate attachment and seal of perimeter air and vapor barrier material.
- C. Where metal surfaces of tubular unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, provide permanent separation as recommended by manufacturer.
- D. Align device free of warp or twist, maintain dimensional tolerances.
- E. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

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- F. Inspect installation to verify secure and proper mounting. Test each fixture to verify operation, control functions, and performance. Correct deficiencies.

3.4 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08 62 23

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section "Hollow Metal Doors and Frames".
  - 2. Division 08 Section "Flush Wood Doors".
  - 3. Division 08 Section "Aluminum Doors and Frames".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
  - 3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
  - 4. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
  - 5. ICC/IBC - International Building Code.
  - 6. NFPA 70 - National Electrical Code.
  - 7. NFPA 80 - Fire Doors and Windows.
  - 8. NFPA 101 - Life Safety Code.
  - 9. NFPA 105 - Installation of Smoke Door Assemblies.

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10. TAS-201-94 - Impact Test Procedures.
  11. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
  12. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
  13. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
  2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  3. ANSI/UL 294 - Access Control System Units.
  4. UL 305 - Panic Hardware.
  5. ANSI/UL 437- Key Locks.

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.

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4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
  1. Hurricane Resistant Openings (State of Florida): Within the State of Florida, provide copy of current State of Florida Product Approval as proof of compliance that doors, frames and hardware for exterior opening assemblies have been tested and approved for use at the wind load and design pressure and debris impact resistance level requirements specified for the Project.
    - a. Hurricane Resistant Components (State of Florida): Within the State of Florida, provide copy of independent, third party certified listing to ANSI A250.13.
  2. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

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- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
  - E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
    - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  - F. Hurricane Resistant Exterior Openings (State of Florida including the High Velocity Hurricane Zone (HVHZ)): Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under related sections listed previously, to meet the design pressures, debris impact resistance, and glass and glazing requirements as detailed in the current State of Florida building code sections applicable to the Project.
    - 1. Each unit to bear third party permanent label in accordance with the Florida Building Code requirements.
  - G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
  - H. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
  - B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
  - C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

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1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

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1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Please note that ASSA ABLOY is transitioning the Yale Commercial brand to Arrow. This affects only the brand name; the products and product numbers will remain unchanged. The brand transition is expected to be complete in or about May of 2024, and products shipping after that time will be branded Arrow.
- D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
  4. Hinge Options: Comply with the following:
    - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.



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5. Manufacturers:

- a. Hager Companies (HA) - BB Series, 5 knuckle.
- b. McKinney (MK) - TA/T4A Series, 5 knuckle.
- c. dormakaba Best (ST) - F/FBB Series, 5 knuckle.
- d. Architect approved equal.

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

- a. Ives (IV).
- b. Rockwood (RO).
- c. Trimco (TC).
- d. Architect approved equal.

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

6. Manufacturers:

- a. Ives (IV).
- b. Rockwood (RO).
- c. Trimco (TC).

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- d. Architect approved equal.

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
  2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  4. Tubular deadlocks and other auxiliary locks.
  5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  6. Keyway: Match Facility Standard.
- C. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  3. Existing System: Field verify and key cylinders to match Owner's existing system.
- D. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
  2. Master Keys (per Master Key Level/Group): Five (5).
  3. Construction Keys (where required): Three (3).
- E. Construction Keying: Provide construction master keyed cylinders.
- F. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.
1. Heavy duty cylindrical locks shall have a seven-year warranty.

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2. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
3. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
4. Locks are to be non-handed and fully field reversible.
5. Manufacturers:
  - a. Arrow, formerly known as Yale (YA) - 5400LN Series.
  - b. Corbin Russwin Hardware (RU) - CLX3300 Series.
  - c. Sargent Manufacturing (SA) - 10X Line.
  - d. Architect approved equal.

2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
  1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  2. Strikes for Bored Locks and Latches: BHMA A156.2.
  3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  4. Dustproof Strikes: BHMA A156.16.

2.7 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
  1. Exit devices shall have a five-year warranty.
  2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

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3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
  4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
  5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
  7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Multi-Point Exit Devices for Storm Shelter Openings: Multi-point exit devices specifically engineered for out-swinging door applications on tornado or hurricane resistant storm shelter openings. Extra heavy duty steel component construction with each of the latching points automatically activated when the device is locked. The multi-point exit device is approved for usage as part of a complete ICC 500 (2014/2020) and FEMA P-361 (2015/2021) door, frame and hardware assembly.
1. Manufacturers:

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- a. Corbin Russwin Hardware (RU) - FE5400S Series.
- b. Architect approved equal.

2.8 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

- 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
- 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
- 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
- 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
- 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
- 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

- 1. Heavy duty surface mounted door closers shall have a 30-year warranty.
- 2. Manufacturers:
  - a. Arrow, formerly known as Yale (YA) - 4400 Series.
  - b. Corbin Russwin Hardware (RU) - DC6000 Series.
  - c. Norton Rixson (NO) - 7500 Series.
  - d. Sargent Manufacturing (SA) - 351 Series.
  - e. Architect approved equal.

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2.9 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, .050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Ives (IV).
  - b. Rockwood (RO).
  - c. Trimco (TC).
  - d. Architect approved equal.

2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  1. Manufacturers:
    - a. Ives (IV).
    - b. Rockwood (RO).
    - c. Trimco (TC).

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- d. Architect approved equal.

2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  - 1. National Guard Products (NG).
  - 2. Pemko (PE).
  - 3. Reese Enterprises, Inc. (RE).
  - 4. Architect approved equal.

2.12 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

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2.13 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:



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1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

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- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  - 1. Quantities listed are for each pair of doors, or for each single door.
  - 2. The supplier is responsible for handing and sizing all products.
  - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
  - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Manufacturer's Abbreviations:

- 1. MK - McKinney
- 2. RO - Rockwood
- 3. YA - Arrow, formerly known as Yale
- 4. RU - Corbin Russwin
- 5. NO - Norton
- 6. PE - Pemko

**Hardware Sets**

**AS LISTED ON THE DRAWINGS**

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Notes: All exterior doors on this project shall meet FBC standards for windstorm. The door hardware specified is listed as a basis of design. If alternate hardware is proposed, please provide third-party test results and compliance information to architect.

END OF SECTION 08 71 00

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SECTION 08 91 00 – STATIONARY BLADE WALL LOUVERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior louvers: Extruded aluminum stationary louvers with inverted chevron style sight proof blades
- B. Exterior louvers: Extruded aluminum Miami-Dade approved wind driven rain resistant louvers.

1.2 RELATED SECTIONS

- A. Section 04 810 00 - Masonry Units.
- B. Section 07 60 00 - Flashing and Sheet Metal.
- C. Section 07 92 00 - Joint Sealants.
- D. Section 09 90 00 - Painting

1.3 REFERENCES

- A. AAMA 2604 – High Performance Organic Coatings on Architectural Extrusions and Panels.
- B. AAMA 2605 - High Performance Organic Coatings on Architectural Extrusions and Panels.
- C. AAMA 611 – Voluntary Specification for anodized Architectural Aluminum.
- D. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
- E. AMCA 511 - Certified Ratings Program for Air Control Devices.
- F. AMCA 540 – Test Method for Louvers Impacted by Windborne Debris. – Enhanced Protection.
- G. AMCA 550 – High Velocity Wind Driven Rain Resistant Louvers.
- H. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- I. ASTM D822 - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
- J. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
- K. ASTM D2244 - Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.
- L. Miami-Dade County Building Code Compliance Office (BCCO) - Miami-Dade Notice of Acceptance.

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- M. Florida Building Code (FBC) - FBC Notice of Acceptance.
- N. Florida Building Code: Testing Application Standard (TAS) No. 201 Large and Small Missile Test Standards.
- O. Florida Building Code: Testing Application Standard (TAS) No. 202 Uniform Structural Load Standards.
- P. Florida Building Code: Testing Application Standard (TAS) No.203 Uniform Cyclic Pressure Test Standards.

### 1.4 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.
- C. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each product to be used, including:
  - 1. Manufacturer's product data including performance data.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods.
  - 5. Documentation as required to demonstrate valid Florida approval number.
- B. Shop Drawings:
  - 1. Submit shop drawings indicating materials, construction, dimensions, accessories, and installation details.
  - 2. Submit color samples to architect. Color to be selected from the manufacturer's full range.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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### 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Ruskin Company; 3900 Dr. Greaves Road, Kansas City, Missouri 64030. Tel: (816) 761-7476.
- B. Architect approved equal.

### 2.2 EXTERIOR STATIONARY BLADE LOUVER

- A. Model: EME520MD as manufactured by Ruskin Company.
- B. Fabrication:
  - 1. Design: Extruded aluminum, wind driven rain resistant, stationary louvers with horizontally mounted sight proof blades.
    - a. Miami-Dade Notice of Acceptance Number: 12-0816.01.
  - 2. Florida Building Code (FBC) High Velocity Hurricane Zones: Test Application Standard. (Pending)
  - 3. AMCA Listing Label Compliance:
    - a. AMCA 540 – Test Method for Louvers Impacted by Windborne Debris. – Enhanced Protection. (Pending)
  - 4. Frame:
    - a. Frame Depth: 5 inches (127 mm), nominal.
    - b. Wall Thickness: 0.081 inch (2.1 mm), nominal.
    - c. Material: Extruded aluminum, Alloy 6063-T6.
  - 5. Blades:
    - a. Style: Sightproof, double drainable, horizontally mounted. 2 inches (51 mm) blade centers.
    - b. Wall Thickness: 0.081 inch (2.1 mm), nominal.
    - c. Material: Extruded aluminum, Alloy 6063-T6.
- C. Performance Data:
  - 1. Based on testing 48 inches x 48 inches (1,219 mm x 1,219 mm) size unit in accordance with AMCA 500.
  - 2. Free Area: 44 percent, nominal.
  - 3. Free Area Size: 6.99 square feet (0.65 m<sup>2</sup>).
  - 4. Maximum Recommended Air Flow Through Free Area: 1,327 fpm (6.74 m/s).
  - 5. Air Flow: 9,276 cfm (4.38 m<sup>3</sup>/s).
  - 6. Maximum Pressure Drop at 1,327 fpm: 0.28 inches w.g. (0.07 kPa).
- D. Wind Driven Water Penetration Performance:
  - 1. Based on testing 39 inches x 39 inches (1 m x 1 m) core area, 41 inches x 44 inches (1.04 m x 1.12 m) nominal size unit in accordance with AMCA 500-L.
  - 2. Wind Velocity: 29 mph (47 kph).
    - a. Rainfall Rate: 3 inches/hour (76 mm/hour).

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- b. Free Area Velocity: 1327 feet per minute (6.7 m/s).
    - c. Water Resistance Effectiveness: 99.7% (AMCA Class A).
  - 3. Wind Velocity: 50 mph (80 kph).
    - a. Rainfall Rate: 8 inches/hour (203 mm/hour).
    - b. Free Area Velocity: 778 feet per minute (4.0 m/s).
    - c. Water Resistance Effectiveness: 99.0% (AMCA Class A).
- E. Louvers shall be factory engineered to withstand the specified seismic loads.
  - 1. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction (AHJ).

### 2.3 INTERIOR STATIONARY BLADE LOUVER

- A. Model: ELF40V as manufactured by Ruskin Company.
- B. Fabrication:
  - 1. Design: Stationary sightproof louver type with all mechanically fastened construction. Hidden vertical supports to allow unlimited continuous line appearance up to 120" in width.
  - 2. Frame:
    - a. Frame Depth: 4 inches (102 mm).
    - b. Wall Thickness: 0.081 inch (2.1 mm), nominal.
    - c. Material: Extruded aluminum, Alloy 6063-T6.
  - 3. Blades:
    - a. Style: Chevron featuring 60° surface at 4" (102) inches on center nominal.
    - b. Wall Thickness: 0.081 inch (2.1 mm), nominal.
    - c. Material: Extruded aluminum, Alloy 6063-T6.
- C. Performance Data:
  - 1. Based on testing 48 inch x 48 inch (1,219 mm x 1,219 mm) size unit in accordance with AMCA 500.
  - 2. Free Area: 35 percent, nominal.
  - 3. Free Area Size: 5.55 square feet (0.52 m2).
- D. Design Windload per Code

### 2.4 ACCESSORIES

- A. Insect Screens:
  - 1. Aluminum: 18-16 mesh, mill finish, .011 inch (0.3 mm) wire.
  - 2. Frame: Aluminum.
- B. Visible Mullions: Manufacturer's standard horizontal or vertical visible mullions for architectural accent as indicated on drawings.

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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Inspect areas to receive louvers. Notify the Architect of conditions that would adversely affect the installation or subsequent utilization of the louvers. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean opening thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 INSTALLATION

- A. Install louvers at locations indicated on the drawings and in accordance with manufacturer's instructions.
- B. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.
- C. The supporting structure shall be designed to accommodate the point loads transferred by the louvers when subject to the design wind loads.
  - 1. Install louvers to structural substrate in accordance with Florida Approval data.
- D. Install joint sealants as Specified in Section 07 92 00.

### 3.4 CLEANING

- A. Clean louver surfaces in accordance with manufacturer's instructions.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08 91 00



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SECTION 09 21 16 - GYPSUM BOARD CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior gypsum board panels for ceilings.
- B. Related Sections include the following:
  - 1. Division 6 Section "Rough Carpentry" for wood framing and furring.
  - 2. Division 9 Section "Painting" for primers applied to gypsum board surfaces.

1.3 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance-Rated Assemblies: UL's "Fire Resistance Directory".

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Framing and Furring:
    - a. Clark Steel Framing Systems.
    - b. Consolidated Systems, Inc.
    - c. Dietrich Industries, Inc.
    - d. National Gypsum Company.
    - e. Scafco Corporation.
  - 2. Gypsum Board and Related Products:
    - a. American Gypsum Co.
    - b. G-P Gypsum Corp.
    - c. National Gypsum Company.
    - d. United States Gypsum Co. (\*\*\*) Basis-of-Design)

2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Components, General: Comply with ASTM C 754 for conditions indicated.
- B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch diameter wire, or double strand of 0.0475-inch diameter wire.
- C. Hangers: As follows:
  - 1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

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2. Flat Hangers: Commercial-steel sheet, ASTM A 653/A 653M, G40, hot-dip galvanized
  - a. Size: 1 by 3/16 inch by required
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch wide flange, with ASTM A 653/A 653M, G40, hot-dip galvanized] zinc coating.
  1. Depth: 2-1/2 inches
- E. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.
  1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    - a. Minimum Base Metal Thickness: As indicated
- F. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
    - b. USG Interiors, Inc.; Drywall Suspension System.
    - c. Chicago Metallic Corporation; Drywall Furring 640 or 660 System

## 2.3 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Sag-Resistant Gypsum Wallboard: ASTM C 36, manufactured to have more sag resistance than regular-type gypsum board.
  1. Thickness: 5/8 inch except where required by the UL listing to be otherwise.
  2. Long Edges: Tapered.
  3. Location: Ceilings and as noted in the drawings.
- C. Moisture-Resistant Gypsum Wallboard: ASTM C 36, manufactured to produce greater resistance to moisture, humidity, and surface indentation and through-penetration than standard gypsum panels.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. U.S. Gypsum Products: Fiberock brand Aqua-Tough gypsum interior wall panels, 5/8" thickness.

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2. Core: 5/8 inch
3. Long Edges: Tapered.
4. Location: Throughout except where UL Listing requires Type X and type FRX-G not accepted in the assembly.

2.4 TRIM ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
  1. Provide cornerbead at outside corners unless otherwise indicated.
  2. Provide LC-bead (J-bead) at exposed panel edges.
  3. Provide control joints where indicated.
- B. Aluminum Accessories: Extruded-aluminum accessories indicated with manufacturer's standard corrosion-resistant primer.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
  1. Interior Gypsum Wallboard: Paper.
  2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges: as recommended by the panel manufacturer for the conditions.
  3. Fill Coat: For second coat, : as recommended by the panel manufacturer for the conditions.
  4. Finish Coat: For third coat: as recommended by the panel manufacturer for the conditions.
  5. Skim Coat: For final coat of Level 5 finish: as recommended by the panel manufacturer for the conditions.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

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- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
  - 1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Isolation Strip at Exterior Walls:
  - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

#### 3.3 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Suspend ceiling hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size

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- supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
  4. Secure rod, flat or angled hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  5. Do not attach hangers to steel deck tabs.
  6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  7. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.
- C. Install suspended steel framing components in sizes and spacings indicated on drawings, but not less than that required by the referenced steel framing and installation standards.
- D. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

### 3.4 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

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- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- K. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
  - 1. Space screws a maximum of 12 inches o.c. for vertical applications.
- L. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

### 3.5 PANEL APPLICATION METHODS

- A. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
  - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

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- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.6 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings. If not indicated, install control joints according to ASTM C 840 and in specific locations approved by Architect and Owner for visual effect.

3.7 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
  - 1. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect and Owner will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

END OF SECTION 09 21 16



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SECTION 09 67 23 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Seamless epoxy flooring system, 1/4 inch thick, 100% solids epoxy, as scheduled.
- B. Floor Preparation and Protection.

1.2 RELATED SECTIONS

- A. Division 7, Section 079200 "Joint Sealants"- refer to for joint sealants installed in the epoxy flooring system.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Manufacturer's standard color chart shall also be submitted and must afford the owner color selection from at least twelve (12) standard colors and custom color matching shall be available upon request.
- D. Each individual component of the system will be evaluated on the basis of these standards.
- E. Selection Samples: For each finish product specified, the contractor shall submit (2) 6" x 6" cured system sample, applied to a rigid backing which the contractor has made for verification purposes and finish texture approval for Department review.
- F. Verification Samples: For each finish product specified, the contractor shall submit (2) 6" x 6" cured system sample, applied to a rigid backing which the contractor has made for verification purposes and finish texture approval for Department review.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Obtain the epoxy flooring system materials from a single manufacturer with a minimum of five (5) years verifiable experience providing materials in the type specified in this section.

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B. Contractor Qualifications:

1. Installation must be performed by a manufacturer certified contractor with skilled mechanics not having less than three (3) years satisfactory experience in the installation of the type of system as specified in this section and must be certified in writing by the manufacturer of the specified epoxy flooring system.
2. Preparation, installation, and all work required for epoxy flooring system to be performed by a single installer.

1.5 FIRE RATINGS

- A. Flooring shall be "self-extinguishing" when tested in accordance with ASTM-D-635-72 and shall have "extent of burning" not to exceed 0.25 inch per minute when tested in accordance with same standard.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying Product name(s) and/or Number(s), Manufacturer's name, Component designation (A, B, etc.), Product Mix Ratio, Health and Safety Information, Infotrac Emergency Response Information.
- B. Store material(s) in accordance with manufacturer's instructions, with seals and labels intact and legible. Maintain temperatures within the required range. Do not use materials that exceed the manufacturer's maximum recommended shelf life.
- C. The contractor shall be responsible for materials furnished by him, and he shall replace, at his own expense, such materials that are found to be defective in manufacture or that have become damaged in transit, handling or storage.

1.7 PROJECT CONDITIONS

- A. The contractor should visit the jobsite prior to beginning the installation of the epoxy flooring system to evaluate substrate condition, including substrate moisture content, and the extent of repairs required, if any. Concrete substrates shall be tested by the contractor to verify that the moisture content of the substrate does not exceed the epoxy flooring system's manufacturer's recommendations.
- B. Prior to installation of the epoxy floor system, the contractor shall verify with a water test, that the floors are properly sloped in the direction of the floor drains to provide positive drainage and eliminate any ponding of water throughout the entire restroom. ADA compliance shall be maintained (Max cross slope of 1:50). Provide a clean transition between the current finish and any new finishes. Intent is for the final product to look as if it was installed at one time. The appearance of a patch will not be accepted.
- C. Contractor to use a method that will achieve a profile of at least CSP 3 as described by the International Concrete Repair Institute. Use abrasive, captive shot blasting to

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achieve this profile and to abrade the concrete to remove latent materials that impede adhesion.

- D. The contractor should exercise care during surface preparation and system installation to protect surrounding substrates and surfaces, as well as in-place equipment. The contractor shall prepare the substrate to remove laitance and open the surface. This shall be achieved by brush grit blasting (depending on the hardness of the concrete). Surface profile achieved shall be similar to medium grit sandpaper and free from bond-inhibiting contaminants. Costs incurred that are associated with damage from negligence or inadequate protection shall be the sole responsibility of the contractor.
- E. Each drain in the installation area must be working and raised or lowered to the actual finished elevation of the epoxy flooring system.
- F. Roof shall be completed and building enclosed prior to flooring commencement.
- G. The minimum slab temperature must be conditioned to 50°F-70°F before commencing installation, during installation, and for at least 72 hours after installation is complete. The slab temperature must be at least 5°F above the dew point during installation.
- H. Ventilate area where flooring is being installed. Post and enforce NO SMOKING or OPEN FLAME signs until flooring has cured.
- I. Leaks from pipes and other sources must be corrected prior to the installation of the epoxy flooring system.
- J. Maintain lighting at a minimum uniform level of 50 or more foot-candles in areas where the epoxy flooring system is being installed. Contractor is to provide temporary lighting as needed to meet this requirement.
- K. Restrict traffic from area where flooring is being installed or is curing.
- L. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation of epoxy flooring system only after substrates have a maximum of 5 lb. of water p/1,000 sq. ft. in 72 hours (or as approved by manufacturer) or 75% RH maximum when using ASTM F 2170 Relative Humidity testing using in situ probes.

### 1.8 WARRANTY

- A. The contractor and the manufacturer shall furnish a standard guarantee of the epoxy flooring system for a period for 3 years after installation. The labor and material guarantee shall include loss of bond and wear-through to the concrete substrate from normal use.
- B. Not included in the warranty are damage due to structural design deficiencies including, but not limited to, slab cracking from lateral, vertical or rotational movement, and gouging or other damage due to fork lifts, other equipment, delamination caused by vapor transmission, Acts of God, or other elements beyond the scope of protection of this system nor causes not related to the system materials. In case of a warranty

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claim, the owner will notify the manufacturer and contractor in writing within 30 days of the first appearance of problems covered under this warranty. The owner will provide free and unencumbered access to the area during normal working hours for warranty rework. Property protection is also the owner's responsibility. Remedy is limited to direct repair of the epoxy flooring system.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

#### A. Manufacturers' Names:

1. Plexi-Chemie Inc. (Plexi-Chemie). \*Basis of Design\*
  - a. Product – PlexiQuartz 3/16th inch thick Decorative Slurry/Broadcast Epoxy Flooring System, Level 3 Texture.
    - 1) Moisture Mitigation System: PlexiCrete SL
    - 2) Primer coat: PlexiGlaze #4 100% solids water clear epoxy coating
    - 3) Grout coat: PlexiGlaze #4 100% solids water clear epoxy coating
    - 4) Quartz Aggregate: PlexiQuartz
    - 5) Lock coat: PlexiGlaze #4 100% solids water clear epoxy coating
    - 6) Top coat: PlexiCrest P polyester urethane (Satin finish)
    - 7) Ceramic Coating: BallistiX NCO, Clear Silicon-ceramic Coating (Satin Finish)
    - 8) Note: the total system thickness will be 3/16<sup>th</sup> to 1/4<sup>th</sup> inch
  - b. Patching/Caulking: use PlexiFlex Caulk
  - c. Optional: Type "L" zinc divider strip
  - d. Contact: 606 Lane Ave North, Suite #6, Jacksonville, FL 32254, (904) 693-8800, <https://plexi-chemie.com/>
  - e. Flooring System Properties.
    - 1) Colors: As indicated on the drawings.
    - 2) Finish texture: Shall be non-slip, non-abrasive, textured finish.
    - 3) Physical Properties – Provide flooring system that meet or exceed the listed minimum physical property requirements when tested according to the referenced standard test method in parentheses:
      - a) Compressive Strength (ASTM C579): 12,500 psi
      - b) Tensile Strength (ASTM C638): 6000 psi
      - c) Flexural Strength (ASTM D790): 10,000 psi
      - d) Surface Hardness (ASTM D2240) 70-80 Durometer "D"
      - e) Abrasion Resistance (ASTM D4060): <.003 gr grams lost
      - f) Impact Resistance (MIL-PRF-3134, Para 4.7.3): 0.024" max. (No chipping, cracking, or loss of adhesion)
      - g) Adhesion (A.C.I. Comm. No. 503R): 450 psi (100% failure in concrete)
      - h) Electrical Conductivity (NFPA 56A) Di-electric
      - i) Flammability (ASTM D635): Self-extinguishing over concrete
      - j) VOC (Volatile organic content): Less than 50 grams per liter
2. Master Protective Coatings Inc. (MPC).

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- a. Product – MPC 100 2-component, 100% solids, self-leveling, Epoxy Floor Coating.
    - 1) Moisture Mitigation System: MPC-160 by Master Protective Coatings, Inc.
    - 2) Primer coat: MPC 100, 100% solids pigmented epoxy coating
    - 3) Aggregate: Torginol Quartz Color Granules or Polymer Color Flakes
    - 4) Lock coat: MPC 100, 100% solids pigmented epoxy coating
    - 5) Top coat: Aspartic 85 Slow Go 85% Solids Polyaspartic Clear
    - 6) Ceramic Coating: BallistiX NCO, Clear Silicon-ceramic Coating (Satin Finish)
    - 7) Note: the total system thickness will be 3/16<sup>th</sup> to 1/4<sup>th</sup> inch
  - b. Patching/Caulking: use Manufacturer recommended product for patching/caulking.
  - c. Optional: Type “L” zinc divider strip
  - d. Contact: 8615 Rue du Creusot, Saint-Léonard, QC H1P 2A8, Canada, (904) 693-8800, <https://www.mpcoatings.ca/>
  - e. Flooring System Properties.
    - 1) Colors: As indicated on the drawings
    - 2) Finish texture: Shall be non-slip, non-abrasive, textured finish.
    - 3) Physical Properties – Provide flooring system that meet or exceed the listed minimum physical property requirements when tested according to the referenced standard test method in parentheses:
      - a) Compressive Strength (ASTM C579): 10,500 psi
      - b) Tensile Strength (ASTM C638): 6500 psi
      - c) Flexural Strength (ASTM D790): 5,500 psi
      - d) Surface Hardness (ASTM D2240) 78-80 Durometer “D”
      - e) Abrasion Resistance (ASTM D4060): <.005 gr grams lost
      - f) Adhesion (A.C.I. Comm. No. 503R): >300 psi, ASTM D4541 (concrete failure) Electrical Conductivity (NFPA 56A) Di-electric
      - g) Flammability (ASTM D635): Self-extinguishing over concrete
      - h) VOC (Volatile organic content): Less than 50 grams per liter
3. Architect approved equal.

## PART 3 - EXECUTION

### 3.1 PREPARATION

#### A. Surface Preparation

1. Provide proper surface preparation and surface cleaning to all surfaces receiving the epoxy flooring system before installing the epoxy flooring system. Substrate should be clean, sound and dry before application. Follow all of the manufacturer's recommendations regarding surface preparation and testing.
2. Surfaces receiving the epoxy floorings system should be shot-blasted and/or diamond ground.
3. Substrate should be free of oil, grease, curing compounds, dust particles and dirt.
4. Do not thin materials.

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3.2 SYSTEM APPLICATION

- A. General: If required, build floor back up with a self-leveling underlayment, LEVELFLO by RapidSet or Architect Approved Equal; provide a 2'-0" x 2'-0" depression at floor drains (at 1/8" per foot maximum).
- B. General: Underlayment must be able to support 4000 psi and be compatible with the epoxy floor system. Create cove base at wall perimeters. Install per Manufacturer's Instructions.
- C. General: Install Moisture Mitigation System; PlexiCrete SL on subsurface according to the manufacturer's recommendations prior to installation of epoxy flooring system. Install flexible membrane over PlexiCrete SL according to the manufacturer's recommendations prior to installation of epoxy flooring system. Apply each component of epoxy resin composition flooring system according to manufacturer's directions to produce a uniform monolithic flooring surface of thickness indicated.
  - 1. Contractor must verify moisture content of new and existing slab prior to installation of epoxy flooring system. DO NOT INSTALL if outside of manufacturer's recommendations.
- D. Moisture Mitigation System: Apply PlexiCrete SL over prepared substrate at manufacturer's recommended spreading rate.
- E. Bond Coat: Apply bond coat over prepared substrate at 7-10 mils with either 100% solids clear PlexiGlaze #4 resin system or PlexiGlaze MVB2000 Primer. Once cured, sand the surface.
- F. Body Coat: Mix resin, hardener, and blended colored quarts aggregate per the manufacturer's instruction, and place a sufficient amount of material to obtain the specified thickness. Over primer, trowel apply epoxy mortar mix to recommended thickness. The first broadcast quartz layer should be applied to rejection/saturation. Once cured, sweep the excess quartz off the floor.
- G. Finish or Sealing Coats: After body coat has cured sufficiently, apply grout and finish coats of type recommended by flooring manufacturer to produce finish matching approved sample and in number or coats and spreading rates recommended by manufacturer.
  - 1. Final finish coat shall be in color and skid retardant profile as approved by the Architect.
  - 2. Finished floor shall be 3/16" - 1/4" thick, uniform in color and free of trowel marks.
- H. Cove Base: Apply cove base mix to wall surfaces at locations shown to form cove base height of 6 inches. Follow manufacturer's printed instructions and details including taping, mixing, priming, troweling, sanding, and top-coating of cove base.
  - 1. Provide Type "L" Zinc divider strip typical at all doorway thresholds as well as top and bottom edges of integral cove base.
    - a. All thresholds must be ADA compliant.

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- I. 2<sup>nd</sup> Body Coat: Mix resin, hardener, and blended colored quartz aggregate per the manufacturer's instruction, and place a sufficient amount of material to obtain the specified thickness. Over primer, trowel apply epoxy mortar mix to recommended thickness. The first broadcast quartz layer should be applied to rejection/saturation. Once cured, sweep the excess quartz off the floor.
- J. Lockcoat: Apply the grout/lockcoat of PlexiGlaze #4 @ 12-15 mils.
- K. Topcoat: Apply the topcoat of urethane: PlexiCrest XP Polyaspartic @ 5-10 mils, or PlexiCrest P Polyester Urethane @ 2.5 mils.
- L. Total thickness of system should be 3/16" - 1/4"; hand or power trowel.

3.3 CURING, CLEANING, AND PROTECTION

- A. Cure the epoxy flooring system materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of the installation and prior to completion of the curing process
- B. Protect the epoxy flooring system from damage and wear during other phases of the construction operation, using temporary coverings as recommended by the manufacturer, if required. Remove temporary covering just prior to final inspection.
- C. Clean the epoxy flooring system just prior to final inspection, using materials and procedures suitable to the system manufacturer.
- D. Some cleaners will affect the color, gloss or texture of an epoxy floor surface. To determine how a cleaner will perform, Plexi-Chemie recommends that you first test each cleaner, in a small area, utilizing your cleaning technique. This precaution will demonstrate the effect of your cleaner and technique. If no deleterious effects are observed, continue with the procedure. If deleterious effects do occur, modify the cleaning material and/or procedure. For recommendations regarding the types of cleaners, contact Plexi-Chemie, Inc..

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SECTION 09 90 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of exposed interior items exterior items and surfaces.
  - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect and Owner will select from standard colors and finishes available.
  - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. If a patched area is called to be painted, paint entire surface, corner to corner.
- D. Do not paint pre-finished items, concealed surfaces, finished metal surfaces, operating parts, and labels, unless otherwise indicated in drawings.
  - 1. Pre-finished items include the following factory-finished components:
    - a. Other specified finishes
    - b. Solid surface countertops.
    - c. Shower enclosures.
    - d. Finished mechanical and electrical equipment.
    - e. Light fixtures.
    - f. Toilet partitions
  - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Furred areas.
    - b. Utility tunnels.



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- c. Pipe spaces.
  - d. Duct shafts.
  - e. Attic
3. Finished metal surfaces include the following:
- a. Anodized aluminum.
  - b. Stainless steel.
  - c. Chromium plate.
  - d. Copper and copper alloys.
  - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
- a. Valve and damper operators.
  - b. Linkages.
  - c. Sensing devices.
  - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

### 1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- 1. Paints are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 and/or 85 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe the gloss of our products. The list below is provided for general guidance; refer to the technical data sheet for the actual gloss/sheen level for each product.
    - a. Flat - Less than 5 Percent.
    - b. Eggshell - 5 - 20 Percent.
    - c. Satin - 20 - 35 Percent.
    - d. Semi-Gloss - 30 - 65 Percent.
    - e. Gloss - Over 65 Percent.
  - 2. DFT as used in this section refers to the Dry Film Thickness of the coating.
  - 3. Enamel refers to any acrylic or alkyd (oil) base paint which dries leaving an eggshell, pearl, satin, semi-gloss or high gloss enamel finish.
  - 4. DTM as used in this Section refers to paint that is applied Direct to Metal.

### 1.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
- 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

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2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Submit color sample of each color for review and approval.

C. Qualification Data: For Applicator.

## 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
  1. Product name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.
  5. Thinning instructions.
  6. Application instructions.
  7. Color name and number.
  8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
  1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- D. Disposal:
  1. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store safely for future use.
  2. Do not incinerate closed containers.
  3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

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1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
  - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

- 1. Deliver to owner any paint left over from project. Consolidate identical colors into single container. Securely fasten all lids. Label each container on top and sides w/ color & finish. A minimum of one (1) gallon of each paint color is to be provided to the Owner.

1.9 WARRANTY

- A. Inspection of all surfaces to be coated must be done by the manufacturer's representative to insure proper preparation prior to application. All thinners, fillers, primers and finish coatings shall be from the same manufacturer to support a product warranty. Products other than those submitted shall be accompanied by a letter stating its fitness for use and compatibility.
- B. At project closeout, provide to the Owner or owner's representative an executed copy of the Manufacturer's standard form outlining the terms and conditions of and any exclusions to their Limited Warranty against Manufacturing Defect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. PPG Industries, Inc. (Pittsburgh Paints).
  - 2. Sherwin-Williams Co. (Sherwin-Williams).

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3. Benjamin Moore & Co. (Benjamin Moore). \*Basis of Design\*
4. Coronado Paint Company (Coronado).
5. ICI Dulux Paint Centers (ICI Dulux Paints).
6. Glidden

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
  1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: As indicated on the finish schedule.
- D. Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 MIXING AND TINTING

- A. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.
- C. Where paint is to be sprayed, thin according to manufacturer's current guidelines.

2.4 INTERIOR PAINT SYSTEMS

- A. METAL: Aluminum, Galvanized.
  1. Latex Systems:
    - a. Semi-Gloss Finish High Performance:
      - 1) First Coat: Benjamin Moore Super Spec HP Acrylic Metal Primer P04 (47 g/L), MPI # 107, X-Green 107, 134, LEED 2009, CHPS Certified.

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- 2) Second Coat: Benjamin Moore Ultra Spec 500 Interior Latex Gloss N540 (0 g/L), MPI # 54, X-Green 54, 147, X-Green 147, 141, X-Green 141, LEED 2009, LEED V4.
  - 3) Third Coat: Benjamin Moore Ultra Spec 500 Interior Latex Gloss N540 (0 g/L), MPI # 54, X-Green 54, 147, X-Green 147, 141, X-Green 141, LEED 2009, LEED V4.
- B. METAL - (Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous and Ornamental Iron, Structural Iron, Ferrous Metal)
1. Semi-Gloss Finish High Performance:
    - a. First Coat: Corotech Acrylic Metal Primer V110 (199 g/L), LEED Credit.
    - b. Second Coat: Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341 (71 g/L), LEED 2009.
    - c. Third Coat Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341 (71 g/L), LEED 2009.
- C. WOOD - (Walls, Ceilings, Doors, Trim):
1. Eggshell / Satin Finish:
    - a. First Coat: Benjamin Moore Fresh Start Multi-Purpose Primer N023 (44 g/L), MPI # 6, 17, X-Green 17, 39, 137, X-Green 137, LEED Credit, CHPS Certified.
    - b. Second Coat: Benjamin Moore Waterborne Satin Impervo N314 (137 g/L), MPI # 43, LEED Credit.
    - c. Third Coat: Benjamin Moore Waterborne Satin Impervo N314 (137 g/L), MPI # 43, LEED Credit.
  2. Stain and Varnish System:
    - a. Satin Finish:
      - 1) First Coat: Lenmar Waterborne Interior Wiping Stain 1WB.1300 (240 g/L), MPI # 186 LEED Credit.
      - 2) Second Coat: Lenmar Waterborne Aqua-Plastic Urethane Satin, 1WB.1427 (335 g/L), MPI # 121, 128.
      - 3) Third Coat: Lenmar Waterborne Aqua-Plastic Urethane Satin, 1WB.1427 (335 g/L), MPI # 121, 128.
    - b.
- D. DRYWALL - (Walls, Ceilings, Gypsum Board and similar items)
1. Latex Systems:
    - a. Satin Finish:
      - 1) First Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
      - 2) Second Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss N539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified
      - 3) Third Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss N539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified
  2. Epoxy System (Water Base): Used in restrooms and Janitor's closet
    - a. Semi-Gloss System

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- 1) First Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
  - 2) Second Coat: Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341 (71 g/L), LEED 2009.
  - 3) Third Coat: Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341 (71 g/L), LEED 2009.
3. Porch Concrete floor:
- a. Sealkrete

2.5 EXTERIOR PAINT SYSTEMS

A. CONCRETE - Cementitious Siding, Flexboard, Transite Board, Shingles (Non-Roof), Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement:

1. Latex Systems:
  - a. Flat Option:
    - 1) First Coat: Benjamin Moore Ultra Spec Masonry Interior / Exterior 100% Acrylic Masonry Sealer 608 (46 g/L), MPI # 3, LEED 2009.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
  - b. Low Lustre Option:
    - 1) First Coat: Benjamin Moore Ultra Spec Masonry Interior / Exterior 100% Acrylic Masonry Sealer 608 (46 g/L), MPI # 3, LEED 2009.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Low Lustre Finish 634 (44 g/L), MPI # 15, 315.
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Low Lustre Finish 634 (44 g/L), MPI # 15, 315.
  - c. Satin Option:
    - 1) First Coat: Benjamin Moore Ultra Spec Masonry Interior / Exterior 100% Acrylic Masonry Sealer 608 (46 g/L), MPI # 3, LEED 2009.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).

B. METAL- Galvanized:

1. Latex Systems:
  - a. Flat Option:
    - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
  - b. Low Lustre Option:

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- 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
  - 2) Second Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L) MPI # 15, 315.
  - 3) Third Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L) MPI # 15, 315.
  - c. Satin Option:
    - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
  - d. Soft Gloss/ Semi-Gloss Option:
    - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
  - e. Gloss Option:
    - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309 (48 g/L).
    - 3) Third Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309 (48 g/L).
- C. METAL- Misc. Iron, Ornamental Iron, Structural Iron and Steel, Ferrous Metal:
1. Latex Options:
    - a. Flat Option:
      - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
      - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
      - 3) Third Coat: Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
    - b. Low Lustre Option:
      - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
      - 2) Second Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L) MPI # 15, 315.
      - 3) Third Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L) MPI # 15, 315.
    - c. Satin Option:

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- 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
  - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
  - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
  - d. Soft Gloss/ Semi-Gloss Option:
    - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
  - e. Gloss Option:
    - 1) First Coat: Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04 (48 g/L), MPI # 107, 107 X-Green, 134, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309 (48 g/L).
    - 3) Third Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309 (48 g/L).
- D. WOOD- Decks (NOT COMPOSITE LUMBER), Exterior including pressure treated lumber, Floors (non-Vehicular):
1. Water-Based/Waterborne Alkyd Options:
    - a. Solid Option:
      - 1) First Coat: Benjamin Moore Arborcoat Waterborne Exterior Solid Color Stain 640 (95 g/L), MPI # 16.
      - 2) Second Coat: Benjamin Moore Arborcoat Waterborne Exterior Solid Color Stain 640 (95 g/L), MPI # 16.
- E. WOOD- Siding, Trim, Shutters, Sashes, Hardboard-Bare/Primed:
1. Latex System Options:
    - a. Ultra Flat/Solid Stain Option:
      - 1) First Coat: Benjamin Moore Arborcoat Waterborne Ultra Flat Solid Stain 610 (72.2 g/L), MPI # 16.
      - 2) Second Option: Benjamin Moore Arborcoat Waterborne Ultra Flat Solid Stain 610 (72.2 g/L), MPI # 16.
    - b. Flat Option:
      - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
      - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
      - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
    - c. Low Lustre Option:



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- 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
  - 2) Second Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L), MPI # 15, 315.
  - 3) Third Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L), MPI # 15, 315.
  - d. Satin Best Option:
    - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
  - e. Soft Gloss/ Semi-Gloss Best Option:
    - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
    - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
  - f. Gloss Best Option:
    - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
    - 2) Second Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309, 48 g/L.
    - 3) Third Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309, 48 g/L.
- F. Architectural PVC, Plastic, Fiberglass, Azek:
1. Latex Options:
    - a. Flat Option:
      - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
      - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
      - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Flat Finish 629 (45 g/L), MPI # 10.
    - b. Low Lustre Option:
      - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
      - 2) Second Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L), MPI # 15, 315.
      - 3) Second Coat: Benjamin Moore Aura Exterior Paint Low Lustre Finish 634 (44 g/L), MPI # 15, 315.
    - c. Satin Option:

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- 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
- 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
- 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Paint Satin Finish 631 (44 g/L).
- d. Soft Gloss/ Semi-Gloss Option:
  - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
  - 2) Second Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
  - 3) Third Coat: Benjamin Moore Aura Waterborne Exterior Semi-Gloss Finish 632 (46 g/L).
- e. Gloss Option:
  - 1) First Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer 046 (44 g/L), MPI # 6, 17, 17 X-Green, 39, 50, 50X-Green, 137, 137 X-Green, LEED v4, qualifies for CHPS credit.
  - 2) Second Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309 (48 g/L).
  - 3) Third Coat: Benjamin Moore Impervex Latex High Gloss Enamel W309 (48 g/L).

G. Caulking

1. Pro Select C950A

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
  1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  1. Notify Architect and Owner about anticipated problems when using the materials specified over substrates primed by others.

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- C. The Contractor shall review the product manufacturer's special instructions for surface preparation, application, temperature, re-coat times, and product limitations.
- D. The Contractor shall review product health and safety precautions listed by the manufacturer.
- E. The Contractor shall be responsible for enforcing on site health and safety requirements associated with the Work.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
  - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
  - 1. Provide barrier coats over incompatible primers or remove and reprime.
  - 2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
  - 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

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- a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
  - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
  - c. If transparent finish is required, back-prime with spar varnish.
  - d. Back-prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
  - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
4. Plywood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
- a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
  - b. Remove any splinters and or blow-outs caused by nails, screws, or by any other means. Fill in holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
  - c. If transparent finish is required, back-prime with spar varnish
5. Ferrous Metals: Clean un-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
- a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
  - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
  - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
6. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
- 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

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2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
  10. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. Omit primer over metal surfaces that have been shop primed and touchup painted.

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3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
  3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- F. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.
- I. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

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3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
  - 1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
  - 2. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying paint from Project site, pay for testing, and repaint surfaces previously coated with the non-complying paint. If necessary, Contractor may be required to remove non-complying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
  - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.
- B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
- C. Reconnect equipment adjacent to surfaces indicated to receive coatings.
- D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
- E. Remove protective materials.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect and Owner.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

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1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 COLOR SCHEDULE

1. As noted on the drawings

**END OF SECTION 09 90 00**



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SECTION 10 15 50 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes solid-polymer units as follows:
  - 1. Toilet Enclosures: Floor mounted, overhead-braced solid plastic toilet compartments.
  - 2. Urinal Screens: Wall mounted with continuous bracket.
- B. Related Sections include the following:
  - 1. Division 10 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, baby changing stations, and similar accessories.

1.3 SUBMITTALS

- A. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Shop Drawings: For toilet compartments.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Show locations of cutouts for compartment-mounted toilet accessories.
  - 3. Show locations of centerlines of toilet fixtures.
  - 4. Show locations of floor drains.
- C. Samples for Initial Selection: For each type of toilet compartments material indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments, include maintenance manuals.

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1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective coverage for storage and identified with labels describing content and source.
  - 1. Door Hinges: One hinge(s) with associated fasteners.
  - 2. Latch and Keeper: One latch(es) and keeper with associated fasteners.
  - 3. Door bumper: One bumper(s) with associated fasteners.
  - 4. Door Pull: One door pull(s) with associated fasteners.
  - 5. Fasteners: Ten fasteners of each size and type.

1.7 QUALITY ASSURANCE

- A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."

1.8 PROJECT CONDITIONS

- A. Field Measurements: Contractor to verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities, Florida Building Code- Accessibility, and ICC A117.1 for toilet compartments designated as accessible.

2.2 SOLID-POLYMER UNITS

- A. Plastic Panels: High density polyethylene (HPDE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface, Class B.
- B. Toilet-Enclosure Style: Floor mounted, overhead braced.
- C. Brackets (Fittings):
  - 1. Full-Height (Continuous) Type: polymer or extruded stainless steel
    - a. Polymer Color and Pattern: Matching Panel.
    - b. Double Ear or Single Ear.

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- 1) Use single ear only where wall configuration prevents the use of the double ear.
- D. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.

## 2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
1. Material: Stainless steel.
    - a. Provide aluminum only where a stainless steel option is not available.
  2. Hinges: Manufacturer's standard latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
    - a. Provide continuous stainless steel helix hinges
  3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent an in-swinging door from hitting compartment-mounted accessories.
  4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
  5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, compatible with related materials.

## 2.4 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).
- C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless-Steel Castings: ASTM A 743/A 743M.

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2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide stainless-steel corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Contractor to examine areas and conditions for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
  - 1. Confirm location and adequacy of blocking and supports for installation. Install blocking as required per manufacturer's requirements.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: ½ inch.
    - b. Panels and Walls: 1 inch (25 mm).
  - 2. Full-Height Brackets: Secure panels to walls and to pilasters with full-height brackets.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (50 mm) into structural floor, unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

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- D. Wall Hung Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 15 50

# CAMP HELEN STATE PARK PARK IMPROVEMENT

## SECTION 10 28 13 - TOILET ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:

1. Baby Changing Station
2. Grab Bars
3. Coat Hook
4. Mobile Device Holder
5. Mop Holder
6. Hand Dryer
7. Mirror
8. Sanitary Napkin Disposal
9. Soap Dispenser
10. Toilet Tissue Dispenser
11. Waste Receptacle

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
  1. Construction details and dimensions.
  2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  3. Material and finish descriptions.
  4. Features that will be included for Project.
  5. Manufacturer's warranty.
- B. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by FDEP's authorized representative or otherwise indicated in the drawings.

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### 1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

### 1.6 WARRANTY

- A. Provide manufacturer's standard warranty on all items unless noted otherwise.
- B. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Stainless Steel: Provide ASTM A 666, Type 304 minimum gauge (unless noted otherwise).
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. American Specialties, Inc.
  - 2. Bobrick Washroom Equipment, Inc. (Basis-of-Design).
  - 3. Bradley Corporation
  - 4. GAMCO Specialty Accessories. (A division of Bobrick).

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5. Palmer Fixture

B. Baby Changing Station - B1

1. Basis-of-Design Product: KB300 by KoalaKare, white granite color with external stainless steel hook.
2. Complies with ADA and ICC A117.1 Accessibility Standards. Complies with ASTM Standard F 2285, Standard Consumer Safety Performance Specification for Diaper Changing Stations for Commercial Use.
3. Performance: Unit will deflect less than 1 degree from 90 degrees with a 200 lb. static load placed in the center of the changing surface, has been tested to 300 lbs. Units exceed static load requirements called out by ASTM Standard F 2285, Standard Consumer Safety Performance Specification for Diaper Changing Stations for Commercial Use.
4. Bed Surface: injection molded polypropylene with Microban antimicrobial additive, and ISO 22196 tested for efficacy. Surface is contoured, concave and smooth. Bed surface shall be minimum 535sq in
5. Dual Cavity Liner Dispenser: injection molded polypropylene with integral spring tab dispenses one liner at a time. Total 50 liner capacity. Equipped with tumbler lock, keyed alike Bobrick restroom accessories.
6. External Bag Hook: 18-8, Type 304, 3/4 inch (19mm) diameter, solid stainless steel rod with satin-finish.
7. Operation: Concealed pneumatic cylinder providing controlled, slow opening and closing of the changing station bed.
8. Safety Straps: Replaceable, restraining straps.
9. Frame and Hinge Mechanism: Concealed 11-gauge chassis, will comprise of 1" diameter integral steel-tubing that supports the changing bed and interacts with 11-gauge steel wall mounting bracket to provide steel-on-steel hinge stop. The wall frame shall serve as wall-mounting bracket
10. Mounting: Factory-drilled mounting holes (6). Mounting screws included.
11. Complies with requirements applicable in the jurisdiction of the project, including but not limited to ADA, ICC A117.1, International Building Code (IBC), and state building code requirements as applicable. Also complies with ASTM Standard F2285, Standard Consumer Safety Performance Specification for Diaper Changing Stations for Commercial use and EN 12221 for changing units for domestic use.
12. Instruction Graphics: Universal instruction graphics and safety messages in multiple languages.
13. Safety Straps: Replaceable, restraining straps.

C. Grab Bar, Types G36 and G48.

1. Basis-of-Design Product: B-6806 Series by Bobrick.
2. Mounting: Snap flange covers
3. Materials:
  - a. Snap Flange Covers: #22 stainless steel, 3-1/4" diameter, 1/2" deep, snap over mounting flange to conceal mounting screws.
  - b. Mounting Plates: stainless steel w/ two mounting point locations and heliarc welded to bar to form a one-piece construction.
  - c. Tubing: #18 stainless steel w/ satin finish, 1-1/2" outside diameter.
4. Installation:
  - a. Provide concealed backing behind gypsum board for added support.
  - b. Mount as recommended by the manufacturer for ADA compliance.

D. Collapsible Clothes Hook, Type H1



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1. Basis-of-Design Product: B-983 by Bobrick
  2. Mounting: secured from front
  3. Faceplate: #14 stainless steel, satin finish, seamless one-piece construction
  4. Hooks: snap down for safety if excessively loaded. Hook will auto release with weight capacity of 40lbs and higher.
  5. Fasteners: tamper-resistant, flat-head, hex-socket, stainless steel machine screws
  6. Size: 5-1/8" square, projects a total of 2-1/8" from wall
- E. Mobile Device Holder – H2
1. Bases-of-Design Products: B-635 Klutch Mobile Device Holder by Bobrick
  2. Back Plate: Type 304, 14 gauge stainless steel with satin finish. Mount with two stainless steel 1/4" threaded studs and two glued rubber bands.
  3. Formed Plate: Type 304, 14 gauge stainless steel with satin finish.
  4. Cradle: Type 304, 16 gauge steel with satin finish with two adhesively fastened rubber bands on the inside, and two adhesively fastened rubber dots on the exterior.
  5. Hook: Type 304, 16 gauge sheet metal flange, stainless steel satin finish with stainless steel set screws. Front plate of hook: 11 gauge stainless steel satin finish.
  6. Torsion Springs: Type 302, 0.024 wire diameter stainless steel passivated.
  7. Tubes: 1/2" aluminum threaded rod.
  8. Dimensions: 7-1/2" W x 9" H x 2-3/8" D
- F. Mop Holder & Hook Strip – H3
1. Bases-of-Design Products: B0223 x 24 Stainless Steel Mop and Broom Holder by Bobrick
  2. Mop and Broom Holders: Spring-loaded rubber cam holders with anti-slip coating. Powder coated steel retainers.
  3. Dimensions: 24" long, 8" deep with 3 holders.
- G. Hand Dryer - HD
1. Basis-of-Design Product: B-7180 by Bobrick
  2. Cover: one-piece, aluminum die casting w/ high-gloss white epoxy finish
  3. Air inlet grill: One-piece vandal resistant UL 94-5V black plastic
  4. Performance Requirements:
    - a. Air Velocity: 75-80 mph
    - b. Air Flow: 68-73 cfm
    - c. Voltage: optional, 115V (8.5 amp), OR 208V-240V (4.0-4.4 amp)
    - d. Power: 1000 watts
    - e. Frequency: 50/60 Hz
    - f. Motor: 1/7 hp, 8000 rpm motor on resilient mounting
    - g. Single phase
    - h. cULus listed
  5. Operation: electric, no touch control
  6. Size: 10.2" wide x 13.8" high x 3.9" deep
- H. Mirror Unit - M1.
1. Basis-of-Design Product: B-290 2436 by Bobrick
  2. Materials:

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- a. Frame: Fabricated of type 304 #18 gauge stainless steel, satin finish, 3/4"x3/4" frame with heliarc welded corners, ground and polished smooth.
  - b. Mounting: removable galvanized steel plate w/ embossed horizontal hanging brackets located at top and bottom for mounting on concealed one-piece wall hangers.
  - c. Mirror: 1/4" float/plate glass, protected edges w/ plastic filler strips. Back of mirror protected full-size, shock-absorbing, water-resistant, non-abrasive 3/16" thick polyethylene padding.
3. Size: 24" x 36"
- I. Sanitary Napkin Disposal – T2
1. Basis-of-Design Product: B-270 by Bobrick
  2. Materials:
    - a. Body: #22 ga stainless steel, #4 satin finish. Seamless construction w/ arc, radius on corners and edges
    - b. Cover: #22 ga stainless steel, satin finish, w/ arc, radius on corners and edges
    - c. Hinge: stainless steel, full length, heavy duty piano hinges
  3. Installation:
    - a. Surface Mount as recommended by the manufacturer for ADA compliance.
    - b. When installing on gypsum board, provide concealed blocking within the wall.
  4. Size: 7-1/2" wide x 10" high x 3-13/16" deep
- J. Soap Dispenser - S1
1. Basis-of-Design Product: 818615 by Bobrick.
  2. Tank: 18-8 Type-316 20 gauge stainless steel, satin finish, fully welded one-piece construction, epoxy sealed.
  3. Operation: corrosion-resistant valve dispenses all-purpose hand soaps, top-filled. Single-hand valve to operate with less than 5 pounds of force (22.2 N) required, to comply with Americans with Disabilities Act (ADA) Accessibility Guidelines.
  4. Viewer: Clear plastic window allowing constant fluid level check
  5. Mounting: #22 stainless steel back plate w/ #20 stainless steel bracket
  6. Capacity: 40 fl. Oz.
  7. Size: 7" wide x 6-1/8" high x 3-5/16" deep.
- K. Toilet Tissue (Jumbo Roll) Dispenser - T1.
1. Basis-of-Design Product: B-2892 by Bobrick.
  2. Cabinet: #20 stainless steel, satin finish
  3. Door: #18 stainless steel, satin finish, seamless one-piece construction
  4. Mounting: #20 stainless steel
  5. Dispensing Mechanism: High impact, ABS plastic
  6. Spindles: convertible in the field to dispense 2-1/4" diameter core rolls by removing outer spindle
  7. Capacity: Two 10" diameter toilet tissue rolls w/ 3" diameter core
  8. Size: 20-13/16" wide x 11-3/8" high x 3-5/16" deep
- L. Waste Receptacle – T3
1. Basis-of-Design Product: B-277 by Bobrick.
  2. Receptacle
    - a. 18-8, type 304, 20 gauge stainless steel with satin finish.
    - b. All welded construction.

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- c. Top hemmed edge.
  - d. Bottom edge recessed finger grips
  - e. Capacity; 12.75 gallons
- 3. Liner Holder: unit equipped with LinerMate to facilitate installation and removal of disposable trash liners and retains liner inside of receptable.
  - a. Molded plastic Sleeve with 20 gauge stainless steel
  - b. U-shaped support strap

### 2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 5 keys to Owner's representative. All restroom accessories to be keyed alike.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Provide stainless steel anchors where that option is provided by the manufacturer.
  - 2. Provide aluminum or other corrosive resistant fasteners where stainless steel fasteners are not offered by the manufacturer.
- B. Grab Bars: Install to withstand a downward load of at least 250lbf, when tested according to method in ASTM F 446.
- C. Install blocking within walls as required for secure mounting.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 13

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## SECTION 10 44 16 - FIRE EXTINGUISHERS, AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Submit Product Data.
- B. Provide fire extinguishers approved and listed with UL or FM, and bearing UL or FM markings, for the type, rating, and classification of extinguisher.

#### 1.2 REFERENCES

- A. NFPA 10 – Portable Fire Extinguishers
- B. ADA Accessibility Guidelines

#### 1.3 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements for portable fire extinguishers
- B. Provide fire extinguishers, cabinets, and accessories from a single manufacturer.

### PART 2 - PRODUCTS

#### 2.1 FIRE EXTINGUISHERS AND MOUNTS

- A. Fire Extinguishers: MP10 fire extinguisher by Larsen's Manufacturing Co., or architect approved equal.
  - 1. UL Rating: 4A-80BC:C
  - 2. FE Agent: Multipurpose Dry Chemical
  - 3. 10-lbs Capacity
- B. Mount: Surface mount using manufacturer's standard bracket

#### 3.1 INSTALLATION

- A. Provide a mounting bracket for each fire extinguisher.
- B. Install brackets at heights indicated or, if not indicated, at heights to comply with applicable regulations of authorities having jurisdiction and so they are ADA compliant.
- C. Identify bracket-mounted extinguishers with "FIRE EXTINGUISHER" in red letter decals applied to wall surface. Letter size, style, and location as selected by Architect and Owner.

**END OF SECTION 10 44 16**

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SECTION 22 05 00 - PLUMBING

PART 1 - GENERAL

GENERAL CONDITIONS

The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

DESCRIPTION OF THE WORK

The extent of the work is indicated on the Drawings. In general, the work consists of, but is not limited to, the following:

Plumbing demolition and new plumbing fixture and piping installation.

RELATED WORK

Insulation is specified in Section 23 07 10.

Pipe hangers and supports are specified in Section 23 05 29.

QUALITY ASSURANCE

All materials and installations are to comply with the following. If conflicts occur between plumbing codes and the specifications, the most restrictive requirements shall govern.

National Electric Code  
Florida Building Code  
Florida Plumbing Code  
Florida Energy Efficiency Code for Building Construction  
Florida Administrative Code, 10D-10, Sanitary Facilities for Buildings Serving the Public and Places of Employment.  
Accessibility Requirements Manual, Florida Board of Building Codes & Standards

Furnish and install equipment having the characteristics and accessories indicated on the drawings or in these specifications. The manufacturer's specifications for the models shown on the drawings or given as basis for design, plus all features, options, and accessories indicated on the drawings or in these specifications, whether or not standard for the model scheduled or offered as a substitute, shall constitute the minimum requirements for equipment furnished under this section.

SUBMITTALS

Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

Piping and Fittings  
Plumbing fixtures  
Valves, cleanouts, and floor drains  
Proposed fire proofing systems at penetrations of rated walls.  
Pipe hangers and supports.

CHANGES

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The Drawings indicate generally the locations of plumbing fixtures, apparatus, piping, etc., and while these are to be followed as closely as possible, if before installation, it is found necessary to change the location of same to accommodate the conditions at the building, such changes shall be made without additional cost to the Owner and as directed by the Architect/Engineer.

## PART 2 - PRODUCTS

### MATERIALS WHICH PENETRATE FIRE WALLS

Where insulated piping or plastic materials penetrate fire walls, provide a UL listed systems for maintaining the rating.

Where bare-metal piping systems penetrate fire walls, provide a permanent sleeve which is grouted or rocked into wall. Provide a UL listed fire caulk for the annular space.

### PLUMBING FIXTURES, TRIM AND FITTINGS

Furnish and install all plumbing fixtures and trim, floor drains and cleanouts as shown on the Drawings. Fixtures shall be as specified or equivalent quality fixtures by American Standard, Kohler, Universal Rundle or Eljer.

Provide all items of brass and chrome plated finish except where otherwise noted.

Brackets, Anchors, and Cleats: Furnish and install where required for support, conceal behind finished wall.

### PIPING

Where more than one material is specified for a particular application, comply with Drawing Notes. Where interfacing with an existing system supply materials to match the existing. Where not connecting to existing and where not specified on the Drawings, then the Contractor may select from the options listed.

All materials shall comply with latest ASTM specifications in each instance that ASTM has specifications and standards relating to such materials.

#### Sanitary Waste and Vent

PVC DWV Soil Pipe, schedule 40, ASTM D2665

PVC Sewer Pipe, schedule 40, ASTM D2665

Copper tubing, Type L, conforming to ASTM B88, with brazed or solder-joint copper, brass or bronze fittings conforming to ANSI B16.18 or B16.22.

Copper tubing, DWV grade, hard temper conforming to ASTM B306, with solder joint, cast bronze fittings conforming to ANSI B16.23. Tubing larger than 2 inches shall use wrought copper fittings conforming to ANSI B16.29.

#### Domestic Water Pipe:

Above grade domestic water pipe shall be type L hard copper, conforming to ASTM B88. ProPress cast or wrought fittings per ASME B16.18 or B16.22. Where required solder fittings are acceptable

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Piping below grade shall be annealed soft copper per ASTM B88. Limit fittings where possible.

Below Grade & Below Slab Piping & Fittings: Ductile iron pipe: AWWA C151, working pressure 150 psig, exterior and interior bituminous coating. Provide flanged and anchored connection to interior piping.

Below Grade Piping Alternative: PVC pipe: ASTM D2241, Class 150, working pressure 150 psig, fittings to be AWWA C151. J-M Ring-Tite or approved equal.

Below Piping Alternative 4" and Above: PVC pipe: AWWA C900, Class 150, working pressure 150 psig, fittings to be AWWA C151. J-M Ring Tite or approved equal.

Exposed Pipe in Toilet Areas:

Exposed pipe shall be chrome plated brass, American Brass Co., or equivalent. Furnish and install chrome plated brass wall plates.

Lavatory and Similar Waste Arms:

Type M or L copper water tube, Mueller or equivalent.

Urinal Waste Arms:

PVC.

Roof Drain Piping:

PVC DWV Soil Pipe, schedule 40, ASTM D2665

PVC Sewer Pipe, schedule 40, ASTM D2665

Below grade and below slab piping may be PVC pipe and fittings: schedule 40, conforming to ASTM D2665 or D2661 respectively.

PIPE ACCESSORIES:

Pipe sleeves: metal sized to allow minimum clearance between pipe and sleeves or insulation and sleeves.

Provide chrome-plated brass escutcheon plates where exposed pipe passes through walls, floors, or ceiling in finished areas.

Furnish and install dielectric or isolation fittings at all points where copper pipe connects to steel pipe.

Adjustable wrought clevis type hanger and rods: Anvil or equivalent. Provide copper hangers for copper piping.

Install water hammer arrestors as shown on the Drawings and where required by codes.

VALVES

Ball Valves: 125 lb., bronze ball valve.

TRAPS

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For Lavatories and Sinks: Fully Cast Brass, 17ga., chrome plated.

#### TRAP PRIMERS

1/2 automatic trap primers: all bronze body with integral vacuum breaker and gasketed service cover.

### PART 3- EXECUTION

#### INSTALLATION OF PIPING

Condensate piping shall be sloped same as sanitary waste and vent.

On vertical sanitary drain lines, connect all soil and waste inlets through sanitary tees, wyes, or wyes and eighth bends. Short radius fittings may be used for vent piping. On horizontal lines connect all waste and soil connections through wyes or wyes and eighth bends. Double branch fittings may be used on vertical lines and horizontal runs, providing proper grades can be maintained.

Make joints in PVC plastic pipe with solvent cement in accordance with pipe manufacturer's instructions.

Lay horizontal drain pipes to uniform grade; riser pipes, vertical. Make changes in directions of drain pipes with long bends. No screwed joints permitted in drain pipes, except as described herein.

Lay all sewers and branches, where practicable, on undisturbed earth cut at proper grade. Where laid on fill, provide adequate supports to maintain pitch of the line.

Sizes of risers and mains of water system piping shall be as designated on the Drawings. Verify any omitted sizes before installation.

Cover pipe openings at all times that the work is not in progress at that point.

Cut brass and copper pipe by means of hacksaw. Remove all burrs and metal chips, dirt, etc., before joining pipe. Chrome plated pipe shall show no wrench marks after installation; no threads shall show.

Adequately support all piping above floors inside the building from or on the building structure. Support piping suspended from the building structure by means of the specified pipe hangers and rods. Support interval shall be per FBC Plumbing Table 308.5.

Sanitary and storm drain piping shall be supported by at least one hanger on each full length of pipe close to hub where possible and at least one within 24 inches of each fitting, and wherever else required to prevent tendency toward deflection due to load. Provide a hanger at upper angle at each drop. Locate hangers adjacent to hubs on multiple fittings not more than four feet on centers.

For support spacing of all other horizontal piping refer to MSS-SP-69 and provide additional supports at valves, strainers, in line pumps and other heavy components. Provide a support within one foot of each elbow.

Vertical Pipe Supports: Up to 6 inch 60 feet long or not over 12-inch pipe up to 30 feet long, Riser clamps bolted to pipe below couplings, or welded to pipe and resting securely on the building structure. Vertical pipe larger than the foregoing, support on base elbows or tees, or substantial pipe legs extending to the building structure. Vertical runs less than 15 feet long may be supported by the hangers on the connecting horizontal runs.

Bases of drain stacks: If not buried in earth support on concrete, brick in cement mortar, or metal brackets permanently attached to building structure.



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Make joints in PVC plastic pipe with solvent cement in accordance with pipe manufacturer's instructions.

Yard supply main piping: Piping shall be installed in strict accordance with the manufacturer's recommendations. Provide 6" clean sand fill for pipe bedding. Insure minimum 18" of cover. Provide concrete thrust blocks at all changes of direction. Hand dig thrust block area just behind fittings. Bevel ends of PVC piping. Test piping in accordance with manufactures instruction.

### INSTALLATION OF VALVES

Isolate all major piping assemblies as shown on the Drawings and as required for proper operation and maintenance. All valves shall be accessible. Provide valve boxes and access panels where required for accessibility.

Install service valve for hot and cold water at each plumbing fixture.

### INSTALLATION OF TRAPS

Trap each fixture by water sealing trap placed as near the fixture as possible.

Vent all traps and place within 5 feet of the fixture which it serves unless otherwise noted.

### INSTALLATION OF PIPE SLEEVES

Install pipe sleeves at all locations where pipe passes through walls, floors, or ceilings above or below grade. Sleeves shall extend above floor a minimum of 1". Seal floor sleeves in concrete floors with mortar. Coordinate sleeve size with piping and firestopping requirements in advance.

Where subject to moisture or weather, seal sleeves with watertight sealant.

### INSTALLATION OF FIXTURES, TRIM, AND FITTINGS

Install the fixtures, trim and fittings specified, taking care to properly anchor each fixture.

Installation of carriers shall comply with manufacturers' maximum recommendations. Carriers shall be bolted to floor slab using all bolt holes or slots provided on carrier. Bolt size shall match hole or slot. Provide lock washer on each bolt. Use "Red Head" self-drilling anchors as manufactured by Phillips Drill Co. or approved equal product to set bolts.

When the use of a wrench is necessary on chrome plated piping, protect the pipe from marring by use of felt or cloth wrapping beneath wrench jaws.

### INSULATION

Insulate all domestic hot water lines.

Insulate all interior condensate piping with  $\frac{3}{4}$ " thick elastomeric closed cell foam insulation. Insulation shall have a flame spread of less than 25 and a smoke developed rating of 50 or less as tested by ASTM C534, E84, UL-723 and NFPA 255.

Hot water pipe insulation shall be rigid glass fiber insulation with a nominal density of 3 pounds per cubic foot with a thermal conductivity of not more than 0.23 at 75 deg F mean temperature. Insulation cover shall be an all-service jacket with double self-sealing laps, with self-sealing butt strips. Insulation thickness shall be per FBC Energy Conservation Table C403.2.10 and as follows:

1" thick for pipe sizes 1-1/4" and smaller.

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1-1/2" thick for pipe sizes 1-1/2" and larger.

Insulate all domestic cold-water lines subject to ambient conditions. Use closed-cell elastomeric thermal insulation, minimum density of 5.5 pounds per cubic foot with a thermal conductivity of not more than 0.27 at 75 deg F mean temperature. The material shall have a flame spread of 25 or less and a smoke-developed rating of 50 or less as tested by ASTM C534, E84 (25/50) UL-723 (25-50) and NFPA 255 (25-50). Seal all joints, seams, etc. air tight. Insulation thickness shall be per FBC Energy Conservation Table C403.2.10 and as follows:

1/2" thick for pipe sizes 1-1/4" and smaller.

1" thick for pipe sizes 1-1/2" and larger.

Pipe insulation is not required in crawl spaces where located more than 10' from a ventilation opening.

Install insulation in accordance with manufacturer's recommendations.

### TESTS AND INSPECTIONS

Make all water and air tests of the piping systems in the presence of and to the satisfaction of the Architect/Engineer or his designated representative. Conduct these tests at such places and with timing to permit work to proceed with as little interruption as possible. Make tests before work is concealed.

Test water piping to hydrostatic pressure at 125 psi and hold for 4 hours.

After the installation of sanitary piping and before the pipe is concealed or the fixtures are installed, cap or plug the ends of the system and fill all lines with water to top of vents above roof and allow to stand until a thorough inspection has been made. Should leaks appear, repeat the tests until the system is tight.

### STERILIZATION

The sterilization process shall comply with all governing regulations and with the sterilization procedures recommended by the American Water Works Association. The chlorination process may be simplified by first flushing the system thoroughly clean, then charging with water containing a minimum of 50 parts per million of chlorine, allowing this to stand for 24 hours, then thoroughly flushing. After sterilization and final flushing, the local health authority is to be notified and their approval obtained in writing. Provide copies to the Construction Manager, engineer and Owner. Include a copy in the close out manual.

END OF SECTION

## **SECTION 22 13 44 - SEWAGE LIFT STATION WITH SUBMERSIBLE PUMPS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment, and incidentals required to install, place in operation, and field test submersible wastewater pumps as hereinafter specified. The station shall be complete with pumps, motors, piping, valves, electrical work (including motor controls), structures, connections and appurtenances, tested and ready for service.
- B. These specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, the delivery and complete installation and field testing, of all materials, equipment and appurtenances for the complete pumping units as herein specified, whether specifically mentioned in these specifications or not.

#### **1.2 SITE CONDITIONS**

- A. Prior to submitting their bid, the Contractor shall satisfy themselves as to the character and amount of different soil material, groundwater and the subsurface conditions to be encountered in the work to be performed. Information and data, when furnished, are for the Contractor's general information. However, it is expressly understood that any interpretation or conclusion drawn therefrom is totally the responsibility of the Contractor.

#### **1.3 SUBMITTALS**

- A. Shop Drawings - Contractor shall submit shop drawings and product data for all equipment furnished under this section including, but not limited to, valve vault, wet well, electrical controls and all piping.

#### **1.4 OPERATING AND MAINTENANCE DATA**

- A. Contractor shall compile data and related information appropriate for owner's maintenance and operation of products furnished under contract and furnish an Operation and Maintenance Manual in accordance with this section.
- B. Manual preparation shall be done by trained and experienced personnel familiar with the requirements of this section. The Manual should be an 8 1/2 X 11 bound volume with neatly typed text and should include all manufacturers data. Drawings and schematics should be bound to the manual and folded to 8 1/2 X 11 inches.

#### **1.5 EQUIPMENT INSTALLATION CERTIFICATE**

- A. The manufacturer shall provide a written report, through the Contractor and endorsed in writing by the Contractor, certifying that the equipment has been properly installed and checked and is ready for placement into routine permanent service.

## 1.6 MANUFACTURER'S STARTUP SERVICES

- A. The Contractor shall furnish services of manufacturer's technical representative to inspect the completed installation, correct or supervise correction of any defects or malfunctions, and instruct operating personnel in proper operating and maintenance procedures.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

- A. The pumping units required under this section shall be complete including pumps and motors designed in accordance with Standards of the Hydraulic Institute. All parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness and to be especially adapted for the work to be done. Ample room shall be provided for inspection, repairs, and adjustments.
- B. Stainless steel nameplates giving the name of the manufacturer, the rated capacity, head, speed, and all other pertinent data shall be attached to each pump and motor.

### 2.2 PUMPS

#### A. Description

- 1. The Contractor shall furnish and install two, totally submersible sewage pumps. The required head, GPM, voltage, and other specifications shall be as listed on the drawings. Acceptable manufacture is Liberty or equal.

#### B. Pump Design

- 1. Pumps shall be capable of handling raw, unscreened sewage. The design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed and no need for personnel to enter the pump well. Each pump shall be fitted with a stainless-steel wire rope or space-lay cable of adequate strength and length to permit raising the pump for inspection.

#### C. Pump Warranty

- 1. The pump manufacturer shall warrant the pumps being supplied to the owner against defects in workmanship and materials for a period of five (5) years or 10,000 hours under normal municipal use, operation and service. The manufacturer shall submit the published warranty with the submittal drawings.

### 2.3 SUBMERSIBLE PUMP GUIDE BAR ASSEMBLY

- A. Each pumping unit shall be equipped with a stainless-steel guide bar assembly as recommended by the pump manufacturer. All material used to fabricate the upper guide holder and cable holder shall be aluminum or stainless steel. All bolts, anchors, and other fasteners shall be stainless steel.

## 2.4 ACCESS FRAME AND COVER

- A. The lift station shall be equipped with a standard aluminum access frame and cover. Door leaves shall be a minimum of 1/4-inch thick AASHTO aluminum diamond plate. Doors shall have lifting aids of tubular aluminum construction, with compression springs to assist in opening and closing. Hinges shall be heavy-duty stainless steel with tamper-proof fasteners. All hardware shall be stainless steel. Doors should open to 90 degrees and lock in that position by a stainless-steel positive locking arm and release handle. Doors shall have a stainless-steel lifting handle and stainless-steel snap-lock, with removable key handle and plug. Access frame and cover shall be manufactured by Halliday Products Inc., U.S. foundry, or by an approved equal.

## 2.5 LEVEL CONTROL SYSTEM

- A. Functional Description: The level control system shall start and stop the pump motors in response to changes in wet well levels, as set forth herein.
  - 1. Type: The level control system shall be the mercury switch float type, incorporating intrinsically safe floats secured to a vertical pipe in the wet well. Rising and falling liquid level in the wet well causes switches within the floats to open and close, providing start and stop signals for the level control components. As an alternate the pump manufacturer may provide a submersible pressure transmitter system completely compatible with the control system.
  - 2. Sequence of Operation: The level control system shall start the motor for one pump when the liquid level in the wet well rises to the "lead pump start level". When the liquid is lowered to the "pump stop level", the system shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level rise to the "lag pump start level", the system shall start the second pump so that both pumps are operating to pump down the well. Both pumps shall stop at the same "stop" level.
  - 3. Automatic Pump Alternation: The level control system shall utilize the alternator relay to select first one pump, then the second pump, to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle.
- B. Float Switches: Pump station manufacturer shall furnish four float switch assemblies for installation by the contractor. Each switch assembly shall contain a mercury-type switch sealed in a polypropylene housing, and not less than 20 feet of cable. Station manufacturer shall also furnish polypropylene cord grips and polypropylene mounting hardware for switch assemblies. Sufficient length of non-corrosive pipe for mounting switch assemblies in the wet well shall be furnished by the installing contractor. As an alternate, the pump manufacturer may provide a submersible pressure transmitter system completely compatible with the control system.
- C. Circuit Design: Circuit design in which the application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.
- D. High Water Alarm with Alarm Silence: Pump station manufacturer shall furnish a float switch assembly, intrinsically safe relay, for high water alarm function. Should the wet well level rise to the high-water alarm level, the float switch assembly and intrinsically safe relay shall energize the signal relay. The signal relay shall complete a 115-volt AC circuit for external alarm devices. The signal relay shall maintain the alarm signal until the wet well level has been lowered and the circuit has been manually reset.
  - 1. An alarm silence switch and relay shall be provided to permit maintenance personnel to de-energize the external alarm device while corrective actions are underway. After silencing the alarm device, manual reset of the signal relay shall provide automatic reset

of the alarm silence relay.

## 2.6 CONTROL PANEL

### A. Panel Enclosure

1. The electrical control equipment shall be mounted within NEMA 4X, dead front type control enclosures fabricated of 316 stainless steel. Enclosure doors shall be gasketed with neoprene, hinged, and equipped with captive closing hardware. Control compartments shall incorporate removable back panels on which control components shall be mounted. Back panel shall be secured to enclosures with stainless steel collar studs.

### B. Motor Branch Components

1. All motor branch components shall be of the highest industrial quality, securely fastened to removable subplate with screws and lock washers.
2. The sub-plate shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any components.

### C. Circuit Breaker Components

1. Properly sized heavy duty air circuit breakers shall be provided for each of the following: main and emergency power breaker, breakers for each pump, control breaker, and duplex receptacle breaker. The main breaker and emergency power breaker shall be connected with a factory assembled walking beam interlock to prevent simultaneous energization of both breakers. Breakers shall be mounted on auxiliary back plate with cutouts through the dead front panel so that breaker faces will be flush with the dead front. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering.

### D. Duplex Receptacle

1. A weatherproof Duplex GFI Receptacle providing 115 volts, 60 hertz, single phase current shall be mounted to the side of the enclosure or as shown on the plans. Receptacle circuit shall be protected by a 15-ampere thermal-magnetic circuit breaker.

### E. Emergency Power Generator Receptacle

1. A weatherproof Emergency Power Generator Receptacle shall be furnished and mounted on the side of the side enclosure.

### F. Motor Starters

1. An open frame, across the line, NEMA rated magnetic starter shall be furnished for each pump motor. Starters are to be NEMA size 1 and above with auxiliary contacts. Power contacts shall be double-break cadmium oxide silver. All motor starters shall be equipped to provide under voltage release and overload protection on all three phases. Overload reset button should be mounted through the dead front door.

### G. Pump Run Indicators

1. Control panel shall be provided with one pilot light for each pump motor. Light shall be wired in parallel with the related pump motor starter to indicate that the motor is or should be running.

H. Pump Mode Selection

1. Pump mode selector switches shall be connected to permit manual start and manual stop of each pump individually, and to select automatic operation of each pump under control of the level control system. Manual operation shall override all shutdown systems, but not the motor overload relays.

I. Alternator Relay

1. Pump alternator relay shall be of electromechanical industrial design. Relay contacts shall be rated 10 amperes minimum at 120 volts non-inductive.

J. Sequence Selection

1. A switch shall be provided to permit the station operator to select automatic alternation of the pumps, to select pump number 1 to be the lead pump for each pumping cycle, or to select pump number 2 to be the lead pump for each pumping cycle.

K. Elapsed Time Meters

1. Six-digit elapsed time meters (non-reset type) shall be connected to each motor starter to indicate the total running time of each pump in "hours" and "tenths of hours".

L. High Pump Temperature Protection

1. The control panel shall be equipped with circuitry to override the level control system and shut down the pump motor(s) when required to protect the pump from damage caused by excessive temperature. A thermostat shall be mounted on each pump to detect its temperature, and a signal relay shall be supplied for each thermostat. If the pump temperature should rise to a level which could cause pump damage, the thermostat shall cause the signal relay to drop out the motor starter. An electrical or mechanical indicator, visible on the front of the control panel shall indicate that the pump motor has been stopped because of a high temperature condition. The pump shall remain locked out until the pump has cooled and the circuit has been manually reset. Automatic reset of such a circuit shall not be acceptable.

M. Overload Relays

1. Overload relays shall be of bimetallic ambient compensated type. Overload relays shall be manually reset only.

N. Control Circuitry

1. The control circuit shall be protected by a thermal-magnetic air circuit breaker which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.
2. Provide control circuitry for remote located alarm light, alarm horn, and silence push button switch.

O. Wiring

1. The pump station as furnished by the manufacturer shall be completely wired except for the power feeder lines to the branch circuit breakers and final connections to remote

alarm devices. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC).

P. Wire Identification and Sizing

1. Control circuit wiring inside the panel, except for internal wiring of individual components, shall be 14 gauge minimum, Type MYW or THW, 600 volts. Wiring in conduit shall be 12 gauge minimum.

Q. Phase Monitor

1. A line voltage rate phase sequence and loss monitor shall be provided. The monitor will be pre-wired to take the starters out of service if a phase is reversed, lost or drops below 83 percent of nominal voltage. The unit will automatically restore when normal conditions are restored.

R. Surge Protector

1. An electronic epoxy encapsulated surge protector shall be provided to protect the control circuitry in the pump control panel. The protector shall be of solid-state construction with two stages separated by an indicator that will not saturate under full load conditions. The final stage shall utilize a series of high-speed silicon avalanche devices. Total response time shall be 5 nanoseconds or less. A neon indicator shall signal a failure.

## PART 3 - EXECUTION

### 3.1 INSPECTION AND TESTING

- A. Upon completion of installation, the Contractor, in the presence of the Engineer and a qualified manufacturer's representative, shall perform a preliminary test on the system to insure the functioning of all component parts to the satisfaction of the Engineer.
- B. Approval of the preliminary test by the Engineer shall not constitute final acceptance of the equipment furnished.
- C. After the system is in full operation, a full operating test shall be performed in the presence of the Engineer and a qualified manufacturer's representative. The Contractor shall furnish all labor, materials and equipment required for such test and shall correct any deficiencies noted, by repairing or replacing the defective component, and retesting as required until the equipment meets the satisfaction of the Engineer. A minimum of one complete 8-hour day shall be furnished to satisfy the full load operating test requirements.
- D. Operating personnel shall be trained in operation and maintenance of equipment at startup. Instruction shall be given in operation, service, adjustments, and routine maintenance. Recommended spare lists and maintenance schedules shall be provided.

## PART 4 - WETWELL

- A. Precast concrete manhole barrel shall conform to specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C-478, except as otherwise specified below.



- B. The minimum wall thickness for the various size barrel sections shall be 5 inches or as shown on the drawings. Lifting holes for handling shall be non-penetrating.
- C. Barrel sections shall have tongue and groove joints, with "Ram-Nek" as manufactured by the K.T. Snyder Company, Houston, Texas, or approved equal; or O-ring gaskets set in preformed indentations conforming to ASTM C-443 standard specifications, or Federal Specification SS-S-0210 (GSA-FSS).
- D. Concrete shall conform to ASTM C-94, Type II cement, with a compressive strength of 4,000 psi. Mortar shall be composed of one-part cement to two parts sand.
- E. The date of manufacture and the name of the manufacturer or trademark shall be clearly marked on the outside of each precast section when the form is removed and on the inside after painting. Sections shall be cured by an approved method for at least 2 days prior to painting and shall not be shipped until at least 2 days after having been painted. Sections shall not be shipped until at least 7 days after removal from the forms.
- F. Precast concrete slabs over top section shall be capable of supporting the overburden plus a live load equivalent to AASHTO H-20 loading. The tops of bases shall be suitably shaped to mate with the precast barrel section.
- G. The interior, exterior, and mating surfaces of the manhole shall be coated with a heavy-duty coal tar epoxy coating containing not less than 72.9% by volume nonvolatile solids, approved equal to (or superior to) Koppers 300-M. This coating shall consist of a primer as specified by the manufacturer and a topcoat for a total minimum thickness of 16 dry mils.
- H. Where pipes enter or exit wet well, a "Kor-N-Seal" molded neoprene boot with stainless steel internal and external bands as manufactured by the National Pollution Control Systems, Inc., Nashua, New Hampshire, or a polyurethane joint with a short transition joint as manufactured by Mooreform Corporation, Centralia, Illinois, or an approved equal (or superior) connection shall be provided.
- I. Where pipes or conduits enter or exit top section, the annular space shall be grouted and water and gas tight. Grout shall be Thoroseal or equal.

**END OF SECTION**

CAMP HELEN STATE PARK  
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SECTION 23 01 00 - MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

GENERAL CONDITIONS

The work described hereunder shall be installed subject to the Contractual Conditions for the entire Specifications.

CORRELATION

This Section of the Specifications and its accompanying Drawings are made separate for the convenience of the General Contractor in preparing his bid and in no way relieves the General Contractor of his responsibility to correlate the work under this Section with that of all other trades as regards the items to be furnished by various Subcontractors, the exact location of all equipment and materials and the necessity of planning the work of all trades to avoid interference.

PLANS AND SPECIFICATIONS

Drawings and Specifications are intended to clearly set forth all work, and the detailed description is added to assist in establishing the scope and the location of the several parts of the work. Collectively, they shall govern and control the scope, character, and design of the Work, and any item called for in any one of the documents shall be as though mentioned in all.

Failure to make reference in the Specifications to any items of the work shown on the Drawings, but necessary to the completion of the Work shall not relieve the Contractor of the full responsibility to furnish the materials and perform the work of such items, in a manner comparable to other items of similar nature for which detailed Specifications are included.

PROJECT FAMILIARIZATION

The bidder is expected to visit the site and familiarize himself with conditions at the site before submitting his bid. He shall familiarize himself with the work required throughout the entire project and shall make allowances for contingencies which may occur in the interconnection of the various systems.

ALTERNATES AND ADDENDA

The Contractor shall investigate all Alternates, Addenda and Allowances as they relate to the Work of this Section.

TESTING

The Work shall include complete testing of all equipment and piping at the completion of the Work and making any connection changes or adjustments necessary for the proper functioning of the system and equipment.

WORK INCLUDED

Work covered under this Section consists of furnishing all labor, materials, tools, equipment, transportation, scaffolding, services, supervision, and performing of all operations required to properly complete all mechanical work in accordance with this Division of the Specifications and as indicated on the applicable Drawings, subject to terms and conditions of the Contract.

## CAMP HELEN STATE PARK PARK IMPROVEMENTS

### SUPERVISION OF WORK

The Mechanical Contractor shall have a qualified and experienced superintendent on the job when any related work is in progress.

### RELATED WORK SPECIFIED ELSEWHERE

The Contractor is cautioned to note carefully other Sections of the project Specifications with their cross references to other specific standard specifications, standard detail, etc., describing work to be furnished under these Specifications as well as any mechanical work that may be shown on electrical, structural, architectural, or other drawings, in order that he may fully understand the requirements and work to be provided under this Section of the Specifications.

### ORDINANCES AND REGULATIONS

All work shall conform with all local and State ordinances or regulations governing the installation of such equipment. If work as laid out, indicated or specified is recognized to be contrary to or conflicting with local ordinances or regulations, the Subcontractor shall report same to the Architect/Engineer before submitting a bid. The Architect/Engineer will then issue instructions as to procedure.

### CODES AND STANDARDS

The currently adopted standards of the following organizations, and individual standards named, shall be followed the same as if they were fully written herein and constitute a part of the Specification requirements except where otherwise specified:

- National Fire Protection Associations - Standards
  - NFPA 70, National Electric Code
  - NFPA 101, Life Safety Code
  - NFPA 90-A, Installation of Air Conditioning and Ventilating Systems.
- FL Building Code
- FL Mechanical Code
- FL Gas Code
- FL Plumbing Code
- Florida Fire Prevention Code
- National Board of Fire Underwriters
- SMACNA HVAC Duct Construction Standard
- ANSI/ASME B31.1, Power Piping
- ANSI/ASME B31.9, Building Services Piping

The foregoing rules, standards, regulations, specifications, recommendations and requirements shall be followed by the Contractor as minimum requirements. They shall not relieve the Contractor from furnishing and installing higher grades of materials and workmanship which are specified herein or indicated on the Drawings.

Any material, equipment or workmanship specified by reference to the number, symbol or title of Specification or detail, or other standard rules, codes, regulations, etc., shall comply with the latest edition amendments and revisions thereto in effect on the date of these Specifications.

The Contractor shall submit proof, if requested by the Engineer or his representative, that the materials, appliances, equipment or devices that he furnishes and installs under this Contract meet the requirements of the Underwriters' Laboratories, Inc., or Factory Mutual, as regards fire and casualty hazards.

## CAMP HELEN STATE PARK PARK IMPROVEMENTS

### PERMITS, INSPECTIONS AND UTILITY FEES

Coordinate costs of taps with the Owners Representative & the CM.

The Contractor shall obtain necessary permits and inspections required for work and pay all charges incidental thereto. Contractor shall coordinate all utility taps and shall pay all associated fees, impact charges, etc. Upon completion of the work the Contractor shall deliver to the Engineer a certificate of inspection and approval from the local inspection department, if required.

### MINOR DEVIATIONS

The Contractor shall note that the Mechanical Drawings are intended to indicate only the extent diagrammatically, general character and location of the work included. Work intended, but having minor details obviously omitted or not shown, shall be furnished and installed complete to perform the functions intended.

Arrangements of piping, ductwork, and equipment that differ materially from the obvious intent of the Drawings will not be permitted except where necessary to avoid interferences, and only where specifically approved by the Architect/Engineer. Drawings shall be furnished showing all changes. Any change resulting in a saving in labor and materials shall be made in accordance with a Contract change order.

### BASIC MATERIALS AND METHODS

The materials and methods specified in this article are to be used for work specified throughout this Section of the Specifications.

All materials and workmanship shall be of the highest quality.

The installation shall be made in a workmanlike manner in accordance with acceptable industry standards except where specific procedures are called for in these Specifications, in which case they shall be followed.

All materials shall be new, free of defects and of the manufacturers latest standard design.

Reference to a particular material or specific equipment by name, make or catalog number is to describe equipment which will meet the requirements of the project and is not intended to restrict bidding.

It is the intent that all of the equipment of a similar type shall be the products of the same (one) manufacturer when practicable, providing unit responsibility for each group.

### REVIEW OF MATERIALS

Submittals shall be made in compliance with the General Conditions of the Contract for Construction and the following:

Submittals shall be identified by items numbers as listed in the pertinent section of the specifications and shall be accompanied by a letter of transmittal.

Materials and other items subject to approval shall not be purchased or incorporated in the work before receipt of written approval.

### SHOP DRAWINGS

Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor and which illustrates some portion of the Work.

## CAMP HELEN STATE PARK PARK IMPROVEMENTS

All shop drawings submitted shall bear the stamps of approval of the Contractor as evidence that the drawings have been checked by the Contractor. If the shop drawings show variances from the other requirements of the contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment. Otherwise, the Contractor will not be relieved of the responsibility for executing the work even though such shop drawings have been approved.

Submit electronic copies of the shop drawings to be retained and additional copies as required by the Contractor, all items required under appropriate sections of the Specifications.

### PROJECT CLOSEOUT

The Contractor shall remove all temporary work and temporary facilities prior to final pay request.

The Contractor shall clean spaces that were occupied by temporary work and temporary facilities. Remove debris, rubbish and excess materials from the sites. Burning or burying is not permitted on the sites.

Repair damages caused by installation or use of temporary facilities. Restore to original condition.

Restore grass, landscaping, hardscaping to original condition.

### GUARANTEES, BONDS AND AFFIDAVITS

#### Warranties:

The Contractor shall submit to the Owner all manufacturer's warranties on equipment furnished and installed under this Contract.

In addition, to the guarantee of equipment by the manufacturer of each piece specified herein, the Contractor shall also guarantee such equipment and shall be held for a period of one year from final acceptance test to make good any defects of the materials or workmanship occurring during this period, without expense to the Owner.

#### Affidavits:

The Contractor shall provide affidavits as required in the non-technical portion of these Specifications.

#### Provide Warranty Labels:

All warrantied mechanical equipment see Mechanical Identification requirements.

### OPERATION AND MAINTENANCE DATA

#### Manuals and Instructions:

The Contractor shall deliver to the Owner, upon substantial completion of the Work, two copies of descriptive literature related to the equipment installed under this Contract, including parts lists, wiring diagrams, maintenance and operation manuals and warranties customarily supplied by manufacturers for equipment incorporated in this work. The literature shall be neatly bound in a 3-ring binder and delivered to the Engineer prior to final acceptances. Each manual shall include a copy of the Control Diagrams and a complete description of the operation of the control systems.

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The Contractor shall give physical demonstration and verbal instructions for proper operation and maintenance of equipment to the Owner or his designated representative. Schedule these demonstrations and instructions at the Owner's convenience.

Provide four (4) hours of tour and demonstration of all equipment installed under this project.

### AS-BUILT DRAWINGS

As-Built Drawings are required. Maintain a current and legible record set (full size set) on the job. Final record prints will be drafted by the Engineer and signed off by the contractor. The Contractor is solely responsible for providing accurate as-builts.

### QUALITY ASSURANCE

Products Criteria:

**Standard Products:** Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least two (2) years prior to bid opening. Provide list of users upon request.

Equipment having less than a two-year use record, which in the opinion of the Engineer, provided significant benefits to the Owner such as improved energy efficiency, will be acceptable if it is a product of a manufacturer who has been regularly engaged in the manufacture of that specific type of product which has been used in similar applications for a period of two years. The Engineer reserves the right to require the Contractor to submit evidence to this effect for his approval.

**Equipment Service:** Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located, in the opinion of the Engineer, reasonably close to the site.

**Manufacturer's Nameplates:** Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

**Welding:** Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code.

Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld.

The types and extent of non-destructive examinations required for pipe welds are shown in Table 136.4 of the Code for Pressure Piping, ANSI/ASME B 31.1.

**Manufacturer's Recommendations:** Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

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### FIRESTOPPING

Provide for firestopping of all mechanical systems. UL listed methods conforming to the situations present shall be utilized. Submit shop drawings of intended methods, including installation instructions and proof of UL Listing.

### WALL, FLOOR AND CEILING PLATES

Material and Type: Chrome plated brass or chrome plated steel. Use plates that fit tight around pipes, cover openings around pipes, and cover the entire pipe sleeve projection.

Thickness: Not less than 3/32 inch for floor plates. For wall and ceiling plates, not less than 0.025 for up to 3 inch pipe, 0.035 for larger pipe.

Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, except mechanical rooms or chases. Use also where insulation ends on exposed water supply pipe drop from overhead. Provide a watertight joint in spaces where brass or steel pipe sleeves are specified.

### INSTALLATION

Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment. Locate piping, sleeves, inserts, hangers, ductwork and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.

#### Protection and Cleaning:

Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Engineer. Damaged or defective items, in the opinion of the Engineer, shall be replaced.

Protect all finished parts of equipment, such as shafts and bearings, where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water, chemical or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

Concrete and Grout: Use concrete and shrink-compensating grout, 3000 psi minimum.

Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

### PAINTING

Paint all bare steel pipe, supports, hangers, fabricated parts, etc. with two coats of enamel paint. Prepare surfaces in accordance with the manufacturer's recommendations. Coordinate colors with existing like components or per the Owner.

Paint all cut or heat affected galvanized steel components with two coats of cold galvanizing spray paint, ZRC Cold Galvanizing compound or equal. Prepare surfaces per the manufacturer's recommendations.

### PIPE AND EQUIPMENT SUPPORTS

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Generally, support in accordance with industry standards and as described in Section 23 15 00.

Use of chain, wire or strap hangers, wood for blocking, stays and bracing, nor hangers suspended from piping above will not be permitted.

Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 1" clearance between pipe or pipe covering and adjacent work.

LUBRICATION

Field check and lubricate equipment requiring lubrication prior to initial operation.

END OF SECTION



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SECTION 26 00 00 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

APPLICATION

The work described hereunder shall be installed subject to the Contractual Conditions for the entire Specifications.

These provisions apply to all sections of Division 26 of this project except as specified otherwise in each individual section. Codes, standards, policies and requirements contained in this Section are applicable to all contract documentation.

CORRELATION

This Section of the Specifications and its accompanying Drawings are made separate for the convenience of the Contractor in preparing his bid and in no way relieves the Contractor of his responsibility to correlate the work under this Section with that of all other trades as regards the items to be furnished by various Subcontractors, the exact location of all equipment and materials and the necessity of planning the work of all trades to avoid interference.

DESCRIPTION OF WORK

Furnish all labor, materials, equipment and incidentals required to complete all electrical work as specified in this Division and as shown on the Contract Drawings. Division 26 work shall include the installation of a complete and properly operating electrical system.

Refer to other Divisions of this specification for electrical requirements of factory installed motors, controllers, power supplies, etc. Electrical connections to equipment furnished as specified in other sections of these Specifications or shown on other than the Electrical Drawings shall be governed by this Division of the Specifications.

The bidder shall inspect the present jobsite conditions before preparing his bid. The submission of a bid will be considered evidence that such a visit and inspection was performed by the bidder and that he takes full responsibility for all factors governing his work.

The electrical work shall be complete, fully operational, and suitable in every way for the service required. Drawings are generally diagrammatic in nature and do not show all details, devices and incidental materials necessary to accomplish their intent. Therefore, it shall be understood that such devices and incidental materials required shall be furnished at no cost to the Owner.

RELATED WORK

Drawings and general provisions of Contract, including General Conditions, Supplementary General Conditions, and Special Conditions sections apply to work specified in Division 26.

The Contractor shall be aware that other divisions of these Specifications may apply to related work required to perform Division 26 requirements. All related work shall be performed in accordance with those divisions.

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## CONFORMANCE

If the Contractor takes no exceptions to these Specifications in the Submitted Bid, the Contractor will be held totally responsible for failure to comply.

Any exception to the Specification shall reference the affected paragraph(s), subject(s), and list benefit to the Owner.

The Owner reserves the right to have the Contractor replace installed material or equipment which does not comply with these Specifications at the Contractor's expense.

## SUBMITTALS

Obtain approval before procurement, fabrication, or delivery of items to the job site. Submit manufacturers' data on the equipment listed below and as directed in other Sections of Division 26. Follow the procedures required in Division 1 of this specification. Data shall be in the form of manufacturer's descriptive data sheets and engineering drawings and will be reviewed by the Engineer before materials and equipment are delivered to the work site. Review of the submittal by the Engineer is to check for general conformance to the design intent and will not relieve the Contractor of the responsibility for the correctness of all dimensions, conformance and the proper fitting of all parts of the work.

- Panelboards and Circuit Breakers
- Surge Protection Devices
- Disconnect Switches
- Fuses
- Lift Station Control Panel
- Plugs and Receptacles
- Lighting Fixtures
- Lighting Controls

Submit manufacturers' names and catalog numbers for the following materials:

- Conduit, Fittings, and Couplings
- Boxes and Fittings
- 600 Volt Wire and Cables
- Grounding Equipment

The Contractor shall thoroughly check the submittal for accuracy and compliance with the contract requirements. Shop drawings and data sheets shall bear the date checked and shall be accompanied by the Contractor's statement that they have been checked for conformity to the Specifications and Drawings. Submittals not so checked and noted will be returned without review.

Deliver the entire electrical submittal to the Engineer complete and in one package. An incomplete submittal will be returned to the Contractor without review.

## EQUIPMENT SUBSTITUTIONS

Substitutions that do not increase installation value will not be accepted.

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Contractor proposed substitutions may result in necessary changes to the construction documents. Coordination effort due to Contractor proposed substitutions shall be the complete responsibility of the Contractor. All potential conflicts are to be addressed. The Contractor shall also be responsible for any work of any other trades made necessary by the substitution. All potential conflicts with other trades are to be addressed.

The Engineer's review of the proposed substitutions and coordination documents is for the benefit of the Owner and not the Contractor and does not relieve the Contractor of responsibility for making any corrections necessary to insure the Owner receives full benefit of the original design intent.

Detailed coordination documents shall be provided for any equipment that, in the opinion of the Engineer, materially differs from the design documents. This difference includes but is not limited to any equipment having:

- access requirements that differ from the design / specification
- operating characteristics that differ from the design / specification
- footprints or elevations that differ from the design / specification
- connection requirements or locations that differ from the design / specification
- venting or combustion air requirements that differ from the design / specification
- electrical characteristics that differ from the design / specification
- control requirements that differ from the design / specification
- hydronic characteristics that differ from the design / specification
- plumbing requirements that differ from the design / specification

Documentation shall include a detailed listing of all differences from the design / specification. Also included will be a detailed explanation as to why these differences should be considered equal or an improvement.

Any physical differences shall be coordinated with drawings. All Coordination Drawings shall be produced by a competent drafts person and shall be equivalent in quality, detail, and scope to the Construction Drawings.

Acceptance of the substitution as an equal will be the sole descretion of the Engineer. Items of necessary coordination or review omitted from the documentation shall be grounds for rejection of the substitution.

No cost increase to the Owner for any changes due to coordination will be considered. The Engineer shall be compensated for any and all efforts associated with review and coordination of non-conforming equipment

#### CODES, INSPECTION AND FEES

Comply with the indicated edition of the following codes and ordinances. Where specific edition is not indicated, comply with the latest published edition.

American National Standards Institute - ANSI

The National Electrical Safety Code

ANSI/IEEE C37.90.1 Surge Withstand Capability (Swc) Tests For Relays And Relay  
Systems Associated With Electric Power Apparatus

C62.41 - Transient Voltage Surge Suppressors

American Society for Testing and Materials - ASTM

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National Fire Protection Association - NFPA

NFPA 70; The National Electrical Code

NFPA 101; The Life Safety Code

Florida Building Code

FBC-B 2023; The Florida Building Code 8<sup>th</sup> Edition

FPC 2023; The Florida Fire Prevention Code 8<sup>th</sup> Edition

FBC-M 2023; The Florida Mechanical Code 8<sup>th</sup> Edition

FBC-P 2023; The Florida Plumbing Code 8<sup>th</sup> Edition

FBC-A 2023; The Florida Accessibility Code 8<sup>th</sup> Edition

Federal Communications Commission - FCC

Insulated Cable Engineers Association - ICEA

Institute of Electrical and Electronic Engineers – IEEE (latest edition)

383 Vertical Flame Test

587 Transient Voltage Surge Suppressors

1547 Interconnecting Distributed Resources with Electric Power Systems

1547.1 Standard Conformance Test Procedures for Equipment Interconnecting

Distributed Resources with Electric Power Systems

National Electrical Manufacturers Association

NEMA ICS 1; Industrial Control and Systems General Requirements

NEMA ICS 2; Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts

NEMA AB3 - "Molded Case Circuit Breakers".

Serving Utility Company Policies

Underwriters Laboratories - UL

467 Electrical Grounding and Bonding Equipment

506 Enclosures 514A Outlet Boxes and Fittings

514C Non-metallic Outlet Boxes and Fittings

1449 Transient Voltage Surge Suppressors

Obtain all permits required. Contractor shall pay all fees for permits and inspections.

## COMPLIANCE AND REVIEW

Within two weeks of the awarding of the contract, and before any work is commenced, the Contractor shall meet with all legal authorities having jurisdiction, review all materials and details of this project, and agree on any required revisions. A letter shall be forwarded to the Engineer listing the names, dates and place of such review and the revisions required. A copy of the letter shall also be sent to the reviewing authority.

The Contractor shall also meet with each serving utility and repeat the above procedure. A letter certifying each meeting shall also be written with the information as described above.

## TEMPORARY LIGHTING AND POWER

Provide temporary lighting and power during construction. Temporary power shall be 120/240 volt, single phase.

Temporary wiring shall be done in a safe and neat manner. See Article 590 of the NEC.

Provide a minimum of one (1) 100 watt incandescent lamp for every 300 square feet of interior space being constructed.

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Provide 30 amp, 120/240 volt single phase power points throughout the construction area such that a power point will be within fifty feet of where any saws, drills, or other electrical tool is being used. Each power point shall have a disconnecting safety switch.

Provide 20 amp receptacles with ground fault interrupting circuitry. Outdoor or otherwise exposed receptacles shall have weatherproof covers. Provide any necessary special outlets required.

Size temporary power conductors so that voltage drop is kept below 5% at maximum designed load at the delivery point.

## RECORD DOCUMENTS

Prepare record documents in accordance with Division 1 requirements. Record documents shall be complete and accurate and clearly show deviations to the Contract Drawings. Additionally, indicate major raceway sizes and routings, locations of all control devices, all equipment and locations to scale, and fuse and circuit breaker ratings and arrangements.

Record documents shall reflect the complete contract record, including all changes, supplements and addenda as issued. All drawings, sketches and notations describing the work and as issued by the Engineer shall be incorporated.

Prepare bound sets of equipment Operation and Maintenance Instructions. These instructions shall include the name and location of the system, the name and telephone number of the Contractor, and all subcontractors installing the system or equipment, and the name and telephone number of each local manufacturer's representative for the system or equipment. Routine maintenance actions shall be clearly identified and include a listing of approved disposable materials necessary.

Furnish bound copies of all test results required in other sections of this division.

## GUARANTEES

Equipment: one (1) year from final acceptance by the Owner. Materials and labor: one (1) year from final acceptance by the Owner.

All equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner.

In addition to the guarantee of equipment by the manufacturer the Contractor shall also guarantee such equipment for a period of one (1) year from final acceptance by the Owner. The Contractor's one (1) year guarantee shall be for equipment, materials, and labor.

The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision will be allowed.

Additional guarantee requirements specific to certain parts or assemblies or installations may be in the General and Special Conditions, or other Sections of these Specifications.

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## PART 2 - PRODUCTS

### EQUIPMENT AND MATERIALS

Furnish materials or equipment specified by manufacturers named.

Materials furnished shall be new, undamaged and packed in the original manufacturer's packing.

All equipment and apparatus shall bear the seal of approval of the Underwriter's Laboratory where testing and listing performance criteria has been established for like items.

Protect equipment and materials from mechanical and water damage during construction. Suitable storage facilities shall be provided. Equipment shall not be stored out-of-doors except as follows:

Concrete items, plastic conduit if protected from sunlight, rigid metal conduit if protected from water and debris, padmounted equipment for outdoor installation if maintained in a normal weathertight condition, ground rods, and large spools of cables with ends properly sealed. In no case will materials be stored directly on the ground. Provide suitable timbers or billets on which items will be stored out of direct contact with the earth.

All items to be installed shall be free of rust and dirt. Damaged materials and equipment shall be replaced by the Contractor at no cost to the Owner.

All electrical panels, enclosures, raceways, conduit, and boxes shall be fabricated of metal unless indicated otherwise.

### EQUIPMENT AND MATERIALS STANDARDS

Design and fabrication of electrical equipment and materials:

The American National Standards Institute (ANSI)  
The American Society of Mechanical Engineers (ASME)  
The American Society for Testing and Materials (ASTM)  
The Institute of Electrical and Electronic Engineers (IEEE)  
The National Electrical Manufacturers Association (NEMA)  
The Occupational Safety and Health Administration (OSHA)  
The Underwriters Laboratories (UL)  
The National Fire Protection Association (NFPA)

Comply with the latest edition and revisions of these codes and standards.

### EQUIPMENT RATINGS

Horsepower and wattages of equipment shown on the Drawings are estimated and comply with a certain basis of design. It is the Contractor's responsibility to coordinate with, and furnish proper connections to equipment substituted and accepted as equivalent to the basis of design.

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Conduit, wire, disconnects, fuses, and circuit breakers shall be sized to suit the horsepower and wattage of equipment actually furnished. However, conduit, boxes, wire or disconnects shall not be sized smaller than shown on the Drawings.

### PART 3 - EXECUTION

#### QUALITY ASSURANCE

Installer's Qualifications: At least three years of successful installation experience on projects with electrical work similar to that required for this project.

Manufacturer's Qualifications: Manufacturers regularly engaged in the manufacture of electrical components and equipment of the types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.

Electrical work shall be performed by experienced persons skilled in the trade.

Work shall be supervised by a licensed journeyman or master electrician who shall be on the job site at all times while work is in progress.

Work shall be done neatly and in keeping with good practice and conventions of the trade. The electrical installation shall be of high quality, and of the performance level associated with top level commercial electrical installations as determined by the Engineer and the National Electrical Code.

#### IDENTIFICATION

Provide laminated plastic nameplates for each panelboard, safety disconnect, equipment enclosure and all other major pieces of equipment installed or modified as part of this contract.

Furnish all starters, disconnect switches and control panels with engraved name plates identifying the equipment served. Attach nameplates to equipment, aligned with structural features of equipment, with two pressure pins or #4 stainless steel screws, nuts, and lockwashers.

Panelboards shall have typewritten directories with all loads thoroughly described for each circuit.

#### CLEANING AND PAINTING

Clean all equipment and boxes thoroughly inside and outside at the completion of installation. Do not leave dirt and debris inside panelboard and equipment cabinets, device and junction boxes, etc.

Paint all exposed conduit and wiremold installed on painted surfaces to match surrounding surface. Paint exposed threads on conduits and touch up all scratches in galvanized pipe and fittings with a high quality cold galvanizing compound.

Touchup scratched or marred surfaces of lighting fixtures, panelboards, etc. with paint furnished by the equipment manufacturer specifically for the purpose.



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EXCAVATION, TRENCHING AND BACKFILLING

Perform all excavation and trenching to install raceways indicated on the drawings.

No tunneling shall be allowed unless written permission is received by the Engineer.

Excavated material not suitable for backfill shall be removed from the job site.

Insure that the bottom of trenches are uniform, without large rocks or lumps of dirt which could damage the raceway or conductors.

Backfill with material that will compact readily. Compact backfill material from bottom of excavation up, to within 2" of surrounding undisturbed material.

Cover shall not be less than surrounding grade and no greater than 2" above surrounding grade.

All trenching in and around rooted areas shall be by hand. Contractor shall take all steps necessary to protect existing root growth from damage by trenching or digging. Trenching in proximity to trees and other growth shall be directed radially away from the main trunk so as not to cut across major roots.

All trenching routing shall be coordinated with and approved by the Engineer before digging. Contractor shall contact the Engineer twenty four hours before work is scheduled to begin. Conduit routing shall be clearly laid out with paint or staking before inspection takes place. The Engineer reserves the right to specify final routing before digging begins, or at any point during the operation.

TESTS

Contractor shall test all wiring for shorts and all equipment for proper grounding before energizing. Equipment shall be thoroughly checked and adjusted for proper operation. Check motors for proper rotation before energizing and adjust if necessary.

END OF SECTION

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SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

SCOPE OF WORK

Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

STANDARD OF MATERIALS

All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

All conduits and raceways, wire, devices, panelboards, switches, etc. of a given type shall be the product of one manufacturer.

SUBMITTALS

Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division. Submit in accordance with Division 1.

PART 2 - PRODUCTS

CONDUCTORS

Compliance: Provide wires, cables and connectors that comply with the following standards as applicable:

UL Standard 83	Thermoplastic Insulated Wires and Cables
UL Standard 486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL Standard 854	Service Entrance Cable
NEMA/ICEA WC-5	Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NEMA/ICEA WC-8	Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
IEEE Standard 82	Test procedures for Impulse Voltage Tests on Insulated Conductors

Wire and cable manufactured more than twelve months before delivery to the jobsite shall not be used.

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All conductors shall be soft-drawn copper of not less than ninety-eight percent (98%) conductivity, with NEC Type THW, THHN, or THWN for No. 4 and smaller, and Type RHW, THW, or THWN for No. 2 and larger, 600 volt insulation.

Jackets: Factory applied nylon or PVC external jacketed wires and cables for installation in raceways and where indicated.

Color coding of all ungrounded service, feeder, and branch circuits conductors shall be required according to the following convention:

120/240 Volt, 1 phase: black and red

Ground wires shall be green and neutrals shall be white or gray or other combination per NEC. Isolated grounding conductors shall be green with yellow stripe or green with applied yellow tape to indicate isolated ground. Ground and grounded wire colors shall be used for these purposes only. Where grounded conductors of different systems are installed in the same raceway, box, auxiliary gutter, or other type of enclosure, each grounded conductor shall be individually identified by system. Additional grounded conductors shall be white with a readily distinguishable colored stripe, other than green, running along the insulation.

Conductors No. 12 AWG through No. 10 AWG shall be solid and No. 8 AWG and larger shall be stranded. No conductors smaller than No. 12 AWG shall be used except as otherwise noted.

Acceptable manufacturers: Anaconda Wire and Cable Co., General Electric Co., Okonite Co., Southwire Co., or Rome Cable Co.

## RECEPTACLES

Receptacles shall be furnished and installed where shown on the drawings and shall conform to the following requirements:

Grounding type duplex receptacle: rated 20 amperes, 125 volt, 2 wire, 3 pole with grounded shunt (yoke permanently grounded to third clip), NEMA Configuration No. 5-20R, and conforming to Federal Specification W-C-596F (submit proof of compliance).

All receptacles listed on the drawings shall be specification grade receptacles.

Tamper resistant receptacles shall be in compliance with the intent of the NEC. The design of the tamper resistant receptacle shall not incorporate any switching mechanism.

All exterior devices shall be designed for the application and shall be installed in a waterproof enclosure with proper cover.

Acceptable manufacturer: Eagle, GE, Hubbell, Leviton or Pass and Seymour.

## SWITCHES

Flush, enclosed type, specification grade, rated at 20 amperes, 120/277 volts, alternating current only, quiet operation, and shall comply with Federal Specification W-S-896F (submit proof of compliance). Switch housing shall be color coded for current rating.

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Acceptable manufacturer: Eagle, GE, Hubbell, Leviton or Pass and Seymour.

Motor switches with inherent thermal overload protection shall be Square D, Type F for flush or surface mounting as required by the location of the unit. Units shall be furnished with pilot lights as indicated.

#### DEVICE PLATES

All plates for switch, receptacles and telephone outlets located on finished walls shall be UL listed with the number of gangs required for the application. Nylon or plastic plates shall match device color. All plates for outlets located on unfinished walls or on conduit type fittings shall be zinc coated sheet metal with rounded or beveled edges.

Weatherproof receptacle covers shall be of impact resistant plastic, gasketed, in-use type. Switch covers shall be gasketed aluminum.

Device plates shall be factory engraved where indicated on the drawings. Letters shall be black filled.

#### GROUNDING AND BONDING

Conductors: type THW, THHN/THWN, or RHW to match power supply wiring.

Bonding Jumper Braid: copper braided tape, constructed of 30 gage bare copper wires and properly sized for application.

Flexible Jumper Strap: flexible flat conductor, 48,250 circular mils, with copper bolt hole ends sized for 3/8" diameter bolts.

Grounding Electrodes: solid steel core with a heavy uniform covering of electrolytic copper, 5/8" X 10'. Provide sectional rods if required. Threads, on sectional rods, shall be rolled (not cut) into the composite metal after the copper covering has been applied. Sectional rod couplings shall be of a corrosion resistant alloy.

Plate Electrodes: plate electrodes are not permitted. If sufficiently low resistance cannot be obtained with driven rods, the Architect shall be notified and will provide written instruction on grounding methodology.

#### NAMEPLATES

Nameplates: 0.125 inch thick laminated plastic; white and black finish; rectangular shaped; minimum of 1.0 X 2.5 inches with 0.25 inch high block style engraved lettering.

#### PART 3 - EXECUTION

##### WIRING

All conductors shall be carefully handled to avoid kinks or damage to insulation.

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All wires, cables and each conductor of multi-conductor cables shall be uniquely identified at each end by color or with wire and cable markers. Lighting and receptacle wiring shall be distinctly differentiated and junction boxes marked.

Lubrications shall be used, if required, to facilitate wire pulling. Lubricants shall be UL approved for use with the insulation specified.

Neutral wires shall be pigtailed to receptacles so that a receptacle can be removed for replacement without the neutral connection to other receptacles on the circuit being disconnected.

Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A.

All 600 Volt wire insulation shall be tested with a "megger" after installation. Tests shall be made at not less than 500 Volts.

### DEVICES

Unless indicated otherwise on the drawings all light switches shall be mounted with the centerline of the device 48" above the finished floor.

Unless indicated otherwise on the drawings or in the specifications all receptacles shall be mounted with the centerline of the device 18" above the finished floor.

Receptacles shall be installed with the grounding contact at the top.

Mount all devices so that the cover plate edges are in contact with the wall and are parallel to building features.

### GROUNDING

Ground all non-current carrying metal parts of the electrical system to provide a low impedance path for ground fault current. Route ground connections and conductors to ground and protective devices in shortest and straightest paths as possible.

Insulated grounding bushings shall be required for all raceways, service entrance panels, distribution panels, all raceways one inch and larger and any raceway entering a concentric knock-out.

In general a ground wire shall be installed in every conduit. The conduit installation itself shall serve as an additional grounding means.

Where there are parallel feeders installed in more than one raceway, each raceway shall have a ground conductor.

Where conduits terminate without mechanical connection (i.e., locknuts and bushings) to panelboards, and for all terminations of conduit sizes one inch and larger; and for all sizes of metallic conduit (rigid or flexible) terminating in concentric knockouts, the following procedure

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shall be followed: Each conduit shall be provided with an insulated grounding bushing and each bushing connected with a bare copper conductor to the ground bus in the electrical equipment. The ground conductor shall be in accordance with Article 250 of the NEC.

Install ground rods as necessary to provide an earth ground having a test resistance of no more than 25 ohms.

Test ground rods for ground resistance value before any wire is connected. A portable ground testing megger shall be used to test each ground rod or group of rods. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the electrode tested. Where tests show resistance to ground is over 25 ohms, reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest.

Grounding connections shall be made by exothermal weld or by using a compatible mechanical connector and brazing completely over. Exothermal welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds that have puffed up or which show convex surfaces, indicating improper cleaning, are not acceptable. No mechanical connector is required at exothermal welds.

Connect together system neutral, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing system.

The neutral conductor(s) of the incoming electrical service shall be grounded to the ground rod system, metal cold water piping system, and structural steel using Table 250-66 of the NEC for conductor sizing. Grounding conductors shall be run in rigid non-metallic conduit.

Grounding conductors shall be attached to equipment with a bolt-on lug or approved tapered screw used for no other purpose. Use crimp-on spade lugs for stranded conductors.

## IDENTIFICATION

### Equipment

Equipment identification shall be made using engraved laminated plastic plates (indented tape labels will not be permitted). Characters shall be white on a black background and 1/4" high minimum. Plates shall be secured to the panels by means of screws or metal pressure pins. Cement, by itself, will not be acceptable. All nameplates shall be mounted on the outside surface of the piece of equipment.

Individually enclosed safety switches, circuit breakers, and motor starters, pull boxes, control cabinets and other such items shall be identified indicating load, electrical characteristics, and source. For example, a disconnect switch for a 7-1/2 horsepower, 208 volt, 3 phase air handling unit, Number 8 feed from Panel "MDP", Circuit Number 2 shall be labeled as follows:

AHU-8  
7-1/2 HP, 208V, 3Ø  
Cir: MDP-2

Service entrance panel, distribution panels, panelboards, and transformers shall be identified indicating panel designation from the drawings, electrical characteristics and source. For

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example, a 277/480 volt 3 phase panel "LPA" feed from "MDP" Circuit No. 3 shall be labeled as follows:

LP-A  
277/480V, 3Ø  
(Feeder: MDP-3)

All enclosures containing energized components shall be marked with mylar labels identifying hazards. Such warning messages as "WARNING-HAZARDOUS VOLTAGE", "480 VOLTS", "240 VOLTS", etc. are acceptable. Labels shall be EZ-Code by Thomas & Betts or similar product.

Junction Box Identification: Each junction box cover shall be labeled with a permanent "magic" marker or other means to identify the circuits within. For example, a junction box containing lighting circuits 21, 23, 25 from Panel L2A would be labeled "L2A-21,23,25". Telephone junction boxes shall be labeled "T". Fire alarm system junction boxes shall be labeled "FA". Public address, nurse call, and other system junction boxes shall be labeled accordingly.

Conductor Identification: All cables and wires shall be color coded as to phase per convention. See color coding above.

Device Identification: When it is not clear what a wall switch or what a receptacle is dedicated for then the device plate shall be engraved appropriately. Blank plates for future devices shall be engraved "FUTURE". All plates shall be factory-engraved.

#### FIREPROOFING

All conduit and boxes passing through or installed within fire walls and smoke walls shall be installed so as to maintain the integrity and rating of the wall through which it passes. Boxes shall be installed within 1/8" of wall surface. Conduits penetrating rated floors shall be installed to maintain the fire rating of the floor using UL approved sealing materials.

END OF SECTION

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SECTION 26 05 30 - RACEWAY SYSTEMS

PART 1 - GENERAL

SCOPE OF WORK

Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

STANDARD OF MATERIALS

All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

All conduits and raceways, wire, devices, panelboards, switches, etc. of a given type shall be the product of one manufacturer.

SUBMITTALS

Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division. Submit in accordance with Division 1.

PART 2 - PRODUCTS

RIGID CONDUIT, TUBING AND FITTINGS

Rigid steel conduit: zinc coated, threaded type conforming to the requirements of UL 6 and ANSI C80.1 standards. Zinc coating shall be applied to both inner and outer surfaces.

Intermediate metal conduit: hot-dipped galvanized, threaded type conforming to the requirements of UL 1242 and ANSI C80.6 standards.

A fitted thread protector shall protect threaded ends from damage during shipment and handling.

Fittings for rigid steel and IMC conduit: zinc coated, threaded type, conforming to Federal Specification W-F-408.

Electrical Metallic Tubing (EMT): UL 797 and ANSI C80.3 standards.

Fittings for electrical metallic tubing: Federal Specification W-F-408. Steel compression or set-screw type, galvanized or cadmium plated, and suitable for location of installation. Conduit bushings shall be metallic with insulated throats. Insulating grounding type bushings shall be provided where required under "Grounding". EMT connectors shall be similar to T&B "Insuline" with completely insulated throats. Field applied insulated throats are not acceptable.



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Rigid aluminum conduit: UL 6 and ANSI C80.5 standards.

Couplings, fittings, pipe straps and spacers used with aluminum conduit shall be fabricated of aluminum.

Fittings for rigid aluminum conduit: threaded type, fabricated of aluminum.

Plastic conduit for direct burial: UL labeled Schedule 40 PVC manufactured to NEMA TC-2 specifications, and UL 651 specifications. Plastic conduit concrete encased may be Type EB.

Plastic interduct for installation in PVC conduits: UL labeled and listed for installation of inside/outside communication cable.

Couplings, fittings, pipe straps and spacers used with rigid plastic conduit shall be fabricated of plastic.

Fittings for plastic conduit: manufactured to NEMA TC-3 specifications.

Acceptable Metal Conduit and Tubing Manufacturers:

EMT:               Allied Tube & Conduit Co.  
                      Wheatland Tube Co.  
                      Triangle PWC, Inc.

Fittings:               Steel City  
                      Thomas & Betts (T&B)  
                      Raco Inc.

#### FLEXIBLE METAL CONDUIT, COUPLINGS AND FITTINGS

Flexible metal conduit for dry interior applications: Federal Specification WW-C-566 and UL 1, continuous, spiral wound galvanized steel type.

Fittings (connectors) for flexible metal conduit: UL E 23018. Squeeze Type of galvanized steel or malleable iron zinc plated.

Flexible metal conduit for damp or exterior applications: liquid tight, UL listed, spiral wound galvanized steel with PVC outer jacket.

Fittings for liquid tight conduit: Federal Specification W-F-406. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and gasket sealing rings and insulated throats.

Acceptable Metal Conduit and Fittings Manufacturers:

FMC:               Alflex Corp.  
                      American Flexible Conduit Co.  
                      Anaconda Metal Hose, ANAMET Inc.

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FMC Fittings:                      Steel City  
   Thomas & Betts (T&B)  
   Raco Inc.

#### CONDUIT MOUNTING EQUIPMENT

Hangers, rods, backplates, beam clamps etc. shall be hot-dipped galvanized iron or steel. They shall be as manufactured by the Appleton Electric Co., Thomas and Betts Co., Unistrut Corp., or approved equal.

#### JUNCTION BOXES

Sheet Steel Outlet Boxes: conform to UL 514A, "Metallic Outlet Boxes, Electrical", UL 514B, "Fittings for Conduit and Outlet Boxes, Covers, and Box Supports", and NEMA OS1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports".

Sheet Steel: Flat-rolled, code gauge galvanized steel.

Acceptable Manufacturers: Sheet-steel boxes shall be manufactured by RACO, Steel City or equal.

All junction boxes and pull boxes shall be sized per NEC requirements and be of the proper NEMA classification for the locations where they are installed. Where boxes occur above other than lift-out ceilings, access panels must be provided.

Wet location covers shall meet NEC wet location requirements (shall comply with NEC). Covers shall be "in-use" type and shall mount vertically or horizontally and be of gasketed heavy-duty polycarbonate construction with clear cover with lockable hasp for 1/8" shank lock.

#### OUTLET BOXES

Switch, receptacle and wall or ceiling mounted junction boxes shall be the 4" X 2 1/8" square type. Tile, dry wall, or flat cover plates for one or two devices shall be furnished for each box as required.

#### OUTDOOR BOXES

Cast Aluminum Boxes: exposed, exterior locations; copper free aluminum, threaded raceway entries, and features and accessories suitable for each location including mounting ears, threaded screw holes for devices, and closure plugs.

Boxes shall have a rear opening in addition to necessary top and bottom openings. Boxes shall be provided complete with a minimum of two closure plugs and self-threading ground screw. Boxes shall have a thermoset, baked enamel silver gray finish. Weatherproof cover plates for one or two devices shall be furnished for each box as required.

Covers shall be of heavy duty die-cast construction. Mounting screws shall be stainless steel. Covers shall have a thermoset, baked enamel silver gray finish and be equipped with a sealing gasket. Covers shall be equipped with a hasp-type locking tab.

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Nonmetallic boxes shall be thermoplastic or polyester fiberglass types as manufactured by Carlon or Pass & Seymour.

#### LOCATION OF OUTLETS

The approximate locations of outlets, etc. are shown on the drawings. The exact locations shall be determined at the building.

It is the responsibility of the Contractor to note the locations and heights of cabinets, counters, shelving units, etc. before the installation of outlets.

#### CONDUIT BODIES

Conduit bodies shall be constructed of galvanized or cadmium plated malleable iron or copper-free aluminum. Galvanized steel or aluminum covers and gaskets shall be supplied.

LB's 3" and greater shall be mogul type with domed covers.

### PART 3 - EXECUTION

#### RACEWAY INSTALLATION

All interior and above grade exterior wiring shall be installed in a metal conduit and all embedded in concrete or below grade wiring shall be in PVC conduit unless indicated otherwise on the drawings. Refer to drawing notes for details.

Exterior low voltage (less than 50 volts) wiring may be installed in liquid tight, non-metallic flexible conduit ("Sealtite") where installation is above grade and not subject to damage.

No conduit smaller than 3/4 inch electrical trade size shall be used, nor shall any have more than three 90 degree bends in any one run. Pull boxes shall be provided as required or directed.

No wire shall be pulled until the conduit system is complete in all details.

The ends of all conduits shall be tightly plugged to exclude dust and moisture during construction.

Conduit support shall be spaced at intervals of 8 ft. or less, as required to obtain rigid construction.

Single conduits shall be supported by means of two-hole pipe clamps. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall be not less than 3/8 inch diameter. The channel shall be not less than 1 1/2" nominal size.

All conduits on exposed work shall be run at right angles to and parallel with the surrounding walls and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall be run straight and true.

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Conduit terminating in sheet steel boxes shall have double locknuts and insulated bushings.

Flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present. Flexible conduit length shall not exceed 1'-6" in length for this application.

Transitions from below grade to above grade shall be with rigid aluminum long sweep nineties with a bituminous coating where in contact with earth or concrete. Area of transition shall not be subject to standing puddles of water.

Seal all wall penetrations to watertight condition. Finish as applicable to location.

Aluminum conduit, when buried in soil, shall be treated with a protective coating of bitumastic or asphalt-base paint, or wrapped with plastic tape.

In general, the conduit installation shall follow the layout shown on the plans. This layout is, however, diagrammatic only, and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made without additional cost to the Owner. It is recognized that branch circuit routing shown on the drawings may not always be the most economical or the most feasible method. Routing may be changed by the Contractor subject to the following provisions:

Conduits shown routed overhead may not be installed in or below slabs or in walls.

Not more than three circuits may be installed in any one conduit. Care must be taken to provide the appropriate number of neutrals where two or three circuits are on the same phase.

All conduit shall be concealed unless otherwise noted on the drawings.

Exposed conduit will be permitted only as shown on the drawings. Exposed conduit shall be run parallel with or at right angles to the building walls.

All empty conduits shall be provided with a plastic pull wire rated for a minimum of 200 lbs.

Conduit stub-ups at panels shall be secured in place by use of Unistrut and clamps.

Flexible conduit in all areas subject to moisture shall be liquid-tight flexible conduit.

All electrical connections to vibration isolated equipment shall be made with flexible conduit.

All conduit entering the building shall be suitably sealed to prevent the entrance of moisture.

Conduit in hazardous locations (as defined and classified by the National Electrical Code) shall be sealed with sealing fittings. Where hazardous locations exist, all conduit, fittings and installation shall comply with Article 500 of the NEC.

Conduit run in areas with hung ceilings shall be installed in the space above the hung ceiling as close to the structure as possible. Conduits shall be supported from the structure.

Where flex conduit is used from junction box to light fixture it shall be supported such that it does not touch ceiling tiles or interfere with their placement.

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Flexible metal conduit connections to light fixtures shall be at least 4 feet but not more than 6 feet in length per NEC 410-117(c).

Raceways concealed in ground outside building shall be a minimum of 2 feet below grade and topped with a two inch concrete cap before backfilling. Install plastic warning tape 12 inches above raceway, buried in backfill. Note, plans indicate deeper installation for service feeder.

#### RACEWAY INSTALLATION - CONDITIONS

Conduit raceways shall be installed as indicated herein. Where more than one type of raceway is listed under one condition, the Contractor may exercise his option of the raceway used. Conditions of raceway installation are as follows:

Exposed Raceway Below 8'-0" from Finish Floor and in Areas Subject to Moisture: Rigid galvanized aluminum conduit.

Raceway Concealed Indoors Overhead, or in Walls: Rigid galvanized steel conduit, rigid galvanized aluminum conduit, intermediate metallic conduit or electrical metallic tubing (EMT).

Raceway Concealed in Ground Outside Building: Schedule 40 PVC or rigid aluminum. Rigid conduits installed below slab-on-grade or in the earth shall have a factory-applied PVC coating, two coats of a coal-tar system, or shall be field-wrapped with 0.010 inch thick pipe-wrapping plastic tape applied with a 50-percent overlay.

Final Raceway Connection to Recessed Fixtures in Accessible Locations: Flexible steel conduit maximum of 6'-0" long.

Final Raceway Connection to Pumps, Motors, Transformers, Etc.: Liquid-tight flexible steel conduit maximum of 1'-6" long.

Raceway That Extend Through the Slab or Above Finish Grade: 90° elbows, nipples and couplings of rigid aluminum shall be used where any raceway extends through the slab or above finished grade. In general PVC conduit shall not be allowed above finished slab inside the building or within 1 1/2' of finished grade outside the building.

In general, no steel shall be installed outdoors where subject to salt spray.

#### OUTLET BOXES

Outlet boxes for flush mounted lighting fixtures shall be accessible. If lighting fixture is in a non-accessible ceiling the box shall be accessible when the fixture is removed.

Set boxes plumb and such that their device mounting plane is within 1/8" of the finished wall.

The location of boxes on the electrical plans is approximate. Review architectural drawings for specific location or if not shown center and align within architectural detail. The Architect shall reserve the right to move boxes during rough in.

END OF SECTION

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SECTION 26 27 13 - SERVICE AND DISTRIBUTION

PART 1 - GENERAL

SCOPE OF WORK

Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

STANDARD OF MATERIALS

All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

All conduits and raceways, wire, devices, panelboards, switches, etc. of a given type shall be the product of one manufacturer.

SUBMITTALS

Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division. Submit in accordance with Division 1.

PART 2 - PRODUCTS

PANELBOARDS

Compliance: NFPA 70 National Electrical Code, UL 67, "Electric Panelboards", NEMA Publication PB1, "Panelboards", Federal W-P-115a Type 1, Class 1 specifications and NEMA PB 1.1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".

Provide factory assembled panelboards in sizes and rating as indicated. Panelboards shall be UL listed and labeled.

Acceptable manufacturers: panelboards shown on the drawings shall be manufactured by Cutler-Hammer, Eaton, Square D, or Siemens.

PANELS

Provide dead front safety type lighting and appliance panelboards as indicated, with panelboard switching and protective devices in quantities, ratings, types, and with arrangement shown; with anti-turn solderless pressure type main lug connectors approved for use with copper conductors.

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Refer to the drawings to determine each panelboards pertinent characteristics such as bus rating, main circuit breaker or lugs only, voltage rating, number of phases, number of positions required, etc.

Select unit with feeders connecting at the top of the panel. Equip with copper bus bars with not less than 98 percent conductivity, and with full size neutral bus; provide suitable lugs on neutral bus for outgoing feeders requiring neutral connections.

Interrupting ratings shall be coordinated with the available short circuit current. Provide molded case main and branch circuit breaker types for each circuit, with toggle handles that indicate when tripped. Where multiple pole breakers are indicated, provide with common trip so overload on any pole will trip all poles simultaneously.

All panels shall be provided with an equipment grounding bus similar to, but isolated from the solid-neutral bus. Provide panelboards with bare uninsulated grounding bars suitable for bolting to enclosures.

Panels shall be carefully aligned and rigidly secured in place with the top of the cabinets located 78 inches above the finished floor.

Each panel shall be furnished with an identification plate as specified in the "Equipment Identification" section of this specification.

**Circuit Breakers:**

Panelboards shall be equipped with thermal-magnetic molded case circuit breakers with trip ratings as shown on the drawings.

Circuit breakers shall be quick-make and quick-break units with positive trip indicating mechanism and common trip on all multi-pole breakers.

Single pole 15 and 20 amp circuit breakers shall be UL listed as "Switching Breakers" and be marked SWD.

Circuit breakers shall be the bolt-on type.

**Bus Assembly:**

Bus bar connections to the branch circuit breakers shall be the "phase sequence" type.

Bus bars shall be of copper construction. All current carrying parts of the bus shall be plated.

Buses shall be full length with constant cross sectional area, designed for the bus current indicated.

Cable lugs shall be furnished in the quantity and size required for the size and number of conductors indicated.

Mains ratings: as shown on the drawings.

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Short circuit current rating: as shown on the drawings. Panelboards, as a complete unit, shall have a short circuit current rating equal to or greater than that indicated. It shall be understood that the minimum rating for 240 and 480 volt rated panelboards shall be 10,000 and 14,000 RMS symmetrical amperes respectively.

Cabinet construction:

Panel enclosures: UL 50. Enclosures shall be furnished without knockouts. All knockouts shall be field cut.

The panelboard bus assembly shall be enclosed in a dead front safety constructed steel cabinet.

The size of the wiring gutters and gauge of steel shall be in accordance with NEMA and UL standards; except that the thickness of steel shall not be less than 16 gauge.

The box shall be fabricated from galvanized steel. Boxes intended for outdoor duty, or where indicated, shall be rated NEMA 3R.

Select enclosures which are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards.

Construction shall be such that circuit breaker mounting hardware is not required when circuit breakers are added in the future.

The panelboard front cover shall be hinged 1-piece with integral door. The integral door shall have completely concealed hinges and door swings, flush lock and key mechanism, and steel door pull.

A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Typed directory cards shall be furnished in each panel.

#### SAFETY DISCONNECT SWITCHES

Compliance: NFPA 70 National Electrical Code, UL 98, "Enclosed and Dead Front Switches", NEMA Publication KS1, "Enclosed Switches", and NEMA KS 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)".

Safety switches shall be provided for all motors and equipment indicated or required by the National Electrical Code.

Safety switches shall be Type "HD" (heavy duty) unless noted otherwise, fused or non-fusible as indicated with number of poles as shown or required. Safety switches for equipment may be non-fused only if equipment is UL tested with circuit breaker protection.

Fuses: general use, dual element time-delay, current limiting. Manufactured by Bussman, Littelfuse, Edison, or equivalent.

Safety switches for exterior application shall be NEMA 4X.



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Acceptable manufacturer: provide safety switches manufactured by Cutler-Hammer, Square D, or Siemens.

Construction: Gray baked enamel finish. NEMA 4X enclosures shall be manufactured from 304 stainless steel. Corners shall be ground smooth and polished to overall finish quality. NEMA 4X enclosures shall be fitted with a condensate drain at the bottom and a vent at the top that is rated for NEMA 4X service.

Ratings: Fusible disconnects shall be 240 or 600 volt rated depending on the service voltage.

Fusible disconnects shall be furnished with Class R fuses of the indicated ampere rating (up to 600 amps) and be equipped with rejection clips.

Fusible disconnects shall be UL listed for 200,000 RMS symmetrical ampere short circuit current when equipped with Class R or Class L fuses.

Lugs shall be front removable and be UL listed for aluminum or copper conductors at 60 degrees C or 75 degrees C.

#### SURGE PROTECTION DEVICES

The SPD shall be Listed in accordance with UL 1449, Fourth Edition. The product and ratings shall be included in the database of the UL.com website.

The surge protective device (SPD) shall be designated a location Type 1 or Type 2 device intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the branch panel.

The SPD shall be connected in parallel with the facility's electrical system.

The SPD shall be made up of metal oxide varistors (MOV's), or a combination of MOV's with selenium cells or silicon avalanche diodes, ensuring that all of the performance requirements are met. Gas tubes shall not be used.

The entire SPD shall be enclosed in a metal or ABS enclosure, NEMA rated for the location. SPDs at main service equipment shall be mounted outside the switchboard or panelboard, not integral to, or installed within the switchboard or panelboard. SPDs for branch panelboard (2<sup>nd</sup> tier) locations may be mounted outside of, or integral to, the branch panelboard. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment.

The SPD shall have a maximum continuous operating voltage (MCOV) rating not less than 115% of nominal voltage of the system it is protecting.

#### Protection Modes:

The SPD shall have line to neutral (L-N), line to ground (L-G), line to line (L-L) and neutral to ground (N-G) protection modes for three-phase grounded wye configured systems. For a three-phase delta configured system, the device shall have line to line (L-L) and line to ground (L-G) protection modes.

#### Voltage Protection Rating (VPR):

The UL 1449 Voltage Protection Rating (VPR) for the device shall not exceed the following:

208Y/120 volt applications:	800V L-N, L-G, N-G; 1200V L-L
480Y/277 volt applications:	1200V L-N, L-G, N-G; 2000V L-L

#### Nominal Discharge Current (In):

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The UL 1449 Nominal Discharge Current Rating (In) shall not be less than the following:

20kA for service entrance, switchboard, and main distribution panel locations  
10kA for branch panelboard (2<sup>nd</sup> tier) locations

Short Circuit Current Rating (SCCR):

The SPD shall have a UL 1449 Short Circuit Current Rating (SCCR) of not less than 200kA.

Surge Current Rating:

The single-pulse (8 X 20 microsecond waveform as specified in ANSI/IEEE Standard C62.41) surge current capacity shall not be less than the following:

100kA per mode (200kA per phase) for service entrance, switchboard, and main  
distribution panel locations  
50kA per mode (100kA per phase) for branch panelboard (2<sup>nd</sup> tier) locations

Each SPD shall include externally-mounted LED visual status indicators that indicate the on-line status of the unit, for each phase.

At service entrance, switchboard, and main distribution panel locations each SPD shall include the following features:

- audible diagnostic monitoring by way of an audible alarm function
- one set of NO/NC dry contacts for alarm conditions

The manufacturer shall provide a minimum 5 year warranty from the date of shipment of the SPD.

## PART 3 - EXECUTION

### PANELBOARDS

Mount panelboards such that top most circuit breaker handles shall not be more than 6'-6" above finished floor.

Where panelboards are to be installed on masonry unit walls, including poured reinforced concrete or brick veneer type, install two vertical sections of galvanized steel channel between enclosure and mounting surface. Channel shall be lagged to wall in three places (each length) and the enclosure bolted to the secured channel using stainless steel or galvanized steel hardware. Galvanized channel shall run the entire length of the enclosure, but shall not be exposed at either the top or bottom of the enclosure.

Only one conductor shall be allowed under each terminal of circuit breakers. No splices are permitted in panelboards. Tighten connectors and terminals in accordance with equipment manufacturer's published torque tightening values for equipment connectors.

Complete and install a typewritten directory for each panelboard that accurately indicates all loads being served by each breaker.

### DISCONNECTS

Disconnects shall be labeled in accordance with Section 26 00 00.

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SURGE PROTECTION DEVICES

Install SPD units in accordance with manufacturer's written instructions, applicable requirements of NEC and NEMA standards, and recognized industry practices.

The SPD units shall be installed at the locations shown on the drawings, or as indicated in the one-line diagram. They shall be parallel-connected to, and located adjacent to the switchboard or panelboard being protected. Locate as close as practical to the bus, keeping lead length as short as possible (less than 3 feet preferred to ensure optimum performance).

SPDs shall be connected through a multi-pole circuit breaker or fused disconnect switch, not into main lugs. Circuit breaker or fused disconnect switch shall be 60A for main service device, 30A for branch panelboard device or as recommended by the manufacturer.

Use schedule 40 PVC conduit or metallic conduit between the SPD and the switchboard or panelboard as recommended by the manufacturer. Avoid sharp bends, excess length, and splices in the wires. Where possible, use a close-nippled connection with wires going directly to a circuit breaker within the switchboard or panelboard.

Setup and test per the manufacturer's recommendations.

END OF SECTION

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SECTION 26 29 13 - PUMP CONTROL PANEL

PART 1 - GENERAL

SUMMARY

This section includes control panels and ancillary wiring and devices for control and operation of submersible pump stations. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUBMITTALS

Shop Drawings for Information: For each pump station. Show arrangement, locations, and details of panels, locations of conduits and power supply.

Qualification Data: The duplex float control panel shall be built by a company with at least 3 years experience in this type of panel. The panel shall be constructed in accordance with UL 508 requirements for enclosed industrial control panels and shall bear the serialized UL label.

PART 2 - PRODUCTS

CONTROL PANELS

All controls for the station operation shall be enclosed in a single NEMA 4X, stainless steel enclosure.

The enclosure shall have a hinged inner door fabricated from 5052-H32 .080-inch thick aluminum. The inner door shall be completely removable for ease of service. The inner door shall be held closed by magnetic catches designed to keep the inner door closed until a severe tug on the door handle. The enclosure shall have a twelve gage steel, formed, removable sub-panel. The sub-panel shall be degreased, cleaned, treated with a phosphate process, then primed and painted with white industrial grade baked enamel. The enclosure and mounting system shall be designed to withstand 150 mph wind loads (min.).

CONTROL COMPONENTS

The panel shall, as a minimum, include the following components:

- Main Circuit Breaker rated 240 volts
- Standby/Emergency Main Circuit Breaker rated 240 volts
- Manual Transfer Assembly (one interlocked Main and Emergency Breaker)
- External Generator Receptacle rated equal or greater than Emergency Breaker Rating
- IEC Rated Motor Starter (one per pump)
- Thermal Magnetic Circuit Breaker (one per pump)
- Thermal Overload for each motor circuit
- Under/Over Voltage Monitor (one)
- Ground Fault Sensor for Each Pump Motor circuit
- HOA Selector Switch (one per pump)
- Elapsed Time Meter (one per pump)
- Pilot Light:

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- Liquid Level (4 required)
- Pump Run (one per pump)
- Seal Fail (one per pump)
- Lead Pump Alternator (one)
- Intrinsically safe relay module for each float switch
- Intrinsically safe relay module for each pump seal probe
- Alarm Light (one)
- Audible Horn (one)
- Lightning/Surge Arrestor (one)
- Battery Backup and Charging System to power alarms during power failure
- 150 watt heater with Thermostat to inhibit condensing

General Components:

Motor starters: Each pump motor shall be controlled on-off through an IEC rated motor starter. Starters shall be sealed, with no replaceable components. A solid state overload protection relay shall be integrated into the starter assembly and be adjustable for motor running current by means of a dial or dip switches. Accuracy shall be to within 0.4 amps.

Control Transformer: a suitable transformer shall be provided for all control power. Provide a separate 20A circuit breaker for control power circuit.

Automatic Alternator: An automatic alternator shall be provided to change the selection of the lead pump after each pumping cycle. The alternator shall be capable of parallel operation of all pumps. The alternator shall be Diversified, model ARA-120-ACA or approved equal.

Thermal Magnetic Circuit Breakers: The circuit breakers shall be quick-make, quick-break and trip free. The thermal and magnetic elements shall operate independently and be designed with a common trip bar breaking all poles when a fault is received on any pole. The circuit breakers shall be Square D, Siemens or ITE similar to Q2 or QOU series or approved equal.

Circuit Breaker Operating Handles: Each circuit breaker shall be mounted with the breaker handles extending through the inner door.

Alarm Light: A red alarm light mounted on the panel enclosure top shall be provided to indicate the following alarm conditions: power failure, pump seal failure and a high water condition. The unit shall consist of a 60W incandescent equivalent LED lamp and red lexan lens. The alarm light shall be Ohio Electric model RL-3K or approved equal.

Elapsed Time Meter: Five-digit, non-resettable elapsed time meters interfaced with the appropriate motor starters shall be mounted on the inner door. One elapse time meter shall be supplied for each pump. The elapse time meters shall be Grasslin, model UWZ 48E-120 or approved equal.

Generator Receptacle: NEMA 4X. 50 amps. A panel-mounted receptacle, pin and sleeve type, with a flap cover shall be provided. The receptacle shall be Pass & Seymour, Leviton or Hubbell.

HOA Selector Switches: NEMA 4X. A SPDT, three-position selector switch shall be provided for each pump.

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Pilot Light: NEMA 4X. Pilot lights shall be provided to indicate run status and seal fail of the pumps/motors. The pilot Lights shall be IDI, or approved equal.

Lightning/Surge Arrestor: A secondary arrestor, complying with ANSI 62.41C3, shall be installed on the line side of the main breaker in accordance with manufacturer's instructions. Arrestor shall be Intermatic model AG6503 or approved equal.

Manual Transfer Assembly: a manual transfer assembly shall be supplied. The assembly shall provide one normal power circuit breaker, one emergency power circuit breaker and interlock to prevent both circuit breakers from being energized at the same time. The circuit breakers shall be Square D type QOU or FAL or approved equal. The mechanical interlock shall be fail safe and arranged to prevent tampering or defeating in any way.

Audible Alarm: A horn shall be provided to sound upon the following alarm conditions: power failure, pump seal failure and a high level condition. The horn shall be electronic and shall be rated 90 db at 5 feet. A single pushbutton shall be mounted on the left side of the enclosure used to energize a relay to silence the horn when pressed. Silence button shall be labeled.

Battery and Charger: A back up battery shall be provided to power the alarm horn and alarm light in case of power failure. The battery shall be a maintenance free nickel-cadmium or nickel metal hydride type. A trickle type charger with overcharge protection shall be provided to charge the battery. Switch over to the battery shall be automatic in case of power failure.

Motor Circuit Overcurrent Protection: the control panel shall have one or more dedicated 2-pole circuit breaker(s) for drives motor circuits. Circuit breakers shall be sized according to the input RLA at the drive input for motors furnished.

## OPERATION

Duplex Operations: Floats shall be utilized to send a signal to the Control Panel. Contingent upon sump level, the floats shall energize the appropriate control contacts. The lowest float shall signal the lead pump to shut down. Upon same level rise, the next higher float shall signal the alternator to select and start a pump. If after the lead pump starts and the level continues to rise to the Lag Pump start contact, the float shall send a signal to the alternator to start the lag pump and both pumps shall run simultaneously. The level shall be lowered until the Stop Float is reached and the controller shall shutdown both pumps. Should the level continue to rise to the High Level alarm Float, the controller shall energize the Audible Alarm and Alarm Light.

## PART 3 - EXECUTION

### PREPARATION

Protect structures, utilities, sidewalks, pavements, and other facilities from damage.

### INSTALLATION

Install control panel on concrete posts with hot-dipped galvanized, epoxy coated or stainless steel channel or angle cross supports as needed to support unit. Provide concrete encasement of posts to prevent tipping or movement of panel. Alternatively, install control panel on building

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exterior wall as shown on plans. Utilize hot-dipped galvanized, epoxy coated or stainless steel channel or angle cross supports as needed to support unit to wall.

Seal all conduits entering panel to prevent entry of corrosive gases or moisture. Use non-corrosive sealant for this purpose.

END OF SECTION

## SECTION 31 02 20 - EARTHWORK

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. The work includes all clearing, excavation, borrow, filling, backfilling and grading indicated on the Drawings and necessary for the proper completion of the project, including for pipes, structures, and pavement. Contractor shall adhere to recommendations provided in the Southern Earth Sciences Engineering Report of Geotechnical Exploration for Camp Helen State Park, Panama City Beach, Florida, SES File No. P23-0329, September 12, 2023. Recommendations contained within this geotechnical report will super cede testing and compaction requirements provided in this specification.

#### 1.2 APPLICABLE CODES, STANDARDS, AND SPECIFICATIONS

- A. All work shall be performed in accordance with Florida Department of Transportation standards, specifications and indexes and in accordance with other state and local requirements.
- B. Current editions or revisions of the following specifications and standards will apply unless specifically noted otherwise herein or on the Drawings.

1. American Society for Testing and Materials (ASTM) Standard

ASTM C 33-85	Concrete Aggregate
ASTM D 698-78	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49 Kg) Rammer and 12 in. (304.8 mm) Drop. Standard Proctor.
ASTM D 1556-82	Test Methods for Density of Soil in Place by the Sand-Cone Method.
ASTM D 1557-78	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (45 Kg) Rammer 2 and 18 in. (457 mm) Drop. Modified Proctor.
ASTM D 2487-83	Classification of Soil for Engineering Purposes
ASTM D 2922-76	Density of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)
ASTM D 3017-78	Moisture Content of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)
2. American Association of State Highway and Transportation Officials (AASHTO) Standards

AASHTO T-99	Standard Proctor
AASHTO T-180	Modified Proctor

#### 1.3 SUBMITTALS

- A. Contractor shall have reports submitted to the Engineer as required in the testing portion of this Section.

#### 1.4 RELATED WORK

- Concrete Curbs, Curbs and Gutters and Sidewalks
- Stabilized Subbase
- Limerock Base Course
- Asphaltic Concrete Paving
- Water Distribution Systems
- Sanitary Sewers
- Stormdrainage Culverts and Structures



- Concrete Work General
- Pre-cast Concrete Structures
- Pre-Cast Stormdrain Structures

## 1.5 SITE CONDITIONS

- A. Character of Excavation Material: Prior to submitting his bid, the Contractor shall satisfy himself as to the character and amount of different soil materials, groundwater and the subsurface conditions to be encountered in the work to be performed. Information and data, when furnished, are for the Contractor's general information. However, it is expressly understood that any interpretation or conclusion drawn there from is totally the responsibility of the Contractor.
- B. Subsurface Investigation: If subsurface information is included as an appendix of these specifications it is the results of soil borings and soil classification and testing made at the exact locations only. While the soil borings and information are representative of subsurface conditions at their respective exact locations, local variations in soils and groundwater will be encountered.
- C. Existing Underground Facilities: Underground structures and utilities shown on the drawings are located according to the best available records. However, it shall be the Contractor's responsibility to acquaint himself with all information, and to accurately locate and uncover all underground structures and utilities along the line of work in order to avoid conflicts with existing facilities. Underground utilities shall be located by the Contractor far enough in advance of the trench or site excavation and pipe laying operations to assure ample opportunity to make the necessary adjustments to avoid conflicts. The Owner shall not be held accountable for inaccuracies or omissions in the locations or grade of facilities of this type.
- D. Conflicts: Where actual conflicts are unavoidable, work shall be performed so as to cause as little interference as possible with the service rendered by the facility disturbed. The Owner may require the Contractor to work in off hours (i.e. 1:00am or Holidays) in order to minimize disturbance. Facilities or structures damaged in the prosecution of the work shall be repaired immediately in conformance with the best standard practices or according to the direction of the owner of such facility, to the extent required, including replacement, at no cost to the Owner.

## PART 2 - MATERIALS AND EQUIPMENT

### 2.1 BACKFILL

- A. The following shall define the terms used in the plans and specifications. Backfill material specifications apply to fill material associated with the sitework and that is five feet beyond the footprint of the buildings. The contractor will need to review the structural fill requirements identified in the geotechnical report prepared by GSE, September 2020.
  1. Topsoil - shall be the upper most layer of soil usually dark in color and approximately 6 inches thick, rich in organic matter.
  2. Gravel Bedding - Gravel bedding shall consist of well-graded crushed stone or crushed gravel meeting the requirements of ASTM Designation C-33, Graduation 67 (3/4-inches to No. 4). Air cooled blast furnace slag, alone or in combination with crushed stone and/or crushed gravel, conforming to ASTM C-33 requirements may also be used.
  3. Select Backfill - shall be a select granular material free from organic matter and of such size and gradation that desired compaction can be readily attained. Select backfill is defined as those complying with AASHTO soil classification Groups A-1 and A-3 having a maximum size not to exceed 3 inches with at least 95% passing the 1 1/2 inch sieve and not more than 10% passing the No. 200 sieve with a coefficient of uniformity of six or greater. The liquid limit shall be less than 15.

In most situations the existing backfill will not meet these requirements, therefore, select backfill is material which must be transported to the site from an approved borrow pit.

4. Suitable or Common Backfill - shall be a satisfactory soil material free from organic matter, muck, marl and rock exceeding 3 inches in diameter. At least 95% shall pass the 1 1/2 inch sieve. Common backfill shall comply with AASHTO soil classification Groups of A-2-5, A-2-6, A-2-7, A-4 and A-5. providing that the liquid limit shall be less than 35. Suitable backfill is usually considered on site material that meets these requirements.
5. Existing or Unsatisfactory Backfill - shall be material obtained from the Contractor's excavations to be used in areas not requiring specific compaction densities. This material shall not be used for pipe bedding nor under streets, street shoulders, or structures common unsuitable material shall comply with AASHTO soil classification Groups of A-6 and A-7. Under no conditions are destroyed pavement materials, curbs, broken concrete, etc., to be included in the backfill.
6. Concrete Encasement - shall be of portland cement type with a compressive strength at 28 days of 2500 psi.
7. Clean Sand - shall be a quartz material with less than 5 percent of the soil particles finer than the No. 200 mesh sieve, a uniformity coefficient greater than 1.5 and an effective grain size of 0.20 to 0.55 millimeters in diameter. Clean sand is required for filter material requiring good permeability.

### PART 3 - EXECUTION

#### 3.1 GENERAL REQUIREMENTS

##### A. Safety

1. In the Contractor's use of streets and highway for the work to be done under these Specifications he shall conform to all City, State, and local laws and regulations. The Contractor shall provide, erect, and maintain effective barricades, danger signals, and signs on all intercepted streets or highways for protection of the work and safety of the public rights-of-ways shall be provided with lights which shall be kept burning at all times between sunset and sunrise.
2. The Contractor shall be responsible for all damages resulting from any neglect or failure to meet these requirements. Where conditions require the presence of a watchman to fulfill the requirements stated herein, same shall be furnished without extra cost to the Owner.
  - a. Access to Fire hydrants shall be maintained at all times. Do not block or barricade with spoil, materials or equipment for any period of time.

##### B. Maintenance of Service

1. The Contractor shall arrange his work to cause minimum disturbance of normal pedestrian and vehicular traffic and will be held responsible for providing suitable means of access to all public and private properties during all stages of the construction. Should the construction work require repairs, changes or modifications of other utilities, it shall be the responsibility of the Contractor to provide for the maintenance of continuous water, electric, telephone, and gas as well as sewage and other utility services to all present customers of such utilities, unless approval in writing is secured from the utility company for interruption of such service. A minimum of one lane of traffic shall be maintained at all times. Contractor shall keep all disturbed roads graded smooth and passable. If the

road becomes impassable, the Contractor shall stabilize with dry, select backfill. The Owner may require the Contractor to work in off hours (i.e. 1:00am or Holidays) in order to minimize disturbance.

C. Limits of Construction

1. In locations where the work is to be installed in streets or road rights-of-way the activities of the Contractor shall be confined to these public properties. Where the use of private property is deemed necessary by the Contractor to facilitate construction work arrangement for such use with the property owner shall be the responsibility of the Contractor. The Contractor shall save the Owner harmless from all claims by adjacent property owners for trespassing or damage due to the activities of the Contractor in the prosecution of the work.

D. Existing Utilities

1. The Contract Documents contain data relative to existing public and private utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.
2. All existing improvements such as pavements, conduit, poles, pipes, overhead wires and other structures, shall be carefully supported and fully protected from injury. The Contractor shall be responsible for damages to these existing utilities and shall, in case they are damaged, restore them to their original condition at no cost to the Owner.
3. Contractor shall give written notice to the Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of work. This can be accomplished by making the appropriate contact with the utility companies listed on Sheet 2 of the Construction Drawings.

E. Property Protection

1. Trees, fences, poles, and all other property shall be protected unless their removal is authorized; and any property damaged shall be satisfactorily restored by the Contractor at the Contractor's expense to a condition equal to or better than that existing prior to beginning the work.

3.2 CLEARING AND GRUBBING

- A. On all areas within limits of clearing and grubbing indicated on the Drawings or specified where earthwork is to be done, all timber, brush, stumps, roots, rubbish, and unsuitable material shall be removed to a depth of not less than one foot below the ground surface. Sound trees and shrubs which do not interfere with the construction and are elsewhere indicated or directed not to be removed, shall be protected properly from damage. The surface shall be plowed to a depth of not less than six (6) inches and all stumps, roots and other perishable matter thus exposed shall be removed to a depth of not less than one foot. Any deposits of muck, peat, bark or trash occurring within the limits of clearing and grubbing or where directed by the Engineer shall be removed to their full depth and backfilled with suitable backfill as specified herein. Material removed during clearing and grubbing shall be hauled to in accordance with local laws and regulations. Landfill fees shall be paid by the Contractor.

All shrubbery, ornamental trees and other such plantings including those within construction area shall be fully protected. If it becomes necessary to remove any grass, shrubbery or planting to accomplish the work, it shall be satisfactorily replaced before the work will be accepted. All areas disturbed during construction shall be restored to a condition equal to or better than that existing prior to beginning the work.

- B. Trees and shrubs selected for preservation shall have their root systems protected from construction traffic, surface storage of materials, and any type of land disturbance within the drip line of the tree or shrub. The drip line of a tree or shrub is the outer outline of the tree crown where it intercepts the ground. Barricade all trees or tree groups which are selected for preservation if the possibility of root damage, surface soil disturbance within the drip line, soil compaction, or impact with construction equipment is prevalent. Barricading shall consist of continuous wood fencing constructed to the outline of the tree crown and shall be sturdy, highly visible and shall be maintained during the construction.

### 3.3 EROSION AND FLOODING CONTROL

- A. During construction operations, the Contractor shall install and maintain temporary erosion and flooding control features to the extent necessary to prevent pollution of streams and lakes, detrimental effects on public or private property adjacent to the construction or damage to work on the Project. Additional erosion control devices may be requested by the Engineer to protect the property described above. This shall be done immediately when directed by Engineer at no additional cost to the Owner.
- B. The Contractor shall attempt to limit the surface areas of erodible earth exposed by clearing and grubbing, excavation or filling operations.
- C. Temporary features may include, but not be limited to silt fences, temporary grassing, sodding, mulching, sandbagging, slope drains, sediment basins, sediment checks, artificial coverings or berms. All City, County, State and Federal ordinances will be complied with.
- D. The contractor shall comply with The Florida Development Manual -- A Guide to Sound Land and Water Management, Department of Environmental Regulation -- Stormwater Management Practices.

### 3.4 DUST CONTROL

- A. If, in the opinion of the Owner or the Engineer, it is necessary to control dust during construction period, the Contractor shall furnish and spread water or calcium chloride at points where dust is a nuisance, or as directed by the Engineer, at no additional cost to the Owner.

### 3.5 PAVEMENT AND SIDEWALK REMOVAL AND REPLACEMENT

- A. Pavement and sidewalk shall be removed and replaced as follows unless shown otherwise on the Drawings.
- B. Pavement, which is to be removed for open-cut trenching, shall be cut vertically with a power-driven friction saw prior to removal. The surface shall be scored to sufficient depth to provide uniform, straight break lines. All removal of pavement shall conform to local, County, State or Federal requirements where applicable. Under no condition shall pavement be cut with a trenching machine, power shovel or backhoe. Width of cut of pavement or sidewalk shall be two feet wider than top of trench, one foot on each side of trench. In the event that trench excavation becomes wider than initial cut, pavement or sidewalk shall be recut to at least one foot back from all edges of actual excavation by the Contractor at his own expense.

1. All cut lines shall be parallel to or at right angles to the longitudinal axis of the pipeline.
- C. Pavement, driveway or sidewalk material shall be separated from other excavated materials and shall not be placed in backfill, but shall be satisfactorily disposed of by the Contractor. Base materials may be salvaged and stockpiled for reuse, but such reuse of base materials shall be subject to the review of the Engineer.
  - D. All pavement and sidewalk removed shall be replaced with base and surface materials which conform as closely as possible in thickness and quality to materials removed. All painted street markings and other traffic control devices shall be restored to former conditions. Use Safety Coatings Co. Roadrunner Traffic marking paint, or approved equal, and Ferro Co. glass spheres or approved equal. Pavement with traffic control devices and sidewalks shall be replaced as soon as practicable after compaction of backfill. Replacement pavement shall be tapered at curb.
  - E. Workmanship and materials shall be in accordance with best standard practice for work of this type, and shall conform to the requirements of Section 330-12, Surface Requirements of Florida Department of Transportation Road and Bridge Manual.
  - F. All necessary barricades, detours, lights and other protective measures shall be provided for protection of both pedestrians and vehicular traffic and shall conform to Florida DOT specifications where no local agency has specifications.
- 3.6 STATE HIGHWAY AND RAILROAD RIGHTS-OF-WAY
- A. Pipe crossings and installations along all railroads and State highways shall be in accordance with the applicable portions of American Railroad Engineers Association (AREA) Specifications for "Pipeline Crossing under Railroad Tracks for Non-Flammable Substances" or Florida DOT "Utility Accommodation Guide" and with details shown on the drawings. Verify the existence of a formal permit to work on the right-of-way at each specific location prior to any work at that site and notify the owner of the right-of-way as required by that permit. Furnish the Engineer and the Owner with a copy of any separate certificate of insurance that is required by the owner of the right-of-way.
- 3.7 CURB AND GUTTER REMOVAL REPLACEMENT
- A. Curb or curb and gutter removal, where required in construction of this work, shall be held to a minimum. Curb and gutter material to be removed shall be carefully separated from trench excavation material and shall be satisfactorily disposed of by the Contractor.
  - B. The Contractor shall replace all curb or curb and gutter which has been removed. Curb or curb and gutter shall be replaced as soon as possible after backfill is placed and compacted and shall be a duplicate in all respects to original construction. Workmanship shall be in accordance with the controlling agency (City, County, State).
- 3.8 RESTORATION OF ROADWAY CROSSINGS AND DRIVEWAY CROSSINGS
- A. Clay, marl, shell or similar roadways and driveways that are crossed or traversed by trenches shall be restored to existing conditions prior to excavation. The Contractor may reclaim existing material, or he may furnish and compact new material. There will be no additional compensation for this type of restoration unless specifically called for in the Special Provisions or on the Bid Proposal.
  - B. Final and complete restoration of crossings in existing public roadways shall be completed not more than 24 hours subsequent to the final lift of the backfill.

### 3.9 EXCAVATION

#### A. General

1. Excavation shall be performed in accordance with all State, County and local regulations. Blasting will not be permitted except by written approval of the Engineer for each specific location where it is to be performed. Excavation shall conform to the dimensions indicated or specified for the pipeline or structure and topography and subgrade conditions encountered.
2. The Contractor shall notify the Engineer in due time to permit him to inspect completed excavations, and no pipes or concrete shall be placed in excavations or upon subgrades until they have been approved by the Engineer.
3. In areas where excavation may endanger existing structures, roads or utilities, Contractor will provide suitable support to these existing facilities so as to insure that damage will not occur. Contractor shall submit proposed method of support of these facilities to the Engineer for approval. The Contractor shall obtain written approval from the facility concerned before proceeding with any construction which might undermine or endanger existing facilities.

#### B. Control of Water

1. Furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during construction. Dewater and dispose of water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public. The Contractor shall at all times have on-hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies and shall have available at all times competent workmen for operation of pumping equipment. Dewatering systems shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written approval from the Engineer.
2. Control of ground water shall be such that softening of the bottom of excavations or formation of "quick" conditions or "boils" shall be prevented. Dewatering systems shall be designed and operated so as to prevent removal of natural soils.
3. Static water level shall be drawn and maintained one-foot below bottom of excavation so as to maintain undisturbed state or natural soils and allow placement of backfill to required density. Dewatering system shall be installed and operated so that ground water level outside excavation is not reduced to extent that would damage or endanger adjacent structures or property.
4. Release of ground water to its natural static level shall be performed in a manner so as to maintain undisturbed state of natural foundation soils, prevent disturbance of compacted fill or backfill and prevent flotation or movement of all structures and pipelines.
5. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

#### C. Shoring, Sheet piling and Bracing

1. Excavations shall be shored and sheeted in accordance with requirements of the Department of Labor Occupational Safety and Health Administration (OSHA) with members of sizes and arrangement sufficient to prevent injury to persons, damage to structures, injurious caving, or erosion. They shall be designed, furnished, placed, maintained and removed by the Contractor.

Sheeting and shoring design shall be submitted to the Engineers as a shop drawing prior to installation and shall bear the seal of a structured engineer registered in the State of the job site.

2. Design, planning, installation and removal of all sheeting, shoring, sheet piling and bracing shall be accomplished in a manner so as to maintain required trench or excavated section with an undisturbed state of soils at and below excavation bottom.
3. Sheet piling and timbers used in trench excavations shall be withdrawn in such a manner so as to prevent subsequent settlement or misalignment of pipe or additional backfill loadings which might overload pipe. Where, in the opinion of the Engineer, removal of sheeting and shoring will or may cause damage to the work or to adjacent buildings, utilities or property, the Engineer may direct Contractor to leave all or a portion of sheeting and shoring in place. Sheeting and shoring shall also be provided as necessary to keep excavations within the available right-of-way.
4. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

D. Excavation for Pipe System

1. Common Excavation

- a. Machine excavation shall be carried to a depth above final pipeline grade that will allow final grading using hand tools, as indicated on the Plans. Care shall be taken to not excavate below required depth. If excavations is carried below required depth, overcut depth shall be backfilled with select backfill material or gravel bedding material furnished at Contractor's expense and compacted to provide pipe support at least equal to that of original material.
- b. Contractor may, at his option, elect to overcut trench and backfill with select backfill or bedding material. If Contractor so elects, depth of overcut shall be such that a minimum of two inches of compacted backfill material will result under lowest projection of pipe bell. No additional payment will be made for this overcut or for furnishing and placing of the required backfill material.
- c. The Contractor shall exercise sound construction practices in excavating trench and maintaining it so no damage will occur to any foundation structure, pole line, pipeline or other facility because of slough of slopes or from any other cause. If, as a result of excavation, there is a disturbance of ground that endangers other property, the Contractor shall immediately take remedial action at his own expense. No act of the Owner or his representatives shall in any way affect liability of the Contractor for damages, expenses or costs that may result from trench excavation.
- d. Trees, stumps and roots within limits of trench excavation shall be removed to a depth of at least 12 inches below bottom of trench.

## 2. Trench Requirements

- a. Width of trench banks from bottom to 12 inches above top of pipe shall not exceed 18 inches nor be less than 12 inches on each side of the pipe with the exception of pre-assembled pressure pipe in non-paved areas for which the minimum trench width shall be pipe diameter plus 1 inch on each side of the pipe.
- b. Trenches for gravity sewers shall be of such depth that the invert of pipe will be at elevations shown on the plans, or as may be determined by the Engineer. Trenches shall provide a minimum cover of 36 inches for water mains and 48 inches for sewage force mains over barrel of pipe, except as otherwise shown. Greater depth may be required to accommodate appurtenances or avoid obstruction.
- c. Excavation for appurtenances shall be made to a size that will allow at least 12 inches between their outer surfaces and embankment or shoring.
- d. The trench shall be dry when the bottom is prepared. A continuous trough shall be excavated by hand to receive the bottom 120 degrees of the pipe barrel. In addition, bell holes shall be excavated so that only the barrel of the pipe receives bearing pressure from, and is uniformly supported by, the bottom of trench. Preparation of trench bottom and placement of pipe shall be such that final position of pipe is true to line and grade and uniformly supported throughout barrel of each pipe length. When pipe is placed in select backfill over rock or other overdepth, additional backfill of same material shall be tamped on each side of barrel to height of spring line, thus forming a trough of firm, compacted bedding.

## 3. Pipe Interferes and Encasements

- a. In no case shall there be less than 4 inches between any two pipelines or between pipelines and structures. Pipe deflections shall be performed in accordance with the plans and as contained herein. Wherever there is more than 4 inches but less than 18 inches clearance between sewers, sewer house laterals, force mains and water mains or water services, then a concrete encasement shall be provided for a distance of 10 feet on each side of the obstruction pipe. Wherever there is more than 4 inches but less than 1.0 foot clearance between any two pipe lines, other than water or sewer, or between pipe lines and structures, then a concrete encasement shall be provided for a distance of 3 feet on each side of the obstruction pipe.
- b. The Engineer shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion and to avoid conflicts.

## E. Excavation for Structures

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection, or as shown on the Drawings.
2. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.



3. In areas underlain by expansive clay, undercutting or excavation of clay pockets will be required beneath footings and slab areas as may be shown on the drawings and directed by the Engineer. Post-hole diggers may be used to determine the depth to the clay materials in all of the footing bottoms. Heavy clay that is encountered within a zone that is four (4) feet below the bottom of any footing or floor slab should be undercut and replaced with suitable or common backfill material. The width of undercutting in the footing should extend at least four (4) feet beyond the edge of the footing or slab to provide a non-expansive water barrier above the clay. Other clay pockets discovered during construction may also require complete removal upon the recommendation of the geotechnical engineer.

F. Unsuitable Material

1. Unsuitable materials are soils exposed at the bottom of excavations that are compressible, expansive, contain extraneous rubble, or offer uneven foundation support. Unsuitable materials/soils will include, but not be limited to, mulch, peat, expansive clays, boulders, rubble, any portion of trees or similar vegetation, wood, or unyielding material such as rock.
2. The Contractor shall notify the Engineer immediately when unsuitable material is encountered. The Engineer will investigate questionable material to determine its suitability. Should the Engineer require soils testing be performed to aid in his determination, then tests revealing suitable materials shall be paid for by the Contractor.
3. Where the Engineer determines that unsuitable material is present below the excavation which will not provide adequate support the Contractor shall remove the unsuitable material as directed by the Engineer and replace the unsuitable material with Select backfill. Prior to the excavation of any unsuitable material, written approval must be obtained from the Engineer. The approval shall state the linear feet of excavation. No payment shall be made for the removal of any unsuitable bedding material if prior approval is not obtained.

3.10 BACKFILL AND COMPACTION FOR PIPES

A. General

1. Contractor shall not perform any backfilling operation other than that necessary to hold pipe in place until the locations of connections and appurtenances have been recorded on the "as-built" drawings and the line has been inspected and released for backfilling. Backfill and compaction shall be performed as specified herein and as shown on the drawings. Backfilling of trenches shall progress as rapidly as the construction, testing and acceptance of work permits. In areas subject to traffic temporary backfill or base material is required to provide a smooth stable driving surface until final base and/or pavement can be constructed.

B. Haunching and Initial Backfill

1. After pipe has been properly laid and inspected backfill shall be carefully placed and compacted around the pipe in loose horizontal layers not exceeding 6 inches loose depth, equally on both sides of pipe and shall be spaded (walked in) and compacted with hand tampers to obtain the required density. This shall continue to a level of one foot above the top of the pipe.

C. Subsequent Backfill

1. Above the level of initial backfill, the trench shall be filled in horizontal layers and mechanically compacted to the density required up to 3 feet below the base of pavement or structures, up to 6 inches in areas to receive topsoil, seeding, or soiling and up to final grade in non-paved streets.

D. Backfill and Compaction Requirements for Pipe (unless shown differently on the plans)

1. Paved Areas

- a. Initial - Select backfill in 6" lifts at 100%.
- b. Subsequent - Select backfill in 8" lifts at 100%.
- c. Top 3 feet below road base - Select backfill in 6" lifts at 100%.

2. Unpaved Street and Street Shoulder Areas

- a. Initial - Suitable backfill in 6" lifts at 95%.
- b. Subsequent - Suitable backfill in 8" lifts at 95%.

3. Off Street Areas

- a. Initial - Suitable backfill in 6" lifts at 95%.
- b. Subsequent - Unsuitable or existing backfill in 18" lifts compact till firm.

NOTE: Density listed are maximum dry density in accordance with AASHTO T-99 Standard Proctor Density.

3.11 BACKFILL AND COMPACTION FOR STRUCTURES

- A. For the area under the structure and within a 2 foot of the perimeter, compact the top 12 inches of subgrade and each 6 inch layer of select backfill or fill material to 100% Standard Proctor density.

3.12 GRADING

- A. Grading shall be performed at such places as are indicated on the drawings, to the lines, grades, and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.
- B. Grade all areas as indicated. Fill shall be brought to finish grades shown and shall be graded to drain water away from structures.
- C. Overall area grading for which no grades are indicated within the limits of construction and outer limits of clearing and grubbing, all holes and other depressions shall be filled, all mounds and ridges cut down and the area brought to sufficiently uniform contour that the Owner's subsequent mowing operations will not be hindered by irregular terrain. This work shall be done regardless of whether the irregularities were the result of the Contractor's operations or originally existed. Permanent ponds or other permanent water areas, as so designated by the Engineer, will not be required to be filled.

### 3.13 TESTING

#### A. General

1. Contractor shall comply and pay for the services of an independent testing laboratory in accordance with Section 01410 "Testing and Laboratory Services" to perform testing specifically indicated herein.
2. Exact location of the test shall be selected by the Engineer or his representative. If the Engineer, after being notified by the Contractor, is unable to be present during the test, the laboratory personnel shall randomly select testing locations that are representative of the work being tested. All cost of this testing and providing of certificates shall be a subsidiary obligation of the Contractor with the cost included in the item for which the testing is associated.
3. The minimum testing rate shall not prevent the Contractor nor the testing laboratory from performing additional testing to insure the construction is in accordance with the plans and specifications.
4. A minimum of two (2) copies of reports of test results of all maximum dry density and optimum moisture content determinations and all in-place density tests shall be submitted to the Engineer. Reports must be signed by a registered Professional Engineer.
5. The Contractor shall repair all test holes and borings resulting from the testing and retesting of his work at no cost to the Owner. Any areas failing to pass the tests as called for, and interpreted by the Engineer, shall immediately be brought into conformance with these Specifications at the Contractor's expense.

#### B. Minimum Schedule of Test Required

1. Determination of the soil classification for each type of soil material used to determine its suitability for use as defined herein and in accordance with the AASHTO or Unified Soil Classification System.
2. Determination of maximum dry density and optimum moisture content for each type of soil to be compacted to a specified density.

At least one determination will be made for each soil used. Tests shall be performed in accordance with the appropriate ASTM or AASHTO Standards.

3. In-place (insitu) density test shall be made in accordance with ASTM and AASHTO Standards and shall be made at a frequency to assure contract requirements are met but in no case less than the following:
  - a. Pipeline backfill at the rate of one test for each 50 linear feet of trenchline for each backfill lift. A backfill lift shall never be considered to be greater than one foot in thickness. In unpaved areas, testing rate by be reduced to one test for each 150 lineal feet of trenchline for each backfill lift.
  - b. Structure backfill at the rate of one test for each 2000 square feet for each backfill lift (maximum lift of 12 inches).
  - c. Pavement, sidewalk and curb backfill at the rate of one test for each 50 lineal feet of street for each backfill lift (maximum lift of 12 inches).

### 3.14 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

**END OF SECTION 310220**

## **SECTION 31 02 51 – STABILIZED SUBBASE**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The work specified in this Section includes all labor, materials, transportation and equipment necessary to properly construct a Type B stabilized roadbed having a Limerock Bearing Ratio (LBR) of 40. The required LBR shall be obtained by stabilizing the roadbed material with crushed limerock, oyster shell, coquina shell or any other material specified in Section 914 of the FDOT Standard Specifications.

#### **1.2 RELATED WORK**

- A. The following items of related work are included and specified in other Sections of these Specifications:
  - 1. Earthwork
  - 2. Limerock Base Course
  - 3. Curbs and Gutters
  - 4. Asphalt Concrete Surface Course

#### **1.3 COMPLIANCE WITH STANDARDS**

- A. Except as modified or supplemented herein, all work in this Section shall meet the requirements and standards listed. In case of conflict between the referenced Specifications or standards, the one having the more stringent requirements shall govern.
  - 1. American Association of State Highway and Transportation
  - 2. Officials - AASHTO
  - 3. Florida Department of Transportation - FDOT

#### **1.4 SUBMITTALS**

- A. Submit reports to Engineer demonstrating materials comply with requirements herein.
- B. Test Results: Submit results of all tests conducted to the Engineer.

### **PART 2 - MATERIALS**

#### **2.1 CRUSHED SHELL**

- A. Crushed shell shall be mollusk shell (i.e. oysters, mussels, clams, cemented coquina, etc.). Steamed shell will not be permitted. At least 97 percent, by weight, of the total material shall be retained on the No. 4 sieve. Not more than 20 percent, by weight, of the total material shall pass the No. 200 sieve. The determination of the percentage passing the No. 200 sieve shall be made by washing the material over the sieve.

#### **2.2 LOCAL MATERIALS**

- A. Local materials shall be high bearing value soils or sand-clay material. Material passing the 40 mesh sieve shall have a liquid limit not greater than 30. The plasticity index shall not be greater than 10. No blending of materials to meet these requirements will be permitted unless authorized by the engineer. When blending is permitted, the blended material shall be tested and approved prior to being spread on the roadway.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. The stabilizing material shall be spread, mixed and compacted in accordance with Section 160 of the FDOT Standard Specifications.

### 3.2 TESTING

- A. Contractor shall comply and pay for the services of an independent testing laboratory in accordance with section 01410.

- 1. Bearing Value Tests

- a. Bearing value samples will be obtained and tested for approximately each 500 square yards of pavement area, as directed by the engineer.

- 2. Density Requirements

- a. Minimum density requirements at any location in the stabilized subbase area will be as shown on the plans and set forth in Section 310220 - "Earthwork". Density tests will be made for approximately each 500 square yards of pavement area as directed by the engineer. The contractor shall dewater the subbase, if required, to ensure proper compaction.

**END OF SECTION 310251**

## **SECTION 31 02 52 – LIMEROCK BASE COURSE**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The work specified in this Section includes all labor, materials, transportation and equipment necessary to properly perform all work specified here, indicated on the drawings or reasonably implied to complete the construction of base course composed of limerock. It shall be constructed on a prepared subgrade, in accordance with these Specifications and in conformity with the lines, grades, notes and typical cross-sections shown on the Drawings and in the Plans. Included as a part of this work are the following items:

- 1. Limerock Base Course (single and double course)

#### **1.2 RELATED WORK**

- A. The following items of related work are included and specified in other Sections of these Specifications:
  - 1. Earthwork
  - 2. Stabilized Subgrade
  - 3. Curbs and Gutters
  - 4. Asphalt Concrete Surface Course

#### **1.3 SCHEDULE**

- A. The Contractor, at his option, may construct a Limerock Base Course when such an alternate is shown on the Plans. If selected for construction it shall be used throughout the project. It shall NOT be mixed with other types of base courses for construction of contiguous portions of the work.
- B. Limerock Base Course construction shall not commence (nor shall limerock material be placed on the roadway) until the drainage system (including underdrains) is completed and 100 percent functional and the curbs and gutters, if any, have been properly constructed.
- C. Base Course construction shall commence within 24 hours of completion of the stabilized subgrade work.

#### **1.4 COMPLIANCE WITH STANDARDS**

- A. Except as modified or supplemented herein, all work in this Section shall meet the requirements and standards listed. In case of conflict between the referenced Specifications or standards, the one having the more stringent requirements shall govern.
  - 1. American Association of State Highway and Transportation Officials – AASHTO
  - 2. Florida Department of Transportation – FDOT

#### **1.5 SUBMITTALS**

- A. Submit reports to Engineer demonstrating materials comply with requirements herein.
- B. Test Results: Submit results of all tests conducted to the Engineer.

## PART 2 - MATERIALS

### 2.1 LIMEROCK

- A. The Limerock material shall meet the requirements of FDOT "Standard Specifications for Road and Bridge Construction", Section 911. At the Contractor's option limerock of either Miami or Ocala formation may be used but only limerock of one formation may be used on this contract. The material shall originate in quarries currently on the FDOT approved list for limerock base material sources. Provide certificate of conformance to the requirements of Section 911, FDOT.

### 2.2 PRIME COAT (REQUIRED)

- A. The material used for prime coat shall be cut-back Asphalt Grade RC-70 or RC-250 meeting the requirements of Section 916-2, of the FDOT Specifications, Emulsified Asphalt Grades SS-1 or CSS-1, SS-1H or CSS-1H diluted in equal proportion with water; Asphalt Emulsified Grades AE-60, AE-90, AE-150 or AE-200 diluted at the ratio of 6 parts emulsified asphalt to 4 parts water; special MS-Emulsion diluted at the ratio of 6 parts emulsified asphalt to 4 parts water; Asphalt Emulsion Prime (AEP) meeting the requirements of Section 916-4, of the FDOT Specifications, or other types and grades of bituminous material which may be called for in the Plans or Special Provisions.
- B. The Contractor may select any of the specified bituminous materials unless the Plans or Special Provisions indicate the use of a specific material. Types and Grades of bituminous material other than those specified above may be allowed if it can be shown that the alternate material will properly perform the function of prime coat material.

### 2.3 COVER MATERIAL FOR PRIME COAT (REQUIRED)

- A. If an emulsified asphalt is used for prime coat, the Engineer may require that cover material be hot-asphalt coated (mix to contain from two to four percent asphalt-cement) if necessary to achieve a prime coat which will remain reasonably intact until the surface course is placed. If material other than emulsified asphalt is used for the prime coat, the cover material shall be either sand (bare or hot-asphalt coated) or screenings, at the Contractor's option. The sand shall be non-plastic and free from any appreciable amount of silt, clay balls and root particles, and from any noticeable sticks, trash, vegetation or other organic matter.

### 2.4 TACK COAT

- A. Unless a specific type or grade of material is called for in the Plans or Special Provisions, the material used for tack coat may be any of the following: Emulsified Asphalt, Grades RS-2 or CRS-2; Emulsified Asphalt, Grades SS-1 or CSS-1, SS-1H or CSS-1H (all diluted in equal proportions with water); Emulsified Asphalt, Grades AE-60, AE-90, AE-150 or AE-200, diluted at the ratio of 6 parts emulsified asphalt to 4 parts water; Emulsified Asphalt, Grade CRS-2H; Special MS-Emulsion; Asphalt Emulsion Prime (AEP) (may be diluted with water at the ratio not to exceed 6 parts emulsified asphalt to 4 parts water) meeting the requirements of Section 916-4, of the FDOT Specifications.

## PART 3 - EXECUTION

### 3.1 LIMEROCK BASE COURSE

- A. Equipment to construct the base course shall be as set forth in Section 200-3, FDOT Specifications.



- B. Limerock shall be transported to the point where it is to be used (placed on the roadbed) by hauling over previously placed rock and deposited at the end of the preceding spread material.
- C. The limerock shall be spread, compacted, finished, tested, primed and maintained in accordance with Sections 200-5 through 200-9 (inclusive) of the FDOT Specifications.
- D. In addition to the above requirements, the following shall apply:
  - 1. Section 200-7 shall only apply when the asphalt concrete surface course is to be paid for by the ton.
  - 2. The Contractor shall not be compensated for areas of limerock base that are thicker than shown on the Plans or Drawings. Areas of excess thickness shall not be used to compensate for areas of deficient thickness as set forth in Section 200-9.
  - 3. In maintaining the base the Contractor is required to place sandbag berms at each inlet so as to divert stormwater into the inlet. In all road sections with a grade greater than 2%, per the Drawings, the Contractor shall place sandbag berms at distances no greater than 200 feet between inlets.

### 3.2 PRIME COAT AND COVER MATERIAL (REQUIRED)

- A. Equipment to construct the prime coat and spread the cover material shall be as set forth in Section 300-3, FDOT Specifications.
- B. Cover material shall be transported over the portions of the roadbed previously coated with cover material.
- C. The prime coat and cover material shall be constructed in accordance with Section 300-4, -5, and -6 of the FDOT Specifications.

### 3.3 TACK COAT

- A. When a tack coat is required it shall be constructed as set forth in Section 300-7 of the FDOT Specifications.

### 3.4 TESTING

#### A. General

- 1. Testing Agency - The Agency shall be approved by the Engineer, and shall be the type and possess the degree of experience required. If required, furnish evidence of agency's ability to perform the test required in this Specification.
- 2. All testing shall be arranged and paid for by the Contractor.
- 3. The horizontal and vertical locations of the tests shall be reported. Station numbers shall be used with distances right or left of centerline or baseline. Testing to comply to Section 01410.

#### B. Frequency of Tests

- 1. LBR Test - One (1) for each 750 tons or portion thereof delivered to site. The LBR shall be conducted by the quarry and results sent to the Engineer.

2. In-situ Density - One (1) for each 500 square yards or part thereof finished as a unit, but in no case less than two tests or at intervals of not more than 200 feet.
3. Thickness - Thickness of the base shall be determined at all density test sites at intervals of not more than 200 feet.
4. Proof Rolling - Prior to asphaltic concrete placement, the base shall be proof-rolled with heavy pneumatic-tired rollers having unit pressures of 200 psi. All soft, loose, or yielding areas of base shall be excavated and filled with sand-asphalt hot mix (500 lb. Marshall Stability) and compacted.
5. Contractor shall provide template and conduct cross section/crown test in the presence of the engineer.

**END OF SECTION 310252**

## SECTION 311000 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities or abandoning site utilities in place.
7. Temporary erosion- and sedimentation-control measures.

- B. Related Sections:

1. Section 015000 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities, and temporary erosion- and sedimentation-control measures.
2. Section 017300 "Execution" for field engineering and surveying.
3. Section 024116 "Structure Demolition" for demolition of buildings, structures, and site improvements.
4. Section 024119 "Selective Structure Demolition" for partial demolition of buildings or structures.

#### 1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable,

pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

#### 1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or videotape.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

#### 1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Engineer or Owner.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- F. The following practices are prohibited within protection zones:
  1. Storage of construction materials, debris, or excavated material.
  2. Parking vehicles or equipment.
  3. Foot traffic.
  4. Erection of sheds or structures.
  5. Impoundment of water.
  6. Excavation or other digging unless otherwise indicated.
  7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.
- B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.
  1. Use coating with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag/Wrap a 1-inch (25-mm) blue vinyl tie tape flag around each tree trunk at 54 inches (1372 mm) above the ground.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 TREE AND PLANT PROTECTION

- A. General: Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

### 3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Owner and Engineer not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
- E. Excavate for and remove underground utilities indicated to be removed.
- F. Removal of underground utilities is included in earthwork sections and with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security and utilities sections and Section 024116 "Structure Demolition" and Section 024119 "Selective Structure Demolition."

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
  - 3. Use only hand methods for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

### 3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  - 2. Do not stockpile topsoil within protection zones.
  - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
  - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### 3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

### 3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000



## **SECTION 32 02 51 – CONCRETE CURBS, CURBS AND GUTTERS, AND SIDEWALKS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This Section includes all labor, materials, transportation and equipment necessary to properly perform all work specified here, indicated on the Drawings, or reasonably implied to complete the construction. Included as a part of the work of this Section, but not necessarily limited by it, are curbs, curbs and gutters and sidewalks.

#### **1.2 REFERENCED SPECIFICATIONS**

- A. All materials and methods of construction shall conform to the requirements of the "Florida Department of Transportation, Standard Specifications for Road and Bridge Construction" therein.
- B. Section 310220 - Earthwork

### **PART 2 - MATERIALS**

#### **2.1 CONCRETE**

- A. Curbs, curbs and gutters shall be Class I concrete as required in Section 345 of the FDOT Standard Specifications. Concrete for retaining walls shall be Class II as specified therein.

#### **2.2 REINFORCEMENT**

- A. Any steel reinforcement shall conform to the requirements of Section 415 of the FDOT Standard Specifications.

#### **2.3 JOINT MATERIALS**

- A. Joint materials shall be in accordance with Section 932-1, FDOT Standard Specifications.

### **PART 3 - EXECUTION**

#### **3.1 CURBS AND CURBS AND GUTTERS**

- A. Curbs and curbs and gutters shall be formed, excavated for, placed, constructed jointed, finished, cured and backfilled, and the concrete tested in accordance with Section 520 of the FDOT Standard Specifications.

#### **3.2 SIDEWALKS**

- A. Sidewalks shall be formed, excavated for, placed, jointed, finished and cured in accordance with Section 522 of the FDOT Standard Specifications.

#### **3.3 MACHINE PLACEMENT**

- A. Curbs, curbs and gutters, and sidewalks may be placed by machines at the Contractor's option. The finished product shall be true to line, grade and cross-section as shown on the Drawings.
- B. Notwithstanding Sections 520 and 522 of the FDOT Standard Specifications, the following shall apply to items placed by machines.

- C. Contraction joints shall be sawed. Joints shall be sawed as soon as the concrete has hardened sufficient that raveling will not occur and within 24 hours of placement. Sawing shall be with mechanically driven carborundum or diamond saws. The depth of cut shall not be less than 2 inches.
- D. Construction joints shall be sawed. The time element for sawing shall be as set forth above. Construction joints occur at the beginnings and ends of runs by machine placement. Saw cuts shall be made the full height of vertical faces before the wasted material is removed.

**END OF SECTION 320251**

## **SECTION 32 02 52 – ASPHALTIC CONCRETE PAVING**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This Section includes all labor, materials, transportation and equipment necessary to properly perform all work specified here, indicated on the Drawings, or reasonably implied to complete the construction. Included as a part of the work of this Section, but not necessarily limited by it, are the following items:

- 1. Superpave Asphalt Concrete (SP) PG-67-22 Traffic Level B with Reclaimed Asphalt Pavement Material (RAP) maximum of fifteen percent (15%)

#### **1.2 RELATED WORK**

- A. The following items of related work are included and specified in other Sections of these Specifications:

- 1. Earthwork
  - 2. Base Course
  - 3. Curbs and Curb and Gutters

#### **1.3 DESCRIPTION OF PAVING**

- A. Pavement shall be constructed over the existing pavement or bases constructed as specified, and shall conform to grades, lines, and dimensions as indicated on the Drawings. Type of surface course to be specified on the Plans.

#### **1.4 COMPLIANCE WITH STANDARDS**

- A. All work in this Section shall meet requirements and recommendations of applicable portions of standards listed. In cases of conflict between the referenced Specifications or standards, the one having the more stringent requirements shall govern.

- 1. American Association of State Highway and Transportation Officials – AASHTO
  - 2. Florida Department of Transportation - FDOT

#### **1.5 SUBMITTALS**

- A. Mix Design - Submit mix design for approval by the Engineer. No asphalt pavement shall be constructed until the mix design is approved.
- B. Test Reports - Submit test reports indicating the results of testing specified herein to the Engineer.

#### **1.6 JOB CONDITIONS**

- A. Existing Conditions - Examine surfaces to receive work specified herein, for defects that will adversely affect the execution and quality of the work, and for deviations beyond allowable tolerances. Do not start work until all unsatisfactory conditions are corrected.

B. Environmental Requirements - Temperature and weather conditions shall be within the requirements specified in Sections 334 of the FDOT Standard Specifications.

C. Protection of Work

1. Protect graded surfaces from damage by other construction work. Replace damaged materials.
2. Do not permit traffic on finish until surfaces have hardened sufficiently to prevent marring or distorting.

PART 2 - MATERIALS

A.1 ASPHALTIC CONCRETE

A. Superpave Asphaltic Concrete (SP) shall meet Section 334, FDOT Standard Specifications.

B. Notwithstanding the above, the following shall also apply:

1. Gravel, when used in any of the above mixtures, shall be crushed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 1. Superpave Asphaltic Concrete (SP) shall meet Section 334, FDOT Standard Specifications.

3.2 TESTING

A. General

1. Testing Agency - The Agency shall be approved by the Engineer
2. The Contractor shall arrange and pay for all tests required herein.
3. Except as modified herein below, the type, number, frequency, and methods of testing and the evaluation and meaning of test results shall be as set forth in Sections 334 of the FDOT Standard Specifications as applicable to Superpave.

B. Field Testing

1. The project shall be tested at random intervals for each 2000 tons, or fraction thereof, of each type of asphaltic concrete. The following tests shall be conducted as a minimum:
  - a. Mix Proportions - Each day's production shall be tested for compliance with the mix design as to gradation and asphalt content.
  - b. Surface Requirements, Density and Thickness - Each 300 linear feet of paving lane or part thereof shall constitute a Lot and shall be tested for surface requirements, density and thickness.

**END OF SECTION 320252**

## **SECTION 32 02 61 – PAINTING TRAFFIC STRIPES AND MARKINGS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The work under this section includes furnishing all paint, materials, labor and supervision, and equipment to complete the painting and protective coatings as shown on the drawings (if provided) or contained in the Bid Proposal and specified herein. Included as a part of the work of this Section, but not necessarily limited by it, are the following items:
  - 1. Lead-Free Thermoplastic Traffic Paint
- B. Surface preparation, paint, and coating materials, and their application shall be as recommended by the coating manufacturer, specified in the FDOT Standard Specifications for Road and Bridge Construction and approved by the Engineer. The Contractor shall take all health and safety precautions necessary to prevent accidents during the storage, handling, application, and drying of any of the coatings herein described.
- C. Unless otherwise indicated in the Bid Proposal or on the drawings, Contractor shall provide traffic markings as per the recommendations of the Manual on Uniform Traffic Control Devices.

#### **1.2 DESCRIPTION OF PAINTING**

- A. Painted stripes shall be constructed over existing or proposed pavement as indicated on the Drawings. All painted stripes, markings, and messages shall be reflectorized lead-free thermoplastic paint in accordance with sections 710 and 971 of the FDOT Standard Specifications for Road and Bridge Construction, unless otherwise noted as Thermoplastic Paint, and all painting stripes or markers within the FDOT right of way will be Thermoplastic Paint.

#### **1.3 COMPLIANCE WITH STANDARDS**

- A. All work in this Section shall meet requirements and recommendations of applicable portions of standards listed. In cases of conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.
  - 1. American Association of State Highway and Transportation Officials -AASHTO
  - 2. Florida Department of Transportation - FDOT

#### **1.4 QUALITY ASSURANCE**

- A. Obtain painting materials from one manufacturer. Painting materials not obtainable from the prime manufacturer shall be obtained from a second source recommended by the prime manufacturer.
- B. The contractor shall maintain at the job site throughout the construction period a wet film thickness gauge and a magnetic, dry film thickness gauge for the use of the Engineer or his representative.
- C. All Equipment, Alignment, Tolerances, Application, Protection, Corrective Measures, and Acceptance of Work shall meet the requirements of Sections 710 and 711 of FDOT Standard Specifications for Road and Bridge Construction.

## 1.5 JOB CONDITIONS

- A. Existing Conditions - Examine surfaces to receive work specified herein, for defects that will adversely affect the execution and quality of the work and for deviations beyond allowable tolerances. Do not start work until all unsatisfactory conditions are corrected.
- B. Environmental Requirements - Temperature and weather conditions shall be within the requirements specified in Section 710-6, 711-4, and 971 of the FDOT Standard Specifications for Road and Bridge Construction.
- C. Protection of Work - All newly painted stripes and pavement markings shall be protected in a manner set forth in Section 710-7 of the FDOT Standard Specifications for Road and Bridge Construction.

## 1.6 MEASUREMENT AND PAYMENT

- A. Measurement and payment shall be set forth in the Bid Proposal and as provided in Sections 710-10, 710-11, 711-9 and 711-10 of the FDOT Standard Specifications for Road and Bridge Construction.

## PART 2 - MATERIALS

### 2.1 PAINTS

- A. All materials used for the work shall meet the requirements in Sections 710, 711, and 971 of the FDOT Standard Specifications for Road and Bridge Construction.
- B. Traffic Paint shall meet the requirements of Section 971-12 of the FDOT Standard Specifications for Road and Bridge Construction.
- C. Fast Dry Traffic Paint shall meet the requirements of Section 971-13 of the FDOT Standard Specifications for Road and Bridge Construction.
- D. Glass spheres for Reflective Traffic Paint shall meet the requirements of Section 971-14 of the FDOT Standard Specifications for Road and Bridge Construction.
- E. Thermoplastic Traffic Paints shall meet the requirements of Section 711-2 of the FDOT Standard Specifications for Road and Bridge Construction.

### 2.2 EQUIPMENT

- A. Equipment for painting traffic stripes shall meet the requirements of section 710-3 of the FDOT Standard Specifications for Road and Bridge Construction.
- B. Equipment for the application of Thermoplastic Traffic Stripes and Markings shall meet the requirements of FDOT Standard Specifications for Road and Bridge Construction.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. The application of Paint and Spheres shall meet the requirements of Section 710-6 of the FDOT Standard Specifications for Road and Bridge Construction.
- B. The application of Thermoplastic Traffic Stripes and Markings shall meet the requirements of Section 711-4 of the FDOT Standard Specifications for Road and Bridge Construction.

### 3.2 CERTIFICATION OF TESTS

- A. Certification of paint materials shall meet the requirements of Section 711-8, 971-13 and 971-14 of the FDOT Standard Specifications for Road and Bridge Construction.

### 3.3 CORRECTIVE MEASURES

- A. All deviations from the plans shall be corrected in conformance with Section 710-8 of the FDOT Standard Specifications for Road and Bridge Construction.

### 3.4 ACCEPTANCE OF THE WORK

- A. When the work under sections 710 and 711 of the FDOT Standard Specifications for Road and Bridge Construction has been completed to the satisfaction of the Engineer, including any corrections or repairs ordered by the Engineer, acceptance of the work of painting will be made, independent of the remaining work under the contract, and the Contractor will be relieved of all maintenance of the painting except for damage due to his operations.

**END OF SECTION 320261**

## **SECTION 32 02 93 – SODDING, SEEDING, AND MULCHING FOR SITE STABILIZATION**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment and incidentals required to prepare lawn bed and install sodding, seeding and mulching as shown on contract drawings and as specified.
- B. Areas to receive Centipede sod shall be:
  - 1. Five foot wide strip along edge of all asphaltic concrete paving constructed as a part of this contract. This includes roadways and parking areas.
  - 2. Five foot wide strip around the perimeter of all concrete structures constructed or reconstructed as a part of this contract. This includes drainage structures, slabs, and pump stations. However, sod is not required around manholes nor fences.
  - 3. All side slopes interior/exterior of the proposed stormwater management facility
  - 4. All areas in lawns disturbed by Contractor.
  - 5. Five foot wide strip along the outer edge of the all sidewalks constructed or reconstructed as a part of this contract.
  - 6. All Landscape areas.
- C. Areas to receive seed and mulch shall be:
  - 1. All areas disturbed by Contractor that are not required to be sodded.
  - 2. All areas indicated on the drawings.

#### **1.2 SUBMITTALS**

- A. Contractor shall submit to the Engineer a signed statement of total weight for each type of seed and fertilizer actually installed on the project with copies of purchase receipts.

### **PART 2 - MATERIALS**

#### **2.1 MULCH**

- A. The mulch used shall be normally dry mulch shall be straw or hay and shall consist of centipede.

#### **2.2 SEED**

- A. Grass seed shall be centipede. Seed, which has become wet or moldy shall not be used. All seed shall meet the requirements of Section 570 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction 1991.

#### **2.3 FERTILIZER**

- A. Commercial fertilizer shall comply with the State fertilizer laws. The numeral designations for fertilizer indicate the minimum percentage (respectively) of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash, contained in the fertilizer. The chemical designation shall be 12-8-8. Either dry or liquid fertilizer may be used.



## 2.4 SOD

- A. Sod shall be 99.9% centipede. Sod shall meet the applicable requirements of Sections 575 and 981, of the "Florida Department of Transportation Standard Specification for Road and Bridge Construction", (1991).

## 2.5 WATER

- A. The Water used in the grassing operations shall be free of excess and harmful chemicals, acids, alkalis, or any substance, which may be harmful to plant growth or obnoxious to traffic. Saltwater shall not be used.

# PART 3 - EXECUTION

## 3.1 LAWN BED PREPARATION

- A. Areas to be seeded shall be cleared of all rough grass, weeds, and debris, and the ground brought to an even grade as approved. The soil shall then be thoroughly tilled to a minimum 8-inch depth. The areas shall then be brought to proper grade, free of sticks, stones, or other foreign matter over 1-inch in diameter or dimension. The surface shall conform to finish grade, free of water-retaining depressions, the soil friable and of uniformly firm texture.

## 3.2 SEEDING AND MULCHING

- A. Fertilizing, seeding or mulching operations will not be permitted when wind velocities exceed 15 miles per hour. Seed shall be planted or sown only when the soil is moist and in proper condition to induce growth.
- B. Apply the lawn seed with a drop type spreader at the rate of eight (8) pounds per one thousand (1,000) square feet.
- C. Apply half the seed in one direction and the remainder at right angles to the first seeding.
- D. After applying the seed, rake the seed into the seed bed and roll with a lawn roller.
- E. Seeded areas shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 1 1/2 tons of hay or straw per acre. Hay with noxious seeds or plants will not be acceptable. Rotted, brittle, molded hay will not be accepted. It is intended that mulch shall allow some sunlight to penetrate and air to circulate, at the same time shading the ground, reducing erosion and conserving soil moisture. Thickness of covering shall be adequate to hold soil but sufficiently loose and open to favor development of grass. Immediately following spreading of mulch, material shall be anchored to soil by means of a seed drill, dish harrow set to cut only slightly, or other suitable equipment which will secure mulch firmly and prevent loss or bunching by wind or rain, or may be anchored with string lines placed at sufficient intervals. On slopes where machinery cannot be used mulch may be retained in place by hand spading, string lines, or non-metallic open weave fabric. Unless rain is imminent, mulched areas shall be watered immediately after placing. Upon completion, surface or mulched areas shall be free from clods of earth, bumps, or waterholding pockets and to required grades.

## 3.3 SODDING

- A. Sodding shall be incorporated into the project at the earliest practical time in the life of the contract. No sod which has been cut for more than 72 hours shall be used unless specifically authorized by the Engineer after his careful inspection thereof. Any sod, which is not planted within 24 hours after cutting, shall be stacked in an approved manner and maintained properly moistened.

- B. Sodding shall not be performed when weather and soil conditions are, in the Engineer's opinion, unsuitable for proper results.
- C. The sod shall be placed on the prepared surface, with edges in close contact, and shall be firmly and smoothly embedded by light tamping with appropriate tools.
- D. Where sodding is used in drainage ditches, the setting of the pieces shall be staggered such as to avoid a continuous seam along the line of flow. Along the edges of such staggered areas the offsets of individual strips shall not exceed six inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.
- E. On areas where the sod may slide, due to height and slope, the Engineer may direct that the sod be pegged, with pegs driven through the sod blocks into firm earth, at suitable intervals.
- F. Any pieces of sod which, after placing, show an appearance of extreme dryness shall be removed from the work.

#### 3.4 MAINTENANCE

- A. Maintenance shall begin immediately following the last operation of grassing and continue until final acceptance. Maintenance shall include watering, mowing, replanting, and all other work necessary to produce a uniform stand of grass.
- B. Sufficient watering shall be done by the Contractor to maintain adequate moisture for optimum development of the lawn areas. Grassed areas shall receive no less than 1.5 inches of water per week.
- C. Grassing will be considered for final acceptance when the permanent grass is healthy and growing on 95 percent of the area with no bare areas wider than twelve (12) inches.

**END OF SECTION 320293**

## **SECTION 33 02 66 – WATER DISTRIBUTION SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. Work under this section consists of furnishing all materials, supplies, equipment and labor in accordance with the requirements set forth herein and as shown on the drawings.

#### **1.2 APPLICABLE CODES, STANDARDS, AND SPECIFICATIONS**

- A. The work under this contract shall be in strict accordance with the following codes and standards:

1. Local, county and municipal codes;
2. American Society for Testing and Materials (ASTM);
3. American National Standards Institute (ANSI);
4. National Sanitation Foundation (NSF);
5. American Water Works Association (AWWA);
6. American Association of State Highway and Transportation Officials (AASHTO);
7. Florida Department of Environmental Protection (FDEP)
8. Florida Department of Transportation Specifications (DOT);
9. Federal Specifications;
10. United States Department of Commerce Commercial Standards (CS); and
11. All local government rules and regulations.

#### **1.3 CONTRACTOR LICENSE**

- A. Contractor and Subcontractor shall possess valid licenses required by state and local codes. All water main work shall be performed by a State of Florida licensed Underground Utility Contractor. All plumbing work on private property shall be performed by a licensed plumber.

#### **1.4 SHOP DRAWINGS AND SUBMITTALS**

- A. Shop drawings shall be submitted for all items included under this Section and shall include the following minimum information:
  1. Full details of pipe, fittings, special joints, and assembly thereof, including manufacturer's name;
  2. Joint materials and details;
  3. Catalogue cuts, dimensions and full details of all castings, valves and appurtenances;
  4. Certifications as specified herein; and
  5. Reinforcing steel bending and setting drawings.
- B. Furnish sworn certificates in duplicate that all tests and inspections required by the Specifications under which the materials were manufactured have been satisfied.

#### **1.5 RELATED WORK**

- A. Testing
- B. Earthwork

## 1.6 INSPECTION

- A. All pipe and fittings to be installed under this Contract may be inspected at the site of manufacture for compliance with these Specifications by an independent laboratory selected by the Owner. The manufacturer's cooperation shall be required in these inspections. The cost of inspection by an independent laboratory will be borne by the Owner.

## 1.7 MANUFACTURER TESTING OF PIPE AND FITTINGS

- A. Each joint of pipe 4 inches in diameter and larger shall be hydrostatically tested at the point of manufacture as required by the appropriate AWWA Standard. Owner may request that certificates of compliance be furnished with the material.
- B. All ductile and cast iron fittings to be furnished under this Contract shall be inspected and tested at the foundry as required by the AWWA Standard C-110, Section 10-10.
- C. Provide letters of certification of all tests.

## 1.8 DEFINITIONS

- A. DI: Ductile Iron
- B. PE: Polyethylene plastic.
- C. PP: Polypropylene plastic.
- D. PVC: Polyvinyl chloride plastic.
- E. NPS: Nominal Pipe Size
- F. HDPE: High Density Polyethylene Pipe

## 1.9 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and other specialties to include in emergency, operation, and maintenance manuals.

# PART 2 - MATERIALS AND EQUIPMENT

## 2.1 GENERAL

- A. Unless otherwise specified or shown on the drawings, materials and equipment shall be the standard product of a manufacturer and shall comply with the Contract Documents and applicable standards for such materials or equipment.
- B. NSF Compliance:
  - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
  - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

## 2.2 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe shall conform to the requirements of AWWA C-150 unless other wise noted on the plans. The pipe shall be Class 51 thickness. Glands for mechanical joints shall be ductile iron or cast iron. Pipe shall be as manufactured by American Case Iron Pipe Co., Clow, or equal.
- B. Fittings shall conform to the requirements of AWWA C-110. Fittings shall be mechanical joint and shall have a 350 psi minimum working pressure. Fittings shall be as manufactured by U.S. Pipe Co., American Cast Iron Pipe Co., Clow or equal.

- C. Flanged fittings shall conform to ANSI B16.1, screwed-on flanges, faced and drilled to ANSI Class 125-pound template. They shall provide 1/16-inch full face gaskets of red sheet rubber.
- D. Joints shall conform to the requirements of AWWA C-111.
- E. Coatings and Linings of the internal surfaces of all ductile iron pipe and fittings for water mains shall be coated with a cement lining and seal coat in accordance with AWWA C104. The outside surface shall be coated with a bituminous coating approximately one mil thick.
- F. All pipe shall be given a factory hydrostatic test of not less than 600 pounds per square inch.
- G. All ductile iron pipes (NPS3) shall be designed in accordance with the latest version of ANSI/AWWA C150/A21.50 for a rated water working pressure class of 350 PSI.

Ductile iron pipe for above ground installation shall be furnished with flange type joints, unless otherwise shown on the drawings. Flanges shall be ductile iron and conform to ANSI/AWWA C115/A21.15. Flange gaskets shall be full-face type gaskets molded from high-quality styrene-butadiene rubber (SBR) and shall be pre-drilled to match flange bolt pattern. The flange and gasket shall be rated for a working pressure of 350 psi, unless otherwise specified.

For potable water line the interior surface of all ductile iron pipe and fittings with a cement mortar lining and bituminous seal coat in accordance with ANSI/AWWA C104/A21.4. For buried applications, coat the exterior surface of all fittings with a 1.0 mil thick asphaltic coating in accordance with ANSI A21.51. For exposed or above ground applications, coat the exterior surface with an epoxy primer to a thickness of 5 mils and apply a topcoat of epoxy to a minimum thickness of 15 mils. Approved primer and topcoat products include Tnemec Series N140 Pota-Pox Plus (primer) and Tnemec Series 435 Perma-Glaze (topcoat), or approved equals. The topcoat only may be field applied by an experienced applicator and allowed to cure before installation.

All interior linings and exterior coatings (including primers) shall be applied by a certified applicator at the foundry or certified application facility. All surfaces shall be prepared in accordance with the manufacturers' recommendations for the intended environment and the product(s) to be applied.

## 2.3 POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS

- A. PVC pipe for potable water in sizes 4 inch through 12-inch shall conform to AWWA Standard C900-89, "PVC Pressure Pipe for Water". Laying lengths shall be 20 feet  $\pm$  1 inch for all sizes.
- B. Pipe shall have an integral bell end or extruded coupling with gasket seal which is in compliance with the requirements of ASTM D3139, "Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals".
  - 1. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  - 2. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  - 3. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Gaskets: AWWA C111, rubber.
  - 4. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

- C. Pipe shall be Class 150 (DR 18) with cast iron outside dimensions. Each piece of pipe shall be hydrostatically tested to 600 psi. Marking shall include nominal size and O.D. Base (e.g. 6 inch C.I.), material code designation number (PVC 1120), dimension ratio number (DR 18), AWWA pressure Class 150, AWWA designation AWWA C900, as manufacturer's name and production code. All PVC pipe shall be Underwriters Laboratory (UL) and Factory Mutual approved.
- D. PVC pipe in sizes under 4 inches shall be 200 psi (SDR 21) in IPS dimensions manufactured from 1120 PVC resin. Pipe shall have integral wall bells or extruded couplings with gasket seals. Pipe shall be marked with manufacturer's name, size, material code (PVC 1120), pressure rating (200 psi), DR number (DR21).
- E. All taps on PVC pipe will be made through saddles or tapping sleeve and valve.
- F. Fittings for pipe smaller than 4 inches in diameter shall be PVC. Fittings for pipe 4 inches and larger shall be Ductile Iron conforming with the requirements of ANSI/AWWA C153/21.53-84.

## 2.4 PE PIPE AND FITTINGS

- A. PE, ASTM Pipe: ASTM D 2239, DR No. 11; with PE compound number required to give pressure rating not less than 200 psig (1103 kPa).
  - 1. Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
  - 2. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- B. PE, AWWA Pipe: AWWA C906, DR No. 11; with PE compound number required to give pressure rating not less than 200 psig (1103 kPa).
  - 1. PE, AWWA Fittings: AWWA C906, socket- or butt-fusion type, with DR number matching pipe and PE compound number required to give pressure rating not less than 200 psig (1103 kPa).

## 2.5 WATER SERVICE PIPING

- A. Type "K" copper tubing with bronze compression fittings shall be used for ¾ inch through 2-inch services. Copper tubing size outside dimension ratio – 9 (SDR-9). No substitutes will be allowed. No flared or solder joints shall be allowed.

OR

- B. High Density Polyethylene (HDPE) tubing for water supply shall conform to AWWA C901. For HDPE tubing ¾" to 2" in diameter, dimensions shall conform to ASTM D2737 with copper tubing OD Base.

HDPE tubing pressure rating shall be Pressure Class 200 psi with a minimum working pressure of 150 psig, and comply with ASTM D 1598, D1599, D1693, D3350 and AWWA 901.

HDPE tubing material shall conform to ASTM D3350, Standard Code PE 3408, and shall have minimum cell classification of PE 35434C.

OR

- C. PVC pipe in sizes under 4 inches shall be 200 psi (SDR 21) in IPS dimensions manufactured from 1120 PVC resin. Pipe shall have integral wall bells or extruded couplings with gasket seals.

Pipe shall be marked with manufacturer's name, size, material code (PVC 1120), pressure rating (200 psi), DR number (DR21).

## 2.6 DETECTABLE BURIED WARNING TAPE AND COPPER LOCATION WIRE

- A. Detectable buried pipe warning tape shall be 2 inches minimum width, long lasting plastic with metalized foil core specifically designed for non-metallic pipes and shall be placed over all underground water lines and fittings. Metalized core shall be detectable to depths of up to 6 feet by use of commercially available pipe location equipment. Tape shall be furnished in manufacturer's standard color and roll length and shall be imprinted continuously with the following words unless otherwise approved: CAUTION BURIED WATER MAIN BELOW. Detectable buried warning tape shall be equal to or better than Terra Tape "D", as manufactured by Griffolyn Company Inc., 10020 Mykawa Road, Post Office Box 33248, Texas, 77033
- B. In addition to the installation of the detectable buried warning tape over all PVC water lines, the Contractor shall install an 10 gauge insulated copper wire directly on top of all PVC water lines and taped every ten feet for location purposes. The wire shall be continuous and all connections taped. Three feet of excess wire shall be left in all valve boxes. Each fire hydrant shall have one wrap of the wire around the barrel located at final grade and connected to the wire on the water main. No additional payment will be made for this wire and tape installation and will be included in the unit price per linear foot for PVC water pipe.

## 2.7 VALVES AND GATES

### A. General

- 1. Unless otherwise indicated, valves three (3) inches and smaller shall be all brass or bronze, and valves larger than three (3) inches shall be iron body, bronze mounted. Unless otherwise indicated, gate, globe, angle, and check valves three (3) inches and smaller shall be provided with threaded connections; those larger than three (3) inches shall be provided with connections as indicated. Connections shall conform to the herein above specified piping connections.
- 2. All valves shall be ample strength to withstand and operate satisfactorily under the working pressures and shall be subject to the test pressure specified herein. All valves shall be rated for a minimum cold water working pressure of 150 psi and a minimum test pressure of 300 psi, except as otherwise specified herein.
- 3. Tests shall be made in the shop with a hydrostatic water pressure, cost of tests to be merged in the cost of the valves, and any valves which leak or which show any defects shall be rejected.

### B. Valves 4" and Larger (Resilient Wedge Gate, Check, etc.)

- 1. All gate valves in size four inch through 12 inch shall be of the resilient wedge gate type. Valves shall be manufactured to meet all applicable requirements of AWWA Standards for Resilient Seated Gate Valve C509-80. All valves of this type shall be bubble tight at 200 psi water pressure.
- 2. Valves shall have non-rising stems open by turning counter clockwise (left) and with two inch square operating nut with arrow cast in metal to indicate direction of opening.
- 3. The inside of the valve body and bonnet shall be lined with an epoxy coating. The lining shall be a two-part thermosetting epoxy resin applied by the manufacturer and equal to Endurall 3300.

4. Each valve shall have the manufacturer's name, pressure rating and year manufactured cast on the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure.
5. All valves shall be the mechanical joint type as manufactured by Mueller, Clow, American, Dresser or equal.
6. Each valve shall be equipped with a valve box. For this project a total of two (2) tee handle socket valve wrenches shall be furnished by the Contractor to the Owner. The cost of valve wrenches and boxes shall be included in the price of the valve.
7. All internal coatings shall be ANSI Standard 60 certified.
8. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, ductile iron, non-rising stem, resilient seated gate valves with valve box.
  2. Use the following for valves in vaults and above ground:
    - a. Gate Valves, NPS 2 (DN 50) and Smaller: Bronze, non-rising or rising stem.
    - b. Gate Valves, NPS 3 (DN 80) and Larger: AWWA, ductile iron, OS&Y rising stem, resilient seated or UL/FMG, cast iron, OS&Y rising stem.
    - c. Check Valves: AWWA C508, swing type with rudder flapper.

C. Gate Valves, Under 4 inches (Bronze)

1. Gate valves three (3) inches in size and smaller shall be 125 lb. bronze, rising stem, double wedge disc, union or screwed bonnet type. Valves shall be of a design to permit repacking under pressure. Unless otherwise indicated valves shall be equipped with handwheels. Each valve shall be equipped with a valve box.

## 2.8 VALVE BOXES

- A. All valves installed underground shall be provided with adjustable cast iron valve boxes to fit the depth of earth cover over the valve. Boxes shall be three piece adjustable screw type with a minimum inside diameter of 5". Boxes shall be furnished with case iron covers marked "Water" and so constructed as to be tight and non-rattling. Boxes shall be so designed as not to bear on the valve or pipeline or transmit any surface loads thereto.

## 2.9 FIRE HYDRANTS

- A. All fire hydrants shall fully comply with AWWA C-502 and be a mechanical-joint, dry barrel-traffic type as manufactured by Mueller Centurian No. 423 or equal. The size shall be six (6) inches in diameter by three (3) feet in length with a 1-1/2 inch Pentagon operating nut and equipped with two 2-1/2 inch hoses and one 4-1/2 inch pumper connections. The hydrant shall be painted fire engine red with caps equipped with chains.

## 2.10 HOSE BIBS

- A. Hose bibs shall be Crane No. 58 or equal of size shown on the Drawings.

## 2.11 PIPING INSTALLATION

- A. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:



1. Install tapping sleeve and tapping valve according to MSS SP-60.
  2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
  4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- B. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:
1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
  2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
  3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
  4. Install corporation valves into service-saddle assemblies.
  5. Install manifold for multiple taps in water main.
  6. Install curb valve in water-service piping with head pointing up and with service box.
- C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- D. Install PE pipe according to ASTM D 2774 and ASTM F 645.
- E. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- F. Bury piping with depth of cover over top at least 30 inches (750 mm) in non-paved areas with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following, or per section 3.2 of these specs, whichever is greater:
1. Under Driveways: With at least 30 inches (910 mm) cover over top.
  2. In Loose Gravelly Soil and Rock: With at least 12 inches (300 mm) additional cover.
- G. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- H. Bed pipe in soil that is at least 95% compacted and does not contain sharp rocks or objects. Backfill with native soil, remove sharp rocks and objects in the soil surrounding the pipe. Compact soil for every 1 foot of fill.
- I. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping as indicated in the Restrained Joints section, thrust blocks, anchors, tie-rods and clamps, and other supports.
- K. Joint Construction - Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.

## 2.12 SERVICE SADDLES

- A. For 3/4 inch and 1 inch taps on PVC pipe, a service saddle with a single 2 inch wide stainless steel band or strap shall be furnished. The saddle shall be of cast or ductile iron and shall be epoxy, nylon, or PE coated (10 mils minimum). Approved styles are Ford FC101, Romac 101N and Rockwell 315, or Cascade Model CNS1. No substitutes.
- B. For 1 1/2 inch and 2 inch taps on PVC pipe, a more stable saddle is required. Saddles for these taps shall have either two each stainless steel 2 inch straps or a single stainless strap a minimum of 3 1/4 inches wide. The saddle body shall be cast or ductile iron and shall be coated with epoxy or nylon. Approved styles are Ford FC202, Romac 202N and Rockwell 317, Cascade Model CNS2.
- C. As an equal alternate, service saddles may be Continental "Fasttap" model #5263-31-2506-00.

## 2.13 REPAIR OR JOINING CLAMPS

- A. If repair or joining clamps are required, Contractor shall notify Engineer for approval indicating make and model and intend use. Clamps shall be of non-corrosive material (i.e., stainless steel, cast iron, bronze) as manufactured by Rockwell or equal.

## 2.14 TAPPING SADDLES, SLEEVES AND CROSSES

### A. Tapping Saddles

1. Tapping saddles shall be fabricated of ductile iron or steel and suitable for either wet or dry installation as manufactured by American Cast Iron Pipe Company, U.C. M. Corporation, or approved equal. The sealing gasket shall be the o-ring type suitable for the applicable service. The outlet flange shall be ANSI B16.1, 125 lb. standard.
2. The straps and bolts shall be corrosion resistant alloy steel.

### B. Tapping Sleeves and Crosses

1. Tapping sleeves and crosses shall be of mechanical joint type with outlet flange per ANSE B16.1, 125 lb. standard as manufactured by Mueller No. 615 or 715, or approved equal.

### C. Cut-In Sleeves

1. Cut-In sleeves shall be mechanical joint type class 150 ductile iron as manufactured by Mueller.

## 2.15 METER BOXES

- A. Meter boxes shall be concrete, plastic, or cast iron unless otherwise indicated on the plans or in the Bid Proposal. The inside dimensions shall be approximately 11" x 24", rectangular in shape with a hinged cast iron lid for reading the meter. The box shall be large enough to house the back flow preventor, meter, curb stop, and hand valve.

## 2.16 DOMESTIC WATER METER

### A. General

1. The domestic meter shall be a positive displacement, 5/8 inch by 3/4 inch size unless otherwise indicated on drawings. It shall meet AWWA standards for displacement type cold water meters. The water meter shall be a Rockwell SR or approved equal.

### B. Meter Construction

1. Main Case
  - a. The meter shall have a bronze main case. The bronze case must be able to withstand internal pressure and external stress without distortion, cracking or breaking to cause leaking or to interfere with the proper operation of the meter. The meter shall have a strainer to prevent foreign material from entering the measuring chamber.
2. Register
  - a. The register shall be hermetically sealed and magnetically driven. The registration reading shall be U.S. gallons with a 10 gallon sweepband and shall have a capacity of 1,000,000 gallons.
3. Accuracy and Operating Range
  - a. Normal operating flow range of the meter shall be 1 to 20 gallons per minute and accuracy at the normal flow range shall be  $100 \pm 1.5$  percent of actual flow. Low flow registration shall be 95 percent at 1/4 gallons per minute. Maximum pressure loss at 20 gallons per minute shall not exceed 11 psi. Maximum operating pressure shall be 140 psi.

### C. Workmanship and Materials

1. The supplier and manufacturer shall warrant the meter including register for a period of twenty-five (25) years. The supplier shall replace or repair, without charge, those parts in which a defect has developed within the specified warranty period upon return of such parts.
2. The meter installation shall be warranted for a period of twelve (12) months.

## 2.17 GLOBE SERVICE VALVES (HAND VALVE)

- A. Globe service valves (hand valves) shall be installed inside meter box. Valves shall be 3/4" size with 3/4" iron pipe threads end configuration. Globe service valves shall be Ford G11-333 or approved equal.

## 2.18 ANGLE BALL METER VALVES

- A. Angle ball meter valves shall be 5/8" size with inlet pack joint for 3/4" plastic tubing. Angle ball meter valves shall be Ford BA43-232W or approved equal.

## 2.19 RESIDENTIAL BACKFLOW PREVENTER

- A. Residential backflow preventers shall be Mueller RPZ Model H-14242 or approved equal.

## PART 3 - EXECUTION

### 3.1 GENERAL REQUIREMENTS

#### A. Safety

1. In the Contractor's use of streets and highway for the work to be done under these Specifications he shall conform to all City, State, and local laws and regulations. The Contractor shall provide, erect, and maintain effective barricades, danger signals, and signs on all intercepted streets or highways for protection of the work and safety of the public rights-of-ways shall be provided with lights which shall be kept burning at all times between sunset and sunrise. The Contractor shall be responsible for all damages resulting from any neglect or failure to meet these requirements. Where conditions require the presence of a watchman to fulfill the requirements stated herein, same shall be furnished without extra cost to the Owner.

#### B. Maintenance of Service

1. The Contractor shall arrange his work to cause minimum disturbance of normal pedestrian and vehicular traffic and will be held responsible for providing suitable means of access to all public and private properties during all stages of the construction. Should the construction work require repairs, changes or modifications of other utilities, it shall be the responsibility of the Contractor to provide for the maintenance of continuous water, electric, telephone, and gas as well as sewage and other utility services to all present customers of such utilities, unless approval in writing is secured from the utility company for interruption of such service.

#### C. Limits of Construction

1. In locations where the work is to be installed in streets or road right-of-way the activities of the Contractor shall be confined to these public properties. Where the use of private property is deemed necessary by the Contractor to facilitate construction work arrangement for such use with the property Owner shall be the responsibility of the Contractor. The Contractor shall save the Owner harmless from all claims by adjacent property owners for trespassing or damage due to the activities of the Contractor in the prosecution of the work.

#### D. Existing Utilities

1. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.
2. All existing improvements such as pavements, conduit, poles, pipes and other structures, shall be carefully supported and fully protected from injury. The Contractor shall be responsible for damages to these existing utilities and shall, in case they are damaged,

restore them to their original condition at no cost to the owner.

3. Contractor shall give written notice to the Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of work. This can be accomplished by making the appropriate contact with the following utility companies listed on page 2 of the plans.

### 3.2 PIPE INSTALLATION

#### A. Connections to Existing Mains

1. It is the Contractor's responsibility to make exploratory excavations and/or use other methods available to locate valves, fittings and piping prior to construction of any underground piping system and to adjust the new piping layout to agree with existing piping layout prior to construction and at no additional cost to the Owner. All adjustments shall be subject to approval by the Engineer prior to installation.
2. Prior to any connection to existing mains, all new water mains and service lines must have passed all pressure and disinfection test as required herein and written permission must be obtained from the Engineer authorizing the connection. The Engineer's authorization shall only be given after a clearance or partial clearance is issued by the Florida Department of Environmental Regulation.
3. Contractor shall have all fittings and equipment and adequate labor on-hand so as to make as quick as possible connection to minimize interruption of water service. Engineer shall specify time of day and day of week for connection to minimize effects of interruption. Contractor shall notify Engineer and utility owner 48 hours prior to connection. Engineer may require Contractor to use restraint rods, retainer glands or other methods in place of thrust blocks to avoid time required for concrete to harden.

#### B. Separation

1. Water and sewer main lines 3" in diameter or greater shall maintain a horizontal separation of 10 feet or a vertical separation of 18 inches. When this is not possible, concrete encasement of pipe for a distance of ten feet each side of the sewer main shall be used. In lieu of the concrete encasement, ductile iron pipe may be used. A minimum vertical separation of 6 inches shall be maintained with all other utilities.

#### C. Excavation, Backfill and Compaction

1. Excavation, backfill and compaction shall meet the requirements of Section 02200, Earthwork and as shown on the drawings.

#### D. Field Layout

1. Only approximate location of lines are indicated on drawings. Field adjustment of location will be required. Consult Engineer for proper adjustments.

#### E. Depth of Cover

1. Where elevations are not indicated, lay water main lines with a minimum of 36 inches of cover unless shallower depths are specifically indicated on the drawings. Greater depths will be permitted where required to miss obstructions or for proper installation of valves, hydrants, or specials. Pipe shall not be deflected more than manufacturer's recommendation.

2. Service lines shall have a minimum cover of 18 inches.

F. Well Pointing

1. Water shall not be allowed in the trench at any time. An adequate supply of well points, headers or pumps, all in first class operating conditions, may be used to remove the water. The use of gravel and pumps shall also be an acceptable means of removing the water. The trench shall be excavated no more than the available pumping facilities are capable of handling. This discharge from pumps shall be routed to natural drainage channels or emptied into drains or storm sewers.

G. Ductile Iron Pipe (D.I.P.)

1. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA Standard Specification C600 and the Handbook of Ductile Iron Pipe, 6th Edition.

H. Polyvinyl Chloride Pipe (PVC)

1. PVC pipe and fittings shall be installed in accordance with the Handbook of PVC Pipe, 2nd Edition.

I. Pipe Laying

1. The bottom of the trench shall not be excavated below the specified grade. If undercutting occurs, the bottom of the trench shall be brought up to the original grade with approved material, thoroughly compacted as directed by the Engineer.
2. After placing a length of pipe in the trench, the spigot end shall be centered in the bell, the pipe forced home, brought to correct alignment, and covered with an approved backfill material.
3. When pipe laying is not in progress, the open ends of pipe shall be closed by a water tight plug or other approved means. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
4. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe.
5. Lines shall be laid reasonably straight and any change in grade following the contour of the ground shall be made in long sweeping curves and no abrupt changes in direction or grade will be allowed except as indicated on the Drawings.

3.3 INSTALLATION OF COPPER LOCATION WIRE AND DETECTABLE WARNING TAPE

- A. Install continuous underground detectable warning tape and locating wire during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.
- B. Install a continuous 10 gauge insulated copper locating wire directly on top of all PVC water lines and tape every 10 feet to secure to pipe. The wire shall be continuous and all connections and splices taped and/or secured with wire nuts. Allow at least 3 feet of excess wire above grade at all valve boxes and fire hydrants. The excess wire shall be coiled inside the valve box and/or wrapped around the base of hydrants.

- C. Continuous underground detectable buried warning tape shall be installed by the Contractor over all PVC and plastic water mains or underground piping, or as indicated on the Drawings and specified here, except the detectable tape is not required over service lines. Following trenching and laying of the water main line, the trench shall be backfilled and compacted as specified elsewhere to a depth of 16 inches  $\pm$  2 inches measured from ground level. Tape shall then be placed into the trench with the wording side visible and centered directly above the pipe below. Installation of the tape shall be in accordance with the manufacturer's recommendations, except as otherwise specified or approved. Tape shall run continuously. Where splicing is required, tape shall be over-lapped a minimum of 12 inches.
- D. Following placement of the tape, the trench shall be backfilled with due caution to prevent displacement or damage to the tape. After the tape has been installed and the trench backfilled, the Contractor shall perform a detection test using a commercially available pipe detector furnished by the Contractor. Any undetectable tape shall be replaced by the Contractor to the satisfaction of the Engineer at no additional expense to the Owner.
- E. Permanently attach equipment nameplate or marker indicating plastic water-service piping.

### 3.4 VALVES AND FITTINGS

- A. All valves and fittings shall be set and joined to the pipe in the proper location as specified in the Drawings. A valve box shall be provided for every valve. This valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve, with the box cover flush with the final grade or as may be specified in the Drawings.
  - 1. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
  - 2. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
  - 3. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
  - 4. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
  - 5. MSS Valves: Install as component of connected piping system.
  - 6. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
  - 7. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.

### 3.5 THRUST BLOCKS (LOCATION AND USE IS BY APPROVAL)

- A. Longitudinal thrust along pressurized pipe lines at bends, tees, reducers, and caps or plugs shall be counteracted by enough weight of concrete to counterbalance the vertical and horizontal thrust forces. Where undisturbed trench walls are not available for thrust blocking, the Contractor shall furnish and install suitable pipe harnesses or ties designed and manufactured for this purpose. Harnesses and/or ties shall be approved by the Engineer.
- B. Thrust blocks shall be sized for 150 psi hydrostatic pressure, with dimensions as indicated on the Water Detail Sheet. Restrained joints shall be used where directed by the drawings and may be used at other locations with prior approval by the Engineer. Joints shall be protected by felt roofing paper prior to placing concrete thrust block.

- C. Concrete for thrust blocking shall be no leaner than one part cement, 1 1/2 parts sand, and 5 1/2 parts aggregate having a compressive strength of 2000 psi. Concrete shall be placed against undisturbed material, and shall not cover joints, bolts or nuts, or interfere with the removal of any joint. Wooden side forms shall be provided for thrust blocks.
- D. In lieu of thrust blocking, with the approval of the Engineer, pipe harnesses and/or ties or restrained push-on or restrained mechanical joints may be used.

### 3.6 RESTRAINED JOINTS

A. Restraining Gaskets and Mechanical Thrust Restraints Products

When restrained joints are required for below ground installations, furnish and install restrained joint pipe and/or mechanical joint restraints in accordance with the Standard Construction Details, or as specified by the Engineer of Record. The type of thrust restraint required shall depend on the material and joint type of the pipe requiring restraint. Thrust restraint maximum working pressure shall equal that of the piping. Approved thrust restraints for various pipe materials and joint types are provided in Table below.

<b>Table Approved Thrust Restraints for Pressure Pipe and Fittings</b>		
Pipe Material	Joint Type	Approved Restraints
DI	Push-On (12-inch and smaller)	American Fast-Grip® Gasket McWane Sure-Stop 350® U.S. Pipe Field-Lok® 350
DI	Push-On (14-inch and larger)	American Flex Ring / Field Flex Ring U.S. Pipe TR Flex®
DI	Mechanical (All sizes)	EBAA Iron Megalug® Series 1100 EBAA Iron Megalug® 15MJ00TD (Tru-Dual®) Sigma One-Lok™ D-Series SLDE (Domestic) Tyler Union TUF Grip™ Series 1000 (TLD/DI) U.S. Pipe MJ Field Lok® (DI) Star Pipe Stargrip Series 3000
PVC	Push-On	Diamond Plastics - Diamond Lok-21® Gasket EBAA Iron Series 1900 JM Eagle - Eagle Loc 900™ Gasket Tyler Union TUF Grip™ Series 3000 (PP/PVC) Star Pipe Restrainers Series 1100G2
PVC	Mechanical	EBAA Iron Megalug® 2000PV EBAA Iron Megalug® 19MJG00 Sigma One-Lok™ D-Series SLCE (Domestic) Tyler Union TUF Grip™ Series 2000 (TLP/PVC) Star Pipe Stargrip Series 4000
HDPE	Fusion Welded	No Restraints Required
HDPE	Mechanical	HDPE MJ Adapter w/ SS Stiffener

NOTES:

- Concrete thrust blocks shall not be allowed unless approved in writing by the owner.
- Except for PVC Push-On joint restraints, split split-design mechanical thrust restraints shall only be considered for adding restraint to existing DI and PVC pipes.
- Bolts and nuts for mechanically restrained joints shall be hot dipped galvanized, low alloy, high-strength steel. All-thread rods and associated washers and nuts for restrained joints shall be Type 304 Stainless Steel.

B. Restraining Gaskets and Mechanical Thrust Restraints Execution



Restraining gaskets and/or mechanical thrust restraints shall be used to provide resistance to thrust forces generated in pressurized pipelines at all valves, bends, tees, reducers, and caps or plugs. The length of restrained pipe on each side of the valve and/or fitting shall be sufficient to provide adequate resisting force to prevent separation of the pipe joints and fittings.

The minimum number of restrained joints required for resisting thrust forces shall be determined by the pipe size, material, type of valve or fitting, operating conditions, pipe trench, and soil type. Minimum restrained lengths for many typical applications are provided in the tables below, which have been calculated for various pipe material and fittings based on the following minimum design parameters:

Soil Designation: Good Sand (Unified Soil Classification: Type SM)  
Safety Factor: 1.5  
Trench Type: Type 3  
Depth of Bury: 3 Feet  
Test Pressure: 150 PSI

Any variations from the minimum restrained lengths provided in the Standard Construction Details and the design parameters above shall be requested in writing by an active Florida Licensed Professional Engineer, in good standing with Florida Board of Professional Engineers. Such requests shall include suggested changes to design parameters, supporting documentation, and new restrained length calculations, signed and sealed by the Professional Engineer.

Where concrete thrust blocks are required in addition to, or in lieu of, restraining gaskets and/or mechanical restraints, thrust blocks shall have a load bearing area sufficient to resist the thrust forces at all valves and pipe fitting. Thrust forces shall be calculated using the same design criteria as for restrained lengths above. Concrete shall be placed against undisturbed material, and shall not cover joints, bolts or nuts, or interfere with the removal of any joint. Joints shall be protected by felt roofing paper or plastic sheeting prior to placing concrete thrust block.

- C. Contractor shall submit type and method of restrained joints to Engineer for approval prior to use.
- D. Thrust Restraint Tables

### 3.7 SERVICE TAPS

- A. All tapping shall follow manufacturer's recommended procedures. Taps will be located at 10:00 or 2:00 on the circumference of the pipe. Direct taps will be allowed only on ductile iron pipe. All other materials will be tapped with a saddle. Teflon tape for sealing and lubricating will be used on the threads of all corporation stops. Torque on corporation stops will not exceed manufacturer's recommendations. Allowance for any possible movement in the main will be made by making a half loop in the service piping at the tap and compacting backfill to 100 percent standard proctor under this loop.

### 3.8 SERVICE LATERALS

- A. Water Service laterals shall be continuous with no joints from the water main to the water meter unless specifically allowed by the Engineer. However, in no case will joints be allowed under roadways.
- B. Laterals may be installed by the open trench method except for paved areas. Under paved areas service laterals shall be installed by the dry-uncased boring method unless otherwise specifically indicated on the plans.
- C. The dry-uncased boring method or "push-pull" method shall be used to eliminate the need for open cutting of streets or sidewalks. The Contractor shall use equipment specifically designed for this purpose such as the Mighty Mole or the Trojan Workhorse Pusher. The push rod shall be of the size compatible with the service lateral. The rod shall be pushed under the paved area and then the pipe attached and pulled back through. The pits for the operation shall be no closer than 3 feet to the edge of payment. In no case shall a wet boring method be allowed.

### 3.9 PRESSURE AND LEAKAGE TESTS OF WATER DISTRIBUTION PIPING

- A. Piping Tests: PVC water mains shall be installed, pressure and leak tested in accordance with AWWA Standard C605 and Ductile Iron water mains in accordance with AWWA C600. Conduct piping tests before joints are covered and after restraints have been installed, or approved concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
- C. Contractor shall furnish all gauges, meters, pressure pumps, equipment, fittings, and labor needed to test the line. The cost of these items shall be included in price of pipe. Contractor shall notify Engineer 48 hours prior to start of test. All pipe installed shall be tested and written acceptance issued by the Engineer prior to connection of new line to existing water system. The pressure test shall include service lines to the curb stop if applicable.
- D. The Contractor may test the system with joints exposed or backfilling complete at his option. The contractor shall obtain and pay for all water used. Care shall be used to prevent backflow of test water into potable water source. Potable water source shall be disconnected prior to pressurizing test line. Water used during test shall be taken from a container, not directly from the existing water system.
- E. The pressure required for the field hydrostatic pressure test shall be 150 psi. The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure. Corporation cocks at least 3/4 inches in diameter, pipe risers and angle globe valves shall be provided at each pipe dead-end and high points in order to bleed air from the line. Duration of pressure test shall be at least two hours. All leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests

shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipe lines shall be tested in such section as may be directed by the Engineer by shutting valves or installing temporary plugs as required. The line shall be filled with water, all air removed, and the test pressure shall be maintained in the pipe for the entire test period by means of a gasoline or electric driven test pump to be furnished by the Contractor. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

- F. No pipe installation will be accepted until or unless the leakage (evaluated on a pressure basis of 150 psi) is less than 2.2 gallons per 24 hours per thousand feet per inch nominal diameter. The following tabulates the allowable leakage.

Allowable Leakage Per 1000 ft of Pipeline (In Gallons)								
Duration of Test	Nominal Pipe Diameter							
	2"	3"	4"	5"	6"	8"	10"	12"
1 hour	0.18	0.28	0.37	0.46	0.55	0.74	0.92	1.10
2 hour	0.38	0.56	0.74	0.92	1.10	1.48	1.84	2.20

- G. Where any section of a main is provided with concrete reaction backing the hydrostatic pressure test shall not be made until at least five (5) days have elapsed after the concrete reaction backing was installed. If high early-strength cement is used in the concrete reaction backing, the hydrostatic pressure test shall not be made until at least three (3) days have elapsed.

- H. Prepare reports of testing activities.

### 3.10 FLUSHING OF COMPLETED PIPELINES

- A. Following the hydrostatic test and backfilling, each section of completed pipeline shall be as thoroughly flushed as possible. A minimum flow shall be used for flushing that will insure a velocity in the pipe of 2.5 feet per second. Water required for testing and flushing shall be furnished by the Contractor. The water shall be from a potable water source satisfactory to the Owner.

### 3.11 DISINFECTING POTABLE WATER PIPELINES

- A. Following flushing, the Contractor shall disinfect all water distribution mains and service lines in accordance with AWWA Specification C651-86 and with the State of Florida Health Standards. Water shall be fed slowly into the system applying sufficient chlorine to produce a dosage in excess of 50 ppm at the farthest point in the system from the point of application. The chlorine solution then shall be retained in the line for a minimum period of 24 hours. At the end of this time if a minimum chlorine residual of 5 ppm is not obtained, the procedure shall be repeated. During the disinfection process all valves shall be operated. After disinfection, the water shall be flushed from the system at its extremities until excessive chlorine residuals are eliminated. The water shall also be flushed through the service lines. The lines shall then be refilled with potable water. Bacteriological sampling and analysis of the replacement water shall be taken by the

Contractor as directed by the Engineer or County Health Department and submitted to the nearest approved bacteriological laboratory. Disinfection shall not be considered satisfactory until laboratory reports are satisfactory to the Division of Health and clearance granted by F.D.E.P. Each sample point shall have two consecutive passing tests taken no less than 24 hours apart.

- B. For water main sections less than 200 feet in length, a minimum of 2 bacteriological sample points shall be tested, one from each end of the pipe section. For water main sections greater than 200 feet in length, a minimum of 3 bacteriological sample points shall be tested, one at each end and one near the midpoint of the section of pipe. But in no case shall less than one bacteriological sample point be tested for each 300 lineal feet of pipe.
- C. Water required for disinfection, testing and flushing shall be furnished by the Contractor. The water shall be from a potable water source satisfactory to the Owner. All cost associated with disinfecting including the cost of the water shall be included in the unit cost of the pipe and no separate payment will be made for this item.
- D. Contractor shall not make any connection to existing water system nor place any water line in operation until all pressure and bacteriological test have been successfully completed and written authorization issued by the Engineer with clearance granted by F.D.E.P.
- E. NOTE: H.T.H. should be applied at a rate of 0.7 pounds per 1000 gallons. Calcium hypochlorite tablets (H.T.H.) containing 70 percent available chlorine may be used when water mains are 12 inches and smaller and lengths up to 2,500 feet. The water main shall be disinfected with a concentration of 50 PPM chlorine. The H.T.H. tablets shall be glued with a #1 Permatex. They shall be placed one foot from the end of the top innerside of the pipe. The following table was computed with 20 feet joints of pipe.  
  
4" pipe use 1 H.T.H. tablet or 0.5 lb. per 1000 feet of pipe  
6" pipe use 2 H.T.H. tablets or 1.0 lb. per 1000 feet of pipe  
8" pipe use 3 H.T.H. tablets or 1.8 lb. per 1000 feet of pipe  
10" pipe use 5 H.T.H. tablets or 3 lb. per 1000 feet of pipe  
12" pipe use 7 H.T.H. tablets or 4.1 lb. per 1000 feet of pipe
- F. Tablets shall be placed in each section of pipe, fire hydrants, and hydrant branches.

### 3.12 RESTORATION OF DAMAGED SURFACES, STRUCTURES AND PROPERTY

- A. Where pavement, trees, shrubbery, fences or other property and surface structures not designated as pay items, have been damaged, removed or disturbed by the Contractor whether deliberately or not, such property and surface structures shall be replaced or repaired at the expense of the Contractor to a condition equal to that before work began within a timeframe approved by the Engineer.

### END OF SECTION 330266

## **SECTION 33 02 73 – SANITARY SEWERS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The work includes furnishing all labor, materials, equipment and incidentals necessary for the complete installation of all gravity sewer lines, manholes, fittings and appurtenances as shown on the drawings and as specified herein.

#### **1.2 APPLICABLE CODES, STANDARDS, AND SPECIFICATIONS**

- A. The work under this contract shall be in strict accordance with the following codes and standards:
  - 1. Local, county and municipal codes;
  - 2. American Society for Testing Materials (ASTM);
  - 3. American National Standards Institute;
  - 4. Southern Building Code - Standard Plumbing Code; and
  - 5. Florida Department of Environmental Regulation. (FDER)

#### **1.3 CONTRACTOR LICENSE**

- A. Contractor and Subcontractor shall possess valid licenses required by state and local codes. All sewer main work shall be performed by a State of Florida licensed Underground Utility Contractor. All plumbing work on private property shall be performed by a plumber licensed in the local community or county of the job site.

#### **1.4 SHOP DRAWINGS AND SUBMITTALS**

- A. Shop drawings shall be submitted for items included under this Section and shall include the following minimum information:
  - 1. Full details of pipe, fittings, special joints, and assembly thereof, including manufacturer's name;
  - 2. Joint materials and details;
  - 3. Catalogue cuts, dimensions, full details and loading capacity of manhole frames and coverings;
  - 4. Certifications as specified herein; and
  - 5. Reinforcing steel bending and setting drawings.
- B. At the Engineer's option, furnish sworn certificates that all tests and inspections required by the Specifications under which the materials were manufactured have been satisfied.

#### **1.5 RELATED WORK**

- Earthwork

### **PART 2 - MATERIALS AND EQUIPMENT**

#### **2.1 GENERAL**

- A. Unless otherwise specified or shown on the drawings, materials and equipment shall be the standard product of a manufacturer and shall comply with the Contract Documents and applicable standards for such materials or equipment.

## 2.2 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe shall conform to ANSI A21.51. Ductile iron shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Thickness of pipe to be supplied shall be one class greater than that required under Table 50.12 AWWA C150 (ANSI 21.50) and not less than Class 51 unless specifically called out on the Drawings.
- B. Pipe shall be supplied in lengths not in excess of a nominal 20 feet. Pipe shall be rubber-ring type push-on joints.
- C. All ductile iron pipe fittings shall be cast iron or ductile iron. Fittings shall meet the requirements of ANSI Specifications as applicable. Rubber gasket joints shall conform to ANSI A21.11 for push-on joints.
- D. Ductile iron pipe shall be coated inside with a polyethylene liner and on the outside with a bituminous coating to a dry film thickness of at least 1.0 mils in accordance with ANSI A21.51. The polyethylene liner materials shall be virgin polyethylene complying with ASTM Designation D1248 compounded with sufficient additives to resist ultraviolet rays during aboveground storage of the pipe. The polyethylene shall be fused to the interior of the pipe by heat forming a tightly bonded lining a minimum of 20 mils thick extending from the spigot end to the barrel socket. A two-part epoxy liner may be used in lieu of the polyethylene liner with the Engineer's prior approval.

## 2.3 POLYVINYL CHLORIDE PIPE

- A. Gravity sewer lines and laterals shall be polyvinyl chloride pipe and shall conform to ASTM Designation D-3034. Pipe shall be SDR-26.
- B. Joints shall be of the bell and spigot type with rubber sealing ring in accordance with ASTM D-3212. The bell shall consist of an integral wall section with a solid cross section rubber ring factory-assembled.
- C. Fittings installed in polyvinyl chloride pipe lines shall conform to the same specifications as the pipe line in which they are installed.
- D. In addition to the requirements of ASTM specifications, the pipe shall not be out-of-round or crooked in alignment as determined by the Engineer. Any length of pipe in sizes 6-inch through 12-inch diameter whose inside diameters measured at right angles to each other vary more than 1/8-inch may be rejected.
- E. Material shall meet or exceed the requirements of ASTM Designation 1784, Type 1, Grade 1 (12454-B). All PVC materials shall be stored in accordance with the manufacturer's specifications (not in direct sunlight). PVC pipe and fittings which show signs of ultraviolet degradation will be considered substandard and unfit for use.
- F. All wyes, fittings, laterals and manhole couplings shall be manufactured by the pipe manufacturer. No saddles will be allowed for new pipe or as determined by the Engineer. Adapters shall be suitable for pipe supplied. All joints shall be rubber gasket. Asbestos cement manhole couplings will not be allowed.

## 2.4 PRECAST CONCRETE MANHOLES

- A. Precast concrete manhole base, barrel, and eccentric top sections shall conform to Specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C-478, except as otherwise specified below.

- B. The minimum wall thickness for the various size barrel sections shall be 5 inches.
- C. Barrel sections shall have tongue and groove joints, with "Ram-Nek" as manufactured by the K.T. Snyder Company, Houston, Texas, or approved equal; or O-ring gaskets set in preformed indentations conforming to ASTM C-443 standard specifications, or Federal specification SS-S-0210 (GSA-FSS).
- D. Concrete shall conform to ASTM C-94, Type II cement, with a compressive strength of 4,000 psi. Mortar shall be composed of one part cement to two parts sand.
- E. The date of manufacture and the name of the manufacturer or trademark shall be clearly marked on the outside of each precast section when the form is removed and on the inside after painting. Sections shall be cured by an approved method for at least 2 days prior to painting and shall not be shipped until at least 2 days after having been painted. Sections shall not be shipped until at least 7 days after removal from the forms.
- F. Top sections shall be eccentric cones, except where cover over the top of the pipe is less than 4 feet and these manholes shall have vertical walls with a flat precast concrete slab top. Precast concrete slabs over top section, where required, shall be capable of supporting the overburden plus a live load equivalent to AASHTO H-20 loading. The tops of bases shall be suitably shaped to mate with the precast barrel section.
- G. The interior and mating surfaces of the manhole shall be coated with a heavy duty coal tar epoxy coating containing not less than 72.9% by volume nonvolatile solids, approved equal to (or superior to) Koppers 300-M. This coating shall consist of a primer as specified by the manufacturer and a top coat for a total minimum thickness of 16 dry mils.
- H. Top of cone shall be set between 3 inches and 18 inches below bottom of manhole cover frame. It is the intent of Specifications to provide a minimum of 3 inches to accommodate future grade changes without disturbing manholes. Riser unit sections shall be used to bring the top of the cone within the required 18 inches. The remaining distance between the top of the cone and the bottom of the cover frame shall be mortared and bricked if the distance is less than 6 inches. If the distance is between 6 and 18 inches, precast leveling rings shall be used. The leveling rings shall be a minimum of 2 inches thick and have at least one continuous #3 reinforcing bar. Leveling rings shall not be used for more than 18 inches vertical adjustment.
- I. Where pipes enter or exit manholes, a "Kor-N-Seal" molded neoprene boot with stainless steel internal and external bands as manufactured by the National Pollution Control Systems, Inc., Nashua, New Hampshire, or a polyurethane joint with a short transition joint as manufactured by Mooreform Corporation, Centralia, Illinois, or an approved equal (or superior) connection shall be provided.
- J. Manholes with precast invert channels formed directly into a precast concrete manhole base shall be used except at junctions with existing mains, in which case, cast-in-place manhole bases shall be used. The floor outside the channel shall be smooth and sloped downward toward the channel. The unit shall be of the Moore Base Design as manufactured by Mooreform Corporation, Centralia, Illinois, Tru-Contour as manufactured by A-LOK Products, Inc. 697 Main Street, Tully Town, Pennsylvania, or an approved equal or superior unit.
- K. Manholes shall include manufacturer provided steps. Manhole steps shall be aluminum or plastic, ASTM C-478, grouted in place using Embeco 167 mortar or other approved method. Steps will be placed over the downstream side of the manhole.
- L. All precast sections shall be case with non-penetrating lifting inserts. Approved: A-Lok Products Corp., Tullytown, Pennsylvania 19007.

## 2.5 MANHOLE FRAMES AND COVERS

- A. Manhole frames and covers shall be gray or ductile cast iron, free from cracks, holes and cold shuts, and shall conform to ASTM A48-83 Class 40 for gray iron castings or ASTM A 536, Grade 60-45-12, for ductile iron castings. Frames and covers shall conform to details shown on the drawings including lettering. Bearing surfaces shall be machined to provide even bearing surfaces or shall have a non-rocking feature. Frames and covers shall be designed to withstand an HS 20-44 loading as defined in AASHTO Specifications.

## 2.6 MANHOLE PICK

- A. Contractor shall furnish Owner with two manhole picks of the type recommended by the manhole frame and cover manufacturer to allow ease of removal of cover. Contractor shall submit cut sheet of manhole pick for Engineer's approval prior to delivery. Cost of manhole picks shall be included in the price of the manhole.

## 2.7 NONSHRINK GROUT

- A. Grout shall be inorganic, non-shrink, nonmetallic type grout similar to Thoroseal or equal. Grout shall be placed with a tamping stick to ensure complete filling in holes and space around pipe.

## PART 3 - EXECUTION

### 3.1 GENERAL REQUIREMENTS

#### A. Safety:

- 1. The Contractor use of streets and highway for the work to be done under these Specifications he shall conform to all City, State and local laws and regulations. The Contractor shall provide, erect, and maintain effective barricades, danger signals, and signs on all intercepted streets or highways for protection of the work and safety of the public. Rights-of-way shall be provided with lights which shall be kept burning at all times between sunset and sunrise. The Contractor shall be responsible for all damages resulting from any neglect or failure to meet these requirements. Where conditions require the presence of a watchman to fulfill the requirements stated herein, same shall be furnished without extra cost to the Owner.

#### B. Maintenance of Service:

- 1. The Contractor shall arrange his work to cause minimum disturbance of normal pedestrian and vehicular traffic and will be held responsible for providing suitable means of access to all public and private properties during all stages of the construction. Should the construction work require repairs, changes or modifications of other utilities, it shall be the responsibility of the Contractor to provide for the maintenance of continuous water, electric, telephone, and gas as well as sewage and other utility services to all present customers of such utilities, unless approval in writing is secured from the utility company for interruption of such service.

#### C. Limits of Construction:

- 1. In locations where the work is to be installed in streets or road rights-of-way the activities of the Contractor shall be confined to these public properties. Where the use of private property is deemed necessary by the Contractor to facilitate construction work arrangement for such use with the property Owner shall be the responsibility of the Contractor. The Contractor shall save the Owner harmless from all claims by adjacent property owners from trespassing or damage due to the activities of the Contractor in the



prosecution of the work.

D. Existing Utilities:

1. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.
2. All existing improvements such as pavements, conduit, poles, pipes and other structures, shall be carefully supported and fully protected from injury. The Contractor shall be responsible for damages to these existing utilities and shall, in case they are damaged, restore them to their original condition at no cost to the owner.
3. Contractor shall give written notice to the Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of work. This can be accomplished by making the appropriate contact with the utility companies indicated on the plans.

- E. Backfill for pipes, structures, and roadways: All trenching, backfill, earthwork, and compaction testing shall be in accordance with Section 02200 Earthwork and other applicable sections.

3.2 MANHOLE INSTALLATION

- A. Manholes shall be pre-cast with pre-cast invert channels except cast-in-place manhole bases may be used when connecting to existing mains.
- B. Manholes constructed over existing sanitary sewers shall be installed in a manner such that wastewater flow is not interrupted. Care shall be taken in excavating for the manhole so that the existing line is not broken or disjointed in such a way that sewage leakage occurs. Only after the new line has been approved by Engineer shall the existing line be cut into in such a way that a smooth invert may be grouted forming the transition between the new pipe and the existing pipe that is to remain in service. The pipe to be abandoned shall be plugged with grout and bricks to form a watertight plug extending a minimum of 3 inches beyond the outside face of the manhole wall.
- C. Manholes are to be constructed completely water tight except for the cover. Any water infiltration will cause the manhole to be unacceptable.
- D. Manhole invert elevations shall not deviate more than 0.20 feet from design elevations; manhole top elevations no more than 0.5 inches in pavement areas and 2.0 inches elsewhere from design elevations. Center line of manhole ring & cover shall not deviate more than 18" from designed horizontal location. Top elevations shown on the plans are approximate. Manhole tops shall be 1 inch above the finished ground or flush with finished pavement.
- E. Set precast concrete sections vertical and in true alignment. Install O-ring rubber gasket in the recess in the base of previously set section or prime and double seal joint surfaces with "Ram-Nek" pre-molded plastic joint sealer or approved equal.
- F. Completely plug seal and smooth all holes in sections used for their handling and the annular space between the wall and entering pipes with nonmetallic, non-shrink grout. Finish grout smooth and flush with the adjoining interior and exterior manhole wall surfaces and make watertight.
- G. Manholes located within the limits of proposed street paving are to be constructed a minimum of

1.0 feet below proposed finished street grade as shown by the Plans. After street base course is completed, the base is to be cut around the manhole and removed, the manhole cover is to be adjusted to conform to the finished street grade, and the excavated area backfilled with concrete (8:1 sand-cement mix to within 8 inches of the finished base grade and 2,800 psi concrete for the top 8 inches troweled to conform to finished base grade). Cost of adjustment is to be included in the manhole price.

- H. Set manhole frames and lids to conform accurately 1.0 inch above the finished ground or flush with finish pavement as shown or as directed by the Engineer. Set frames on manholes concentric with the masonry and in a full bed of mortar so that the space between the top of the manhole masonry and the bottom flanges of the frame will be completely filled and made watertight. Place a ring of mortar around the outside of the bottom flange at least 1 inch thick and pitched.

### 3.3 GRAVITY SEWER LINE INSTALLATION

- A. Gravity sewer lines shall be laid according to the details shown on the drawings or specified herein, and according to applicable portions of ASTM Designation D-2321, Underground Installation of Flexible Thermoplastic Sewer Pipe. Ductile iron pipe shall be installed in accordance with the requirements of Section VII of the Handbook of Ductile Iron Pipes, 4th Edition. The type of bedding to be used shall be as shown on the drawings, specified herein, or as directed in writing by the Engineer.
- B. Sewer mains shall be laid by use of a laser beam directed along the interior of the pipe. The laser equipment shall be of the type specifically designed for such use. The sewer main shall at all points be within 0.1+ feet of the vertical design elevation and be within 0.2+ feet of the horizontal design location.
- C. The trench bottom shall be graded to the proposed elevation of the pipe line and the bottom shaped to fit the lower quadrant of the pipe unless special bedding material is required. Holes shall be excavated at each bell so that pipe is uniformly supported along the entire length of the barrel only and not the bell. Pipe bedding shall be as described in Section "Earthwork".
- D. The storage of pipe on the job site shall be done in accordance with pipe manufacturer's recommendations and with the approval of the Engineer. Pipe shall be protected during handling against impact shocks and free fall. Pipe laying shall not precede backfilling by more than 100 feet without approval from the Engineer.
- E. The laying of the pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of flow. The interior of the pipe and the jointing seal shall be free from sand, dirt and trash before installing in the line. Extreme care must be taken to keep the bells of the pipe free from dirt and rocks so that joint may be properly assembled without overstressing the bells. The jointing of the pipe shall be done in strict accordance with the pipe manufacturer's instructions and shall be done entirely in the trench.
- F. Each time the work on the sewer is halted for more than one hour, the ends of the pipe shall be sealed to prevent foreign material from gaining entrance to the pipe.
- G. Concrete encasement shall be used where indicated on the drawings. In all cases where sewer mains cross water mains with minimum clear distance between top of sewer and bottom of water main of less than 18 inches, sewer shall be ductile iron pipe or 6-inch thick concrete encased PVC ASTM D-3034 for a distance of 10 feet to either side of point of crossing. Dimensions of encasement or of cradles shall conform to those shown on the drawings. Each pipe shall be supported on brick at two points to allow minimum thickness of concrete to be placed under pipe. Concrete shall be placed carefully around and over pipe to avoid displacement or floating of pipe. Trench shall be dewatered properly before placing of concrete. Backfill shall not be placed over

a concrete cradle or arch until 24 hours after pouring unless authorized by the Engineer.

- H. Joint seals in polyvinyl chloride pipe and fittings shall comply with ASTM Designation D-3212. Laying instructions of the manufacturer of the pipe and joint shall be followed explicitly. Any pipe having defective joint surfaces (bell and spigot) shall be rejected.

### 3.4 LATERAL INSTALLATION

- A. A lateral connection shall be provided for each platted lot or parcel. Location of lateral connections shall be determined by the Engineer in the field.
- B. Service connections shall be extended to the property line as shown on the drawings and adequately sealed with plugs or caps prior to beginning tightness tests. Six inches of crusher-run gravel or bedding rock shall be placed in front of the plugs or caps and over the top of the last 3-feet of pipe laid.
- C. The Contractor shall maintain a record of service connection locations in conjunction with the "As-Built Plans" and, upon completion of work, shall furnish a copy of record to Engineer. The record shall include (1) location of wye branch and end of sewer connection referenced to next downstream manhole of each run, (2) offset of end of service as referenced from center line of main sewer pipe, (3) depth at end of service, and (4) distance from service end to nearest lot corner (reference lot corner shall be clearly indicated on the record). End of service pipe shall be marked with a 3'-0" minimum length of #4 rebar buried underground directly over end of service and extending to one inch above ground.
- D. Service connections shall be constructed perpendicular to the sewer, unless otherwise indicated on a straight line and a constant grade of not less than 2 percent (1/4 inch per foot) and not greater than 100 percent (i.e., 45 degrees from horizontal). Riser piping is not acceptable. Inverts of service connections at property lines shall be established so as to provide a minimum grade of 2 percent to the center of the lot or parcel with a minimum invert depth of 4 feet, unless otherwise indicated by the drawings.
- E. No special fittings shall be used for a service connection constructed from a manhole. Service lines from manholes shall have crown elevation of service pipe matching that of effluent sewer. A shaped invert shall be provided from the wall of the manhole to shaped invert of main sewer.
- F. When installing service connections on existing sewer mains not having wyes or tees, the Contractor shall install tapping tees or saddles. The opening in the sewer main shall be cut using a diamond tipped power driven cutter for clay pipe or a saw of the type recommended by the manufacturer of PVC pipe. Tapping tees or saddles shall be installed using an epoxy type jointing compound provided by the saddle manufacturer and stainless steel bands.

### 3.5 HOUSEHOLD HOOKUPS

- A. Under no circumstance shall household/building connection be attempted until all sewer main and pumpstation tests have been accepted by the Engineer and written authorization issued by the Engineer to proceed with hookups.
- B. Contractor shall connect new service lateral to existing house plumbing in a manner acceptable to the Engineer, and in accordance with local plumbing codes. Fittings with bends greater than 45 degrees shall not be used. Cleanouts shall be installed where indicated on the drawings, but a minimum of one at the property line, one at the house connection, and one for every 90 degree change in direction of the lateral.
- C. Contractor shall connect all sanitary and gray water drains from the house or building (including washing machine drains) to the new service lateral.

- D. The Contractor shall ensure that all laterals within the right-of-way are deep enough to receive the private service line while maintaining a minimum slope of 1/4 inch per foot on the private service.
- E. Contractor shall cooperate with property owner to minimize disturbance and restore all damaged trees, grass, structures, etc.

### 3.6 ABANDON EXISTING SEPTIC TANKS

- A. Where house or building is connected to new sewer system by Contractor, the Contractor shall abandon the existing septic tank by locating and disconnecting it, pumping it out and filling it with clean sand. The area shall be resodded. While being disconnected, the Contractor shall bypass the tank to the replaced private service line to the service connection at the right-of-way. Household sewage service shall not be interrupted.
- B. Contractor shall work closely with property owner to minimize disturbance.
- C. Septage pumping and disposal shall be by a licensed septage hauler.

### 3.7 INSTALL FORCE-MAIN, PRESSURE PIPING ACCORDING TO THE FOLLOWING:

1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
2. Install piping with 36-inch minimum cover.
3. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41.
4. Install ductile-iron special fittings according to AWWA C600.
5. Install PVC pressure piping according to AWWA M23 or to ASTM D2774 and ASTM F1668.
6. Install PVC water-service piping according to ASTM D2774 and ASTM F1668.

### 3.8 TESTING

#### A. General:

1. All sanitary sewers installed under this contract shall be tested for tightness, deflection, and alignment. All service laterals from the main to the right-of-way line shall be included in the tightness test. Sanitary sewers will not be accepted by the Owner until the sewers have been tested and do in fact meet the criteria stated. All test shall be conducted by the Contractor in the presence of the Engineer. Contractor shall notify Engineer 48 hours prior to test. Contractor shall furnish all gauges, meters, pressure pumps, equipment fittings, and labor needed to test the line. The cost of these items shall be included in the installation price of pipe. Generally, the sewers will be tested from manhole to manhole. It is recommended the test be conducted on each section as soon as that section is complete in order to detect potential problems on future sections. All lines which fail to meet these tests shall be repaired and retested as necessary, until test requirements are met. The Engineer reserves the right to require the Contractor to test the first section between the manholes laid by each pipe crew under this contract.

#### B. Tightness Test (Low Pressure Air Test):

1. It is critical that the sewer system be constructed in a water tight fashion in order to eliminate infiltration and exfiltration. All sewer mains, laterals, and manholes shall be visually inspected. Any observed indications of infiltration shall require the Contractor to determine the source and make the necessary corrections. In addition, the sewer mains

and laterals shall be subject to a low pressure air test to be performed in the following manner:

- a. The Contractor shall have completed to installation of the sewer main section including the associated manholes and laterals. The laterals shall have been installed to right-of-way and a temporary air tight plug installed. In order to locate leaks, backfill operations need to be complete only to one foot above the top of pipe. At the Contractor's option and risk additional backfill may be added prior to the test.
- b. The Contractor shall clean and remove all debris, silt, earth or other material from the sewer prior to testing. The sewer shall be flushed with water by the Contractor. None of this water or debris shall be allowed to enter the existing sewer.
- c. Equipment specifically designed for low pressure air testing of sewer pipe shall be used and the Contractor shall supply the Engineer with such information so as the Engineer may be reasonable assumed the equipment is properly functioning and calibrated.
- d. Test plugs shall be installed in the pipe at the upstream and downstream manholes.
- e. In order to compensate for groundwater table, all gauge pressures listed herein shall be increased by adding 0.5 psi for each foot of groundwater depth above the invert of the pipe.
- f. Air shall be added slowly to the test portion of the pipe until the internal air pressure is raised to 4.0 psig. A stabilization time of 5 minutes will be used to allow entering air to equalize with the temperature of the pipe wall.
- g. At the end of the stabilization time, the internal air pressure shall be observed, and the time required for the pressure drop from 3.5 to 3.0 psig recorded. The minimum time allowed for this 0.5 psi pressure drop for 8 inch main with laterals shall be 5 minutes for manholes spaced less than 300 feet apart and 6 minutes for manholes spaced between 300 and 400 feet apart. For pipe sizes differing from this established standards shall be used.
- h. Should testing on any sections of pipe line disclose an air loss greater than that permitted, the Contractor shall repair the defective area at his own expense. Following corrections, the sewer shall be tested again.

C. Tightness Test (Infiltration):

1. All sewer mains shall be subject to infiltration test. The test consists of observing and measuring the groundwater infiltration into the new sewer main. The maximum allowable infiltration rate for any section of sewer main shall be 4 gallons per 1,000 lineal feet of sewer main per hour. (This allowance takes into account service laterals and is based upon the standard 50 gallons per inch of diameter per mile per day). The Contractor shall conduct the infiltration test in the presence of the Engineer prior to the acceptance of the sewer main.
2. All manholes shall be inspected for infiltration. Visual inspection of manholes 24 hours after backfilling and compaction are complete shall indicate no leakage into the manhole when groundwater is present. When groundwater is not present, each manhole shall be sealed at each pipe penetration and filled with water to a level above the last joint. This

level shall be marked and the manhole shall be re-inspected after 4 hours. Any change in water level shall be indication of infiltration and further inspection and repair of the leakage shall be completed.

D. Deflection Test (Mandrel Test):

1. After the completion of all backfilling operations on a section of sewer main, a deflection test shall be conducted to determine the out-of-roundness of the pipe. The maximum allowable deflection shall be 5%. The test shall consist of passing a 5% deflection mandrel through the entire length of the pipe without the mandrel becoming stuck nor requiring the use of excess force. For 8 inch pipe the mandrel shall have a minimum diameter of 7.2 inches. The mandrel may be floated through the pipe using clean water but must be attached to a string of sufficient strength to allow it to be retrieved if it becomes stuck. This test may be performed in conjunction with pipe flushing.

E. Alignment Test (Lamp Test):

1. After the completion of all backfilling operations on a section of sewer main an alignment test shall be conducted. After the pipe is flushed, a high beam 12 volt lamp with lamp diameter of the approximate size of the pipe diameter shall be placed at one end of the section of pipe. A hand mirror shall be used at the opposite end of the pipe to observe the light. The full diameter of the pipe/light shall be visible when viewed between the consecutive manholes. If less than 1/2 of the pipe/light diameter can be observed, the alignment is unacceptable.

3.9 CLEANING

- A. At the conclusions of the work, the Contractor shall thoroughly clean all of the pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the lowest outlet. Debris or water from the lowest outlet shall not be introduced into the Owner's sewage collection system. If, after this outlet cleaning obstructions remain, they shall be removed. After the pipe is cleaned and if the groundwater level is above the pipe, or following a heavy rain, the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired by the Contractor.

**END OF SECTION 330273**

## **SECTION 33 02 75 – STORM DRAINAGE CULVERTS AND STRUCTURES**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment, and incidentals required and install in the locations as shown on the Drawings, the drainage pipe, precast concrete manholes, headwalls, and appurtenances as specified herein.
- B. All drainage culverts and structures shall be manufactured and installed in accordance with details included herein, and as shown on the Drawings.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Earth Work, Section 310220.
- B. Concrete Work - General, Section 030331.

#### **1.3 QUALIFICATIONS**

- A. All drainage culverts and structures shall be furnished by a manufacturer who is fully experienced, reputable, and qualified in the manufacture of items to be furnished. The culverts and structures shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications and the Florida Department of Transportation Specifications.

#### **1.4 REQUIREMENTS**

- A. All work in this section shall meet requirements and recommendations of applicable portions of standards listed. In cases of conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.
  - 1. American Association of State Highway and Transportation Officials
  - 2. Florida Department of Transportation (FDOT) Standard Specifications for Road & Bridge Construction

#### **1.5 SUBMITTALS**

- A. Submit to the Engineer for approval shop drawings showing details of construction, reinforcing, joints, and pipe/wall connections.

#### **1.6 INSPECTION**

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or on the work after delivery, or at both places, and the sections shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though a sample section may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.

- B. At the time of inspection, the sections will be carefully examined for compliance with the ASTM designation specified below and these Specifications, and with the approved manufacturer's drawings.
- C. Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval.

## PART 2 - MATERIAL & DESIGN

### 2.1 DRAINAGE CULVERTS

- A. Type of Pipe to be used will be designated in the plans or in the bid proposal. If the type of pipe is not designated and only the term "culvert" or "pipe" is used then the contractor may choose from the following alternate types:
  - 1. For side drain pipe, unless the use of a particular type (or types) is so provided for, the type to be used may, at the Contractor's option, be either concrete pipe, corrugated steel pipe, corrugated aluminum pipe, or corrugated polyethylene pipe. The particular type selected, however, shall be used throughout the project, unless otherwise allowed.
  - 2. For gutter drain pipe, unless a specific type is shown in the plans, the type to be used may, at the Contractor's option, be corrugated polyethylene, corrugated steel or corrugated aluminum pipe.
  - 3. For cross drain pipe, the Contractor, at his election, may use either concrete pipe, bituminous--coated corrugated steel pipe or corrugated aluminum pipe.
  - 4. For ditch closures and similar applications, any of the alternate side drain pipe types may be used unless the use of a particular type is specified.
- B. Concrete Pipe shall meet the requirements of Section 941, FDOT Standard Specifications for Road & Bridge Construction.
- C. Corrugated Steel Pipe and Pipe Arch shall meet the requirements of Section 943, FDOT Standard Specifications for Road & Bridge Construction.
- D. Corrugated Aluminum Pipe and Pipe Arch shall meet the requirements of Section 945, FDOT Standard Specifications for Road & Bridge Construction.
- E. Cast Iron Pipe shall meet the requirements of Section 946, FDOT Standard Specifications for Road & Bridge Construction.
- F. Corrugated Polyethylene Pipe shall meet the requirements of Section 948-2, FDOT Standard Specifications for Road & Bridge Construction.
- G. Gaskets shall meet the requirements of Section 942, FDOT Standard Specifications for Road & Bridge Construction.
- H. Unless specifically stated in the plans, Asbestos-Cement Pipe and Bituminized-Fiber Pipe shall not be used.

### 2.2 DRAINAGE STRUCTURES

- A. Concrete structures shall meet the requirements of Section 400, FDOT Standard Specifications for Road and Bridge Construction.



## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All drainage culverts and structures shall be installed in accordance with FDOT Standards and Specifications for Road & Bridge Construction, specifically Sections 425 and 430.
- B. Earthwork, backfill, land compaction requirements shall be in accordance with Section 310220.

**END OF SECTION 330275**

## **SECTION 33 02 93 – STORM WATER POLLUTION PREVENTION PLAN**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This section covers the storm water management practices that the Contractor shall employ in accordance with the NPDES permit governing storm water discharges during construction and in accordance with erosion control practices specified in other sections.
- B. The Owner has petitioned the DEP for the storm water discharges during construction at this site to be covered by the NPDES General Permit for Construction Activity. A Notice of Intent (NOI) to be covered under this permit has been filed by the Owner. The Contractor is required to file a separate NOI at least forty-eight (48) hours prior to any earth disturbing activities.
- C. The Contractor shall manage the discharge of storm water from the site in accordance with the NPDES permit and this document. The Contractor shall be responsible for conducting the storm water management practices in accordance with the permit. The Contractor shall be responsible for any enforcement action taken or imposed by Federal or State agencies, including the cost of fines, construction delays, and remedial actions resulting from the Contractor's failure to comply with the permit provisions.
- D. The Contractor shall monitor the suitability of the designated management practices to achieve the storm water quality provisions of the permit, and shall notify the Owner of the need to change management practices. If changes are ordered by the Owner, an adjustment in Contractor's fee shall be considered in accordance with the General Conditions. However, the Contractor's failure to monitor or report deficiencies to the Owner will result in the Contractor being liable for fines and construction delays resulting from any Federal or State agency enforcement action.

### **PART 2 - CONTROLS**

#### **2.0 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings and this Stormwater Pollution Prevention Plan (SWPPP).
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### **2.1 EROSION AND SEDIMENT CONTROLS STABILIZATION PRACTICES**

Stabilization practices for this site include:

- A. Land clearing activities shall be done only in areas where earthwork will be performed and shall progress as earthwork is needed.

- B. Temporary seeding of all areas for which soil-disturbing activities have temporarily ceased for a period of more than 21 days will be commenced by the 14<sup>th</sup> day.
- C. Permanent seeding and planting for vegetative establishment of all unpaved areas within 7 days where construction activities have permanently ceased.

## STRUCTURAL PRACTICES

Structural practices for this site include:

- A. Silt fence
- B. Inlet protection and outlet protection
- C. Storm sewer

## 2.2 SEQUENCE OF MAJOR ACTIVITIES

The general contractor will be responsible for implementing the following erosion control and storm water management control structures. The general contractor may designate these tasks to certain subcontractors as he sees fit, but the ultimate responsibility for implementing these controls and ensuring their proper functioning remains with the general contractor. The order of activities will be as follows (refer to the plans for details):

### CONSTRUCTION SEQUENCE

1. Post all applicable permit placards. The permit placards shall not be nailed to trees.
2. Flag or stake the proposed limits of clearing prior to demolition commencement.
3. Contractor shall meet with Leon County Environmental Inspector prior to construction commencement.
4. Construct tree barricades or fences around protected trees in the vicinity of any vehicular traffic and as shown on the plans.
5. Designate vehicular pathways within the limits of the site.
6. Designate employee parking areas, materials storage areas, and topsoil storage areas.
7. Designate refueling areas away from the water bodies or watercourses onsite.
8. Construct sedimentation control devices.
9. Follow any requirements of notification prior to construction stated in the Environmental Management Permit.
10. Clear and grub site within the limits of clearing. Stabilization and additional erosion control measures will be required in areas where immediate construction is not taking place.
11. Remove topsoil from all areas of the site where improvements are to be constructed. Stockpile onsite for redistribution on slopes and shoulders.
12. Relocate all underground utilities, install storm drainage pipes required, rough grade road and construct all swales. Protect all storm drain inlets with hay bales and filter fences (per F.D.O.T. Index 102) until a permanent vegetative cover is established.
13. Construct all remaining improvements as indicated in the plans and specifications.
14. Clean out any sediment and debris from stormwater structures, as required.
15. Seed, fertilize and mulch all disturbed areas not paved or sodded with minimum 80% coverage of a perennial type ground cover within 90 days of planting. At least 75% coverage must be provided by a seasonal coverage within 30 days of planting.

### STORM WATER MANAGEMENT

Grading and storm sewer will provide storm water drainage.

When construction is complete, all unpaved areas will be stabilized with vegetation consisting of either seed and mulch or grass.

## 2.3 OTHER CONTROLS

### WASTE DISPOSAL

All waste materials will be collected and stored in accordance with all local and state solid waste management regulations.

### SANITARY WASTE

All sanitary waste will be collected from the portable units a minimum of three times per week by a licensed portable facility provider in complete compliance with local and state regulation.

### OFF-SITE VEHICLE

A stabilized construction exit will be provided to help reduce tracking of sediments. The paved street adjacent to the site entrance will be inspected daily and swept as necessary to remove any excess mud, dirt, or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin. The job site superintendent will be responsible for seeing that these procedures are as followed.

### CONCRETE WASTE FROM CONCRETE TRUCKS

Emptying of excess concrete and/or washout from concrete delivery trucks will not be allowed on the job site. If such excess concrete and/or washout residue is found on the job site it will be cleaned up immediately and not allowed to come in contact with storm water discharges.

This residue will be disposed of in accordance with Part VII of this plan and all applicable state and federal regulations. The job site superintendent will be responsible for seeing that these procedures are followed.

### HAZARDOUS SUBSTANCES AND HAZARDOUS WASTE

- A. All hazardous waste materials will be disposed of in the manner specified by local, state, and/or federal regulations and by the manufacturer of such products. Site personnel will be instructed in these practices by the job site superintendent, who will also be responsible for seeing that these practices are followed. Material Safety Data Sheets (MSDS's) for each substance with hazardous properties that is used on the job site will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the SWPPP file at the job site construction trailer office. Each employee who must handle a substance with hazardous properties will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.
- B. The contractor will implement the Spill Prevention Control and Countermeasures (SPCC) Plan found within this SWPPP and will train all personnel in the proper cleanup and handling of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with storm water discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the job site superintendent to properly train all personnel in the use of the SPCC plan.

- C. Any spills of hazardous materials which are in quantities in excess of Reportable Quantities as deemed by EPA regulations shall be immediately reported to the EPA National Response Center 1-800-424.8802.
- D. In order to minimize the potential for a spill of hazardous materials to come into contact with storm water the following steps will be implemented.
  - 1. All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, under cover, when not in use.
  - 2. The minimum practical quantity of all such materials will be kept on the job site.
  - 3. A spill control and containment kit (containing, for example, absorbent such as kitty litter or sawdust, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.
  - 4. All of the product in a container will be used before the container is disposed of.
  - 5. All products will be used in strict compliance with instructions on the product label.
  - 6. The disposal of excess or used products will be in strict compliance with instructions on the product label.

#### CONTAMINATED SOILS

- A. Any contaminated soils (resulting from spills of materials with hazardous properties) which may result from construction activities will be contained and cleaned up immediately in accordance with the procedures given in the Spill Prevention Control and Countermeasures (SPCC) Plan and in accordance with applicable state and federal regulations.
- B. The job site superintendent will be responsible for seeing that these procedures are followed.

#### COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The contractor will obtain copies of any and all local and state regulations which are applicable to storm water management and pollution minimization at this job site and will comply fully with such regulations. The contractor will submit written evidence of such compliance if requested by the Owner or any agent of a regulatory body. The Contractor will comply with all conditions of the NPDES General Permit for Construction Activities, including the conditions related to maintaining the SWPPP and evidence of compliance with the SWPPP at the job site and allowing regulatory personnel access to the job site and to records in order to determine compliance.

The owner has petitioned the appropriate regulatory agencies for authorization and recommended measures needed in dealing with endangered species located on the proposed site.

## 2.4 MAINTENANCE INSPECTION PROCEDURES

Erosion and Sediment Control Maintenance and Inspection Practices

- A. The following is a list of erosion and sediment controls to be used on this site during construction practice.
- I. Stabilization practices for this site include:  
Temporary seeding  
Permanent seeding and planting
  2. Structural practices for this site include:  
Stabilized construction exit(s)  
Silt fences  
Storm water Detention Ponds  
Hay bales for storm sewer inlet and outlet protection.
- B. The following inspection and maintenance practices will be used to maintain erosion and sediment controls.
1. All control measures will be inspected at least once each week and following any storm event of 0.25 inches.
  2. All measures will be maintained in good working order. If repairs are found to be necessary, they will be initiated within 7 days of report.
  3. Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.
  4. Silt fences will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are securely in the ground.
  5. Temporary and permanent seeding will be inspected for bare spots, washouts and healthy growth.
  6. A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.
  7. The job site superintendent will be responsible for selecting the individuals who will be responsible for these inspections, maintenance and repair activities, and tilling out inspection and maintenance reports.
  8. Personnel selected for the inspection and maintenance responsibilities will receive training from the job site superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls that are used onsite in good working order.

## 2.5 INSPECTION AND MAINTENANCE REPORT FORMS

Inspectors shall complete the forms provided in Appendix A when performing all inspections.

## 2.6 SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) PLAN

### MATERIALS COVERED

The following materials or substances with known hazardous properties are expected to be present onsite during construction:

Concrete	Cleaning solvents
Detergents	Petroleum based products
Paints	Pesticides
Paint Solvents	Acids
Fertilizers	Concrete additives
Soil stabilization activities	

### MATERIAL MANAGEMENT PRACTICES

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff

## 2.7 GOOD HOUSEKEEPING

The following good housekeeping practices will be followed onsite during the construction project:

- A. An effort will be made to store only enough product required to do the job.
- B. All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or other enclosure.
- C. Products will be kept in their original containers with the original manufacturer's label in legible condition.
- D. Substances will not be mixed with one another unless recommended by the manufacturer.
- E. Whenever possible, all of a product will be used up before disposing of the container.

Manufacturer's recommendations for proper use and disposal will be followed  
The job site superintendent will be responsible for ensuring proper use and disposal of materials.

## 2.8 HAZARDOUS PRODUCTS

These practices will be used to reduce the risks associated with hazardous materials:

- A. Products will be kept in original containers with the original labels in legible condition.
- B. Original labels and material safety data sheets (MSDS's) will be procured and used for each material.
- C. Product containers and any surplus product must be disposed of per manufacturer's or local/state/federal government recommended methods.
- D. A spill control aid containment kit (containing, for example, absorbent such as kitty litter or sawdust, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.

## 2.9 PRODUCT SPECIFIC PRACTICES

The following product specific practices will be followed on the job site:

### A. Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers, which are clearly labeled. Any petroleum storage tanks used on site will be installed per all appropriate local/state/federal regulations. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

### B. Fertilizers

Fertilizers will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked in the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

### C. Paints, Paint Solvents, and Cleaning Solvents

All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or state and federal regulations.

### D. Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

## 2.10 SPILL PREVENTION PRACTICES

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup.

### A. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

### B. Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite in the spill control and containment kit (containing, for example, absorbent such as kitty litter or sawdust, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.)

### C. All spills will be cleaned up immediately after discovery.

### D. Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill. Spills of amounts that exceed Reportable Quantities of certain substances specifically mentioned in federal regulations (40 CFR 302 list and oil) will be immediately reported to the EPA National Response Center, telephone 1-800-424-8802. Reportable quantities of some substances which may be used at the job site are as follows:

1. oil-appearance of a film or sheen on water
2. pesticides usually 1 lb.
3. acids 5000 lb.
4. solvents, flammable 100 lb



## OWNER CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signed: \_\_\_\_\_ Position: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_

## CONTRACTOR'S CERTIFICATION

"I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification. Further, by my signature, I understand that I am becoming a co-permittee, along with the owner(s) and other contractors and subcontractors signing such certifications, to the general NPDES storm water permit for the storm water discharges associated with industrial activity from the identified site. As a co-permittee, I understand that I, and my company, are legally required under the clean Water Act, to ensure compliance with the terms and conditions for the Storm water Pollution Prevention Plan (SWPPP) developed under the NPDES storm water permit and the terms of the NPDES storm water permit."

Signature:

Company Name:

Responsible For:

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## PROPOSED SCHEDULE OF WORK ACTIVITIES

Dates   Activity

To be Determined and submitted by Contractor

## APPENDIX A

Storm Water Pollution Prevention Plan  
Inspection and Maintenance Report Form  
To be Completed Every 7 Days and Within 24 Hours  
of a rainfall Event of 0.25 Inches or More

### Sediment Basin:

Depth of Sediment in Basin	Condition of Basin Side Slopes	Any Evidence of Overtopping of the Embankment?	Condition of Outfall from Sediment Basin

Maintenance Required for Sediment Basin:

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To Be Performed  
By:

On or Before:

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### Stabilized Construction Entrance:

Does Much Sediment get Tracked on to Road?	Is the Gravel clean or is it filled with Sediment?	Does all Traffic use the Stabilized entrance to leave the site?	Is the Culvert Beneath the entrance working?

Maintenance Required for Stabilized Construction Entrance:

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On or Before:

To be Performed by: 

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### Stabilization Measures:

Area	Date Since last Disturbed	Stabilized? (Yes/No)	Stabilized with	Condition

Stabilization Required:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

To be preformed by: \_\_\_\_\_ On or before: \_\_\_\_\_

**Structural Controls Earth Dike:**

Stabilized Construction Entrance To:	Stabilized Construction Entrance From:	Is dike stabilized?	Is there evidence of washout or over-topping?

Stabilization Required:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

To be preformed by: \_\_\_\_\_ On or before: \_\_\_\_\_

I certify under penalty of law that this document and all attachments were prepared under my direction of supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those person directly responsible for gathering the information, the information submitted is, to the best for my knowledge and belief, true, accurated, and complete. I am aware that there are significant penalites for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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

Inspector: \_\_\_\_\_ Date: \_\_\_\_\_

Inspector's Qualifications:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Days since last rainfall: \_\_\_\_\_ Amount of last rainfall: \_\_\_\_\_

## SECTION 33 03 41 – PRECAST CONCRETE STORM DRAINAGE STRUCTURES

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required and install in the locations as shown on the Drawings, the drainage pipe, precast concrete manholes, headwalls, and appurtenances as specified herein.
- B. All drainage structures shall be manufactured and installed in accordance with details included herein, and as shown on the Drawings.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Earth Work, Section 31220.
- B. Concrete Work - General, Section 030331.
- C. ~~Precast Concrete Structures, Section 030341.~~

#### 1.3 QUALIFICATIONS

- A. All precast structures shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of items to be furnished. The structures shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications and the Florida Department of Transportation Specifications.

#### 1.4 SUBMITTALS

- A. Submit to the Engineer for approval **six (6) sets** of shop drawings showing details of construction, reinforcing, joints, and pipe/wall connections.

#### 1.5 INSPECTION

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or on the work after delivery, or at both places, and the sections shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though a sample section may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections, which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.
- B. At the time of inspection, the sections will be carefully examined for compliance with the ASTM designation specified below and these Specifications, and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, crack, roughness, soundness, and other features. The surface shall be dense and close-textured.
- C. Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of

4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND DESIGN

- A. Precast structures shall conform to ASTM Designation C478 and meet the following additional requirements:
  - 1. Type II cement shall be used except as otherwise approved.
  - 2. Holes to accommodate pipe shall be precast into the section at the manufacturer's plant.
  - 3. All sections shall be cured by an approved method and shall not be shipped or manhole rungs subjected to loading until the concrete compressive strength has attained 3,000 psi and not before 6 days after fabrication and/or repair, whichever is longer.
  - 4. Precast concrete top slabs shall be designed for an AASHTO H-20 wheel loading.
  - 5. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast unit.
  - 6. Minimum wall thickness shall be 8 inches.
  - 7. Minimum inside diameter shall be 48 inches for manholes.
  - 8. The precast reinforced base shall be a minimum of 8 inches thick and be cast monolithically with the bottom section of manhole walls.
  - 9. Manhole sections shall be joined with either an O-ring type joint or a tongue and groove joint complete with flexible plastic gasket. The O-ring type joint shall be round compression ring of neoprene material set in annular spaces cast into the spigot end of a bell spigot type joint. The ring shall be uniformly compressed between the positioned sections so as to form a watertight joint. After the sections are assembled, the remaining space in the joint shall be pointed up and filled with a dense cement mortar and finished so as to make a smooth, continuous surface inside and outside the wall sections. The tongue and groove joint shall be sealed with a flexible plastic gasket as manufactured by K.T. Snyder and Sons or equal. After the manhole sections have been assembled, the gasket shall completely fill the joint.
  - 10. If the Engineer feels the precast sections do not meet the Specifications, the Engineer shall require the sections to be tested by a certified testing laboratory.
- B. Openings for pipes larger than six (6) inches in diameter are to be precast. A minimum of six (6) inches long, the inter-circumference is to remain between the extremities of hole for adjacent pipe in any single unit. A minimum of two (2) reinforcing bars shall remain in the wall between any two (2) openings.
- C. The Contractor will furnish the fabricator with the angle of alignment and size of all pipes to enter manhole and the height of structure.
- D. Base units shall have sufficient height to allow for minimum of six (6) inches of wall between top of

highest opening for pipes and bottom of joint.

- E. Pipes are to be extended into structure wall a minimum of four (4) inches, but should not extend beyond interior wall of structure.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Manholes shall be constructed to requirements of the State of Florida Department of Transportation as specified herein.
- B. Precast concrete sections shall be set so as to be vertical and with section in true alignment with a 1/4-inch maximum tolerance to be allowed. The outside and side joint shall be filled with a comparatively dry mortar [one (1) part cement and two (2) parts sand] and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. If any leaks appear in the manhole, the inside joints shall be caulked with lead wool to the satisfaction of the Engineer. The Contractor shall install the precast sections in a manner that will result in a watertight joint.
- C. Holes in the concrete pipe sections required for handling or other purposes shall be plugged with a non-shrinking grout or by grout in combination with concrete plugs.
- D. Where holes must be cut in the precast section to accommodate pipe, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.
- E. The precast concrete base shall be placed on a bed of crushed limerock, as directed by the Engineer, to provide even bearing and grade control.
- F. Manhole and Head Wall Pipe Connections:
  - 1. A tapered hole filled with non-shrink waterproof after the pipe is inserted is acceptable, providing the grout is placed carefully to completely fill all around the pipe. If this method is used, place concrete encasement around the stub.
- G. Cast iron frames specified and furnished under Division 5 shall be placed, shimmed and set in Portland Cement mortar to the required grade.
- H. The lines entering the manhole shall be laid to the grade shown on the Drawings.
- I. Outer surfaces of precast and cast-in-place manholes shall be given two (2) coats of bituminous dampproofing at the rate of 30-60 square feet per gallon as directed by the Engineer and in accordance with the manufacturer's instructions.
- J. Manhole frame and cover shall be brought to (or adjusted to) grade from the top of the structure with brick.
- K. All manholes and cast-in-place structures shall be constructed watertight. If leaks appear, they shall be corrected to the satisfaction of the Engineer.
- L. Manholes shall be provided with stubs and plugs if indicated on the Drawings. Pipe stubs shall be as specified in the applicable section for pipe and shall be provided via suitable caps.

**END OF SECTION 330341**



# **Inlet Beach Water System Standard Design and Construction Specifications**

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## **2023 Edition**

## **2023 DESIGN/CONSTRUCTION SPECIFICATION AND DETAIL SHEET CHANGES**

### **WRITTEN SPECIFICATIONS**

#### **• 2.1 – GENERAL REQUIREMENTS**

- Added CAD file requirement to submittal for sewer model.

#### **• 2.3 – DESIGN GUIDELINES**

- Common tap for fire mains and potable water services.
- Proper procedure for abandoning gravity sewer laterals.
- Plugging existing manholes during construction of new system.
- Set a maximum depth for sewer lateral at the right of way line.
- Potable water mains and services on top of storm exfiltration systems.
- 8-inch sewer lateral connection to gravity main.

#### **• 2.4 – EASEMENTS AND SEPARATION REQUIREMENTS**

- Clarified distance from water/sewer mains to any structure.

#### **• 6.3.14 – FIRE HYDRANTS**

- American Darling hydrants only.

#### **• 7.2 - GRAVITY SEWER GENERAL REQUIREMENTS**

- Liner requirements for manholes near wet wells with sewer force main entry.

#### **• 7.3 – GRAVITY SEWER MATERIALS**

- No 90-degree fittings.

#### **• 7.6 – GRAVITY SEWER FIELD TESTING**

- Removed section 7.6.4 – Air Testing

- **9.3 – NON-CLOG LIFT STATION MATERIALS – WET WELL**

- Dewatering requirement for wet well installation.
- Added RAVEN epoxy coating to written specifications.

## **DETAIL SHEETS**

- **GS-1 – GRINDER STATION DETAIL SHEET**

- Clarified spool piece notes.
- Clarified guide rails mounting requirements.
- Clarified air box requirements.

- **LS-1 – NON-CLOG LIFT STATION DETAIL SHEET**

- Clarified spool piece notes.
- Clarified guide rail mounting requirements.
- Clarified air box requirements.
- Added cross brace note.

- **PS-1 – PRESSURE SEWER DETAIL SHEET**

- Added pressure/flow testing requirement for low pressure sewer services.

- **PS-2 – PRESSURE SEWER DETAIL SHEET**

- Modified the joint restraint detail.
- Clarified the HDPE to PVC transition details.
- Modified the valve box details to include cushioning requirements.

- **S-1 – GRAVITY SEWER DETAIL SHEET**

- Clarified cleanout detail to call out fittings and set a tee-wye minimum angle.
- Added note about 90-degree fittings.
- Added note about step requirements.
- Added notes about liner requirements for manholes near lift stations with sewer force main entry.
- Added note about 8-inch sewer lateral connections to gravity main.

- **S-2 – GRAVITY SEWER DETAIL SHEET**

- Added notes about step requirements.

- **W-1 – POTABLE WATER DETAIL SHEET**

- Created new detail for fire main / potable water service sharing common tap.

- Added notes about water mains and services being above storm exfiltration systems.
- **W-2 – POTABLE WATER DETAIL SHEET**
  - Created new detail for proper curb stop handle and lock installation.
  - Changed notes to no longer require handles on meters over 1-inch.
- **W-3 – POTABLE WATER DETAIL SHEET**
  - Modified the valve box detail to include cushioning requirements.
  - Clarified the HDPE to PVC transition details.
  - Clarified the joint restraint details.

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# **SECTION 1**

## **GENERAL ITEMS**

## **SECTION 1 – GENERAL ITEMS**

### **1.1. DEFINITIONS**

1.1.1. The words “Inlet Beach Water System, INC. (IBWS)” as employed herein shall collectively refer to the owner and manager of the water and sewer utility system bounded by Lake Powell to the North and to the East, by the Gulf of Mexico to the South, and by Rosemary Beach to the West.

1.1.2. The word "DEVELOPER," as employed herein, shall mean the owner of the project who, by way of an engineered submittal, proposes to improve a parcel or parcels of real estate by subdividing the land for the purpose of constructing habitable buildings.

1.1.3. The word "ENGINEER," as employed herein shall mean the licensed design professional representing DEVELOPER.

1.1.4. The word "CONTRACTOR," as employed herein shall mean the person, persons, partnership, company, or corporation entering into a contract for the performance of the work defined by the proposed engineered drawings.

1.1.5. The term “SUBCONTRACTOR” as employed herein includes only those having a direct contract with CONTRACTOR and it includes one who furnishes material worked to a special design according to the Drawings or Specifications of this work, but does not include one who merely furnishes material not so worked.

1.1.6. Wherever the word "MANUFACTURER" is used it refers to a person, partnership, or corporation who is furnishing material or equipment to either the OWNER, CONTRACTOR or both.

1.1.7. The word “OWNER,” as employed herein shall refer to DEVELOPER prior to FDEP CERTIFICATION, after which Inlet Beach Water System, INC. shall be referred to as OWNER.

1.1.8. The words “FDEP CERTIFICATION,” as employed herein shall collectively mean that in the opinion of IBWS and the Florida Department of Environmental Protection (FDEP), CONTRACTOR has completed all utility construction in accordance with all Federal, State, and Local Codes and Standards as detailed on the APPROVED DRAWINGS.

1.1.9. The words "APPROVED DRAWINGS" shall collectively mean the project construction drawings and details provided to, and authorized for construction by, IBWS as part of a proposed plan to improve DEVELOPER’S real estate.

1.1.10. "POINT OF SERVICE" shall mean the discharge side of the IBWS underground gate valve, prior to the double detector check valve assembly.

1.1.11. "APPROVED EQUAL" shall mean any pipe, fitting, valve, or material that may be used as a replacement to the material stated in the specifications, after which CONTRACTOR has received written approval prior to construction by IBWS for change.

## 1.2. **SCOPE**

1.2.1. The standards set forth in this document are intended to provide a basis for design and construction.

1.2.2. Applicable Federal, State and County environmental laws and regulations shall be considered concurrently with this text.

1.2.3. Any variation from these standards is to be approved in advance by IBWS General Manager or their designated representative prior to construction.

1.2.4. It is intended that the requirements of this document shall be applicable in all cases where the facilities being constructed or to be constructed shall be owned and/or operated and maintained by IBWS. These requirements shall also be applicable to those portions of facilities which shall lie within public right-of way (ROW).

1.2.5. IBWS responsibility for ownership, operation and maintenance of water mains or water services shall end at the Right of Way.

1.2.6. IBWS shall not be responsible for maintaining sewer services extending beyond the first cleanout which shall be located at the Right Of Way or utility easement.

1.2.7. IBWS shall not acquire, operate or maintain any sewage facilities that are not constructed to our standards. Responsibility for these lines and/or lift stations shall remain with DEVELOPER.

1.2.8. It shall be the responsibility of ENGINEER to verify existing line information and design the proposed utilities in accordance with IBWS standard specifications.

1.2.9. ENGINEER may exceed IBWS standard specifications at their discretion.

1.2.10. IBWS shall review and approve all proposed plans prior to the commencement of construction in accordance with our Plan Review Procedure. IBWS Plan review Procedure may be found on our website at [www.inletbeachwater.com](http://www.inletbeachwater.com).

1.2.11. IBWS shall enforce the approved construction plans.

1.2.12. No changes shall be made to approved plans without written consent from IBWS.

1.2.13. While every effort shall be made to ascertain that the plans are in compliance with our standard specifications as detailed herein, IBWS reserves the right to enforce the minimum standards as required by FDEP, USACOE, FDOT, Walton County and Bay County.

1.2.14. No construction shall start prior to a pre-construction conference with IBWS.

1.2.15. It shall be the responsibility of CONTRACTOR to notify IBWS forty-eight (48) hours in advance of all field-testing and meetings.

1.2.16. IBWS shall not be responsible for newly constructed water and sewer lines within new subdivisions or development sites until all underground utilities are in place (i.e., electric, gas, phone, and cable television, etc.).

1.2.17. CONTRACTOR shall be responsible for locating and protecting newly constructed water and sewer lines until all underground utilities are in place (i.e., electric, gas, phone, and cable television).

1.2.18. Where reference is made in these specifications to specifications compiled by other agencies, organizations or departments, such reference is made for expediency and standardization and such specifications referred to are hereby made a part of these specifications.

1.2.19. Execution of specifications, construction drawings, details, and procedures must meet OSHA safety requirements. All excavation must also meet the Florida Trench Safety Act.

## **SECTION 2**

### **DESIGN & INSPECTION GUIDELINES**

## SECTION 2 – DESIGN GUIDELINES

### 2.1. **GENERAL REQUIREMENTS**

2.1.1. The IBWS standards shall be followed on all plans.

2.1.2. An electronic (pdf file) copy, and a CAD file of the plans shall be submitted for review. All plans shall be submitted to the email [manager@inletbeachwater.com](mailto:manager@inletbeachwater.com)

2.1.3. Once the review process has been completed IBWS will require one (1) hard copy set of the signed and sealed plans and one (1) digital storage device containing a copy of the signed and sealed approved set of plans and all documentation.

2.1.4. CONTRACTOR shall have on the job at all times, one set of APPROVED plans that have been stamped by IBWS at the preconstruction meeting. Any work completed to an unapproved set shall be subject to removal.

2.1.5. Incomplete or unchecked Construction Plans submitted to IBWS for review shall be returned to the design Engineer without review.

2.1.6. Construction Plans shall be prepared on 24"x 36" sheets using an appropriate scale. Drawings submitted on other size sheets or on an unacceptable scale shall be returned without review.

2.1.7. Drawing scales shall be clearly defined and verified by way of a standard Engineer's box scale. Like scales shall be used on plan and profile drawings with corresponding grids (i.e., 1" = 50' horizontal, 1" = 5' vertical or 1" = 40' horizontal, 1" = 4' vertical). Do not interchange scales or grid count.

2.1.8. IBWS detail sheets are provided under the Forms & Reports tab on our website [www.inletbeachwater.com](http://www.inletbeachwater.com) for your use.

2.1.8.1. Provide all applicable detail drawings.

2.1.8.2. Details altered without the expressed written permission of IBWS shall not be accepted and shall be returned without review.

2.1.9. Clearly indicate all phase and match lines as required.

2.1.10. Show all elevations of crossing pipes indicating the top and bottom of the pipe to define a clear distance between pipes.

2.1.11. All sewer data, including manhole invert and rim elevations, shall be defined on the plan sheets.

2.1.12. Profiles are required for all gravity sewers.

2.1.12.1. Sewer profiles shall show all storm drain and water lines crossings and specify all special treatments as may be required by FDEP codes.

2.1.13. Roadway cross sections are required every 100-feet that show the elevations of all proposed utilities.

2.1.13.1. Proposed gravity sewer mains shall not be at the same elevation as proposed storm water lines.

2.1.14. All pressurized pipelines shall be placed in right-of-way/utility easements unless approved in writing by IBWS General Manager or their designated representative.

2.1.15. All service line sizes shall be shown on the plan sheets.

2.1.16. All water and sewer lines shall include detail of the line diameter, material type and slope.

2.1.17. Specify details for all connections to existing facilities, including double valves, as required.

2.1.18. Identify the number of stories and dwelling units; show zero lot lines with driveway location (if applicable).

2.1.19. All street names, lot and block numbers shall be as shown on proposed drawings.

2.1.20. Finished floor elevations must be specified at least one foot above the crown of the road and clearly shown on the plan drawings.

2.1.21. After IBWS approval, all revisions shall be noted in revision block.

2.1.22. Drawings shall be georeferenced to the US State Plan Coordinate System, NAD 83, Florida State Planes, North Zone, US Foot, and must contain two referenced, labeled points tied to the State Plan Coordinate System.

## 2.2. **DELIVERABLES**

2.2.1. Refer to the Developer Plan Review Procedure for a list of deliverables.

2.2.2. All deliverables shall be labeled with the File Name, Company Name, Contact Name, and Phone Number.

2.2.3. Any additional drawing files used as an external reference within the submitted drawing file shall also be included with the submitted project. Any projects which have an external reference attached and not included shall not be accepted.

#### **2.2.4. FILE NAMING AND REVISIONS**

2.2.4.1. File names shall correspond exactly to the subdivision or project name and shall be consistent from one version to the next.

2.2.4.2. The file name shall contain the project name and the revision date in YY/MM/DD format as part of the name.

#### **2.3. DESIGN GUIDELINES**

2.3.1. Sewer lift stations shall only discharge to a pressurized sewer force main.

2.3.2. Lift station wet wells shall be designed so the pumps remain submerged at all times.

2.3.3. A non-looped (dead end) water line shall be sized no less than 8-inches in diameter for fire flow purposes.

2.3.4. All water and sewer service laterals shall be located no more than 3-feet from the property corners.

2.3.5. All water, gravity sewer, and sewer force mains crossing under creeks and or mosquito ditches shall be in P401 coated ductile iron pipe.

2.3.6. Commercial and residential units located in the same building shall be metered separately.

2.3.7. Restaurants shall be metered separately from all other units, commercial or residential.

2.3.8. Pools and clubhouses shall be metered separately so that there are no sewer charges for pool water.

2.3.9. No more than one residential lot shall connect to a single sewer service lateral.

2.3.10. Potable water services and fire mains shall not share a common tap except in situations where the water main is on the opposite side of the road. In all other instances, potable water services and fire mains shall have separate taps.

2.3.11. Where a fire line and potable water service share a common tap, valves shall be placed on each line where they split per the detail on sheet W-1 of IBWS Water Details.



2.3.12. In the event where existing gravity sewer laterals are to be abandoned as part of a new design, the service shall be plugged in the main using an internal point repair liner and the lateral filled with an excavatable, cementitious flowable fill.

2.3.13. In the event that a new gravity sewer system is connecting to an existing manhole, the new line shall be plugged where it enters the existing manhole and shall remain plugged until the new gravity line has been fully tested and FDEP certified.

2.3.14. Gravity sewer service laterals shall be no more than three (3) feet deep where it terminates at the cleanout.

2.3.15. Potable water main lines and services shall be installed above stormwater exfiltration systems.

2.3.16. An 8-inch sewer lateral shall only connect to a gravity sewer main via a manhole.

#### 2.4. **EASEMENTS & SEPARATION REQUIREMENTS**

2.4.1. Easements shall allow unhindered access to all facilities and mains.

2.4.2. A ten (10) foot easement shall be required in areas adjacent and parallel to rights of way.

2.4.3. A twelve (12) foot easement shall be required for single line areas where zoning or other legal requirements would ensure that structures are not placed within ten (10) feet of facilities.

2.4.4. A twelve (12) foot wide easement, dedicated solely to IBWS, shall be required to provide vehicular access to all pump stations located within a development.

2.4.5. A twenty (20) foot easement shall be required for a line that runs down the side property line of a single-family lot or through areas not typically accessible (buffer zones, green areas, lakeside easements, golf courses, etc.).

2.4.5.1. Easements of 20-foot width are required to ensure that neither structures, nor trees, shrubs, etc., are placed closer than (10) feet to a facility or main.

2.4.5.2. Proposed facilities are not to be constructed in areas that are to be landscaped.

2.4.5.3. If IBWS determines that there is no alternative, plantings with non-aggressive rooting systems may be placed within five (5) feet of a facility or main provided that there is at least four (4) feet of cover is provided.

2.4.6. A **HOLD HARMLESS AGREEMENT** is to be provided for IBWS in such a case, relieving IBWS from any responsibility for damages due to IBWS maintenance or construction work within the easement.

2.4.7. Wider easements may be required for deeper runs per IBWS discretion.

2.4.8. A perpendicular distance of no less than ten (10) linear feet (in plan) shall be required for separation between any and all sewer and water utilities.

2.4.9. A perpendicular distance of no less than ten (10) feet (in plan) shall be required for separation between any structure and all water and or sewer mains.

2.4.10. A perpendicular distance of no less than six (6) linear feet (in plan) shall be required for separation between any and all sewer/water utilities and underground electric utilities.

2.4.11. A perpendicular distance of no less than six (6) linear feet (in plan) shall be required for separation between any and all sewer/water utilities and underground natural gas utilities.

2.4.12. Deviations from these requirements shall be considered on a case-by-case basis, at the sole discretion of IBWS General Manager or their designated representative, and no less than minimum FDEP standards.

## 2.5. **AS-BUILT DRAWINGS**

2.5.1. All as-built plans submitted to IBWS shall be provided via email or on digital device in AutoCAD format, PDF format, and one signed and sealed hard copy.

2.5.2. Drawings shall be georeferenced to the US State Plan Coordinate System, NAD 83, Florida State Planes, North Zone, US Foot, and must contain two referenced, labeled points tied to the State Plan Coordinate System.

2.5.3. All features depicted in the as-built drawings must be surveyed after construction, to verify accuracy. IBWS shall randomly spot check to ensure accuracy. Water system features must be surveyed to an accuracy of  $\leq 0.3$  foot. Sewer system features must be surveyed to an accuracy of  $\leq 0.5$  foot.

2.5.4. IBWS shall provide a template drawing available for downloading on its web site at [www.inletbeachwater.com](http://www.inletbeachwater.com).

2.5.5. Do not use computer-generated scales that cannot be read with a standard Engineer's box scale.

2.5.6. Show profile grade between manholes.

2.5.6.1. Manhole inverts and top elevations.

2.5.7. Special detail drawings covering installation to meet field conditions.

2.5.8. Use appropriate symbols for natural ground, compacted earth and pavement.

### 2.5.9. **LAYERING**

2.5.9.1. Layer names must appear exactly as in Appendix A.

2.5.9.2. All required layers listed in IBWS approved CAD layers shall only contain the associated described features. For example, the BOUND-PROJECT layer shall contain only the project boundary line.

2.5.9.3. All required layers shall be present in the drawing except for features that do not pertain to a particular project.

2.5.9.4. All layers shall be clearly differentiated from one another. For example: two layers having the names WATER-MAIN and WATER-MAINS shall not exist in the same drawing.

2.5.9.5. All text shall appear on separate layers from the layers they annotate. For example, text describing a water main shall be on the WATERMAIN- TXT layer and not on the WATER-MAIN layer.

2.5.9.6. Leaders and dimensions shall be placed on the appropriate text layer and not the feature layer. All Dimensions shall be associative. Exploded dimensions shall not be accepted.

2.5.9.7. All layers shall conform to the proper geometry type (line (polyline), polygon, text, insert) as shown on Appendix A.

2.5.9.8. All polygon type features shall be completely closed. Lines may need to be duplicated on more than one layer to be correctly drawn as a polygon.

2.5.9.9. Gravity Sewer lines and Force Mains shall be drawn as polylines and broken only at changes in pipe type, valves, tees, crosses, manholes and reducers.

2.5.9.10. All valves shall be labeled with coordinates and referenced to road centerlines, power and/or utility poles, phone boxes, or any other existing permanent above ground structure. All dimensions for valve references shall be on the appropriate Valve-Txt layer.

2.5.9.11. Water lines shall be drawn as polylines and broken only at changes in pipe type, valves, tees, crosses and reducers.

2.5.9.12. Pipe end points shall be snapped together at endpoints.

2.5.9.13. “End-of-line” caps shall be drawn to differentiate end-of-lines from lines that extend beyond the extent of the drawing. “End-of-line” caps shall be drawn for lines that are to be permanently capped when the job

is complete, not for lines that are temporarily capped pending inspection.

#### 2.5.10. **SYMBOLS**

2.5.10.1. Symbols shall be standardized according to examples provided in the IBWS As-built Template file. The following “point” features shall be symbolized using the standard IBWS Symbols and inserted as blocks:

- ✓ End of line Cap
- ✓ Fire Hydrant
- ✓ Flush Hydrant
- ✓ Manhole
- ✓ Meter
- ✓ Reducer
- ✓ Tees
- ✓ Valve
- ✓ Cleanout
- ✓ Lift station

\*See Appendix B

#### 2.5.11. **ANNOTATION**

2.5.11.1. All water and sewer lines shall include detail of the line diameter, material type and slope.

2.5.11.2. All addresses and lot numbers shall not be shown with special characters such as \*, #, “, etc.

2.5.11.3. All required text shall be single line text.

#### 2.5.12. **FILE NAMING AND REVISIONS**

2.5.12.1. File names shall correspond exactly to the subdivision or project name and shall be consistent from one version to the next.

2.5.12.2. The file name shall contain the project name and the revision date in YY/MM/DD format as part of the name.

#### 2.6. **ENGINEER CERTIFICATION GUIDELINES**

2.6.1. The ENGINEER shall submit to IBWS the following certifications and status reports when the project is ready to be certified.

2.6.1.1. Written certification that all materials being used for the project meet the latest version of IBWS' Standard Design and Construction Specifications, as well as all ASTM, AWWA, ANSI standards.

2.6.1.2. Fusion equipment operator certification. Refer to section 5.3.2.

2.6.1.2.1. Fusion equipment Data Logger records. Refer to section 5.3.2.

2.6.1.3. Inspection reports from gravity sewer camera inspections, outlining needed repairs and or certifying the line meets IBWS specifications.

## **2.7. INSPECTION REQUIREMENTS**

2.7.1. CONTRACTOR shall be responsible for getting all property corners and right of ways staked prior to final inspection.

2.7.2. It shall be the responsibility of CONTRACTOR to notify IBWS at least forty-eight (48) hours in advance of all inspections.

2.7.3. All construction shall be completed before the CONTRACTOR schedules a walk-through inspection with IBWS.

2.7.4. CONTRACTOR shall supply personnel on the day of the scheduled inspection, who will accompany the inspector to open all manholes, meter boxes, test all fire hydrants, and correct any punch list items found before the inspector leaves the job site. The inspector will return to the job site at a later date to inspect any larger, more difficult items when they have been completed.

## **SECTION 3**

### **EXCAVATION AND BACKFILLING**

## **SECTION 3 – EXCAVATION AND BACKFILLING**

### **3.1. SCOPE**

3.1.1. The work under this section includes the excavation to designated elevations for (where applicable) all structures, trenching for underground piping, stockpiling of materials suitable for backfill, placing and compacting backfill, including granular backfill where shown on the drawings and specified hereinafter.

3.1.2. Excavation, dewatering, sheeting, and bracing required shall be carried out so as to prevent undermining or disturbing foundations of any existing structure or work, and so that all work may be accomplished and inspected in the dry.

3.1.3. The extent of excavation open at any one time shall be held to a minimum consistent with normal and orderly prosecution of the work.

### **3.2. GENERAL REQUIREMENTS**

#### **3.2.1. SUNSHINE STATE ONE CALL OF FLORIDA**

3.2.1.1. Sunshine State One Call (SSOCOF) is a not-for-profit corporation which began with the 1993 adoption of the *"Underground Facility Damage Prevention and Safety Act,"* Chapter 556, Florida Statutes. Its main purpose is to assist with the prevention of damage to underground facilities.

3.2.1.2. Excavators throughout Florida are responsible for notifying SSOCOF of their proposed excavations so that SSOCOF can notify all members with underground facilities near the excavation site.

3.2.1.3. SSOCOF may be notified by contacting (800) 432-4770.

3.2.1.4. Excavators without a valid locate ticket for any project that involves digging run the risk of paying fines levied by SSOCOF and lost revenues from their job site being shut down until they have a valid locate ticket and have waited the required two full business days before digging.

### **3.3. MATERIALS**

#### **3.3.1. BACKFILL**

3.3.1.1. CONTRACTOR shall furnish, place, and compact granular backfill as specified hereinafter, in excavation below normal grade, as pipe bedding material, in other locations as indicated on the drawings, or as specified, and were ordered by IBWS or Engineer for miscellaneous granular backfill.

3.3.1.2. Granular backfill consist of well-graded crushed stone or crushed gravel meeting the requirements of ASTM Designation C-33-, Gradation 67 (3/4 inch to no. 4). Air-cooled blast furnace slag, alone or in combination with crushed stone and/or crushed gravel conforming to ASTM Designation C-33-, requirements may also be used.

3.3.1.3. In lieu of the above-specified granular material for backfill and bedding, CONTRACTOR when so authorized by IBWS may use a good grade AASHTO Class A-3 sand, meeting County Ordinance 2005-24 and free of organic or other unsuitable material in quantities which would render the sand unsuitable for bedding use.

3.3.1.4. Unsuitable materials for backfill shall include pile foundations, concrete, railroad ties, debris, organic material, etc.

3.3.1.5. All backfill shall be placed in uniform horizontal layers. "Ramping," that is pushing backfill material down a ramp into excavated areas, shall not be permitted unless authorized in writing by the IBWS General Manager or their designated representative.

3.3.1.6. Grade and line stakes shall be protected.

3.3.1.7. Benchmarks and other reference points shall be carefully maintained and, if disturbed or destroyed, shall replace as directed.

### 3.4. **EXECUTION**

#### 3.4.1. **HANDLING WATER**

3.4.1.1. CONTRACTOR shall provide ample means and device with which to immediately remove and dispose of all water entering trench and structure excavations and shall keep said excavations acceptably dry, until the structures to be built therein are completed.

3.4.1.2. All water pumped in or drained from the work shall be disposed of in a suitable manner without damage to sewer, pavement, pipes, electrical conduits, or any other work or property.

3.4.1.3. Drainage shall be adequate. No pipe shall be laid in water and no water shall be allowed to rise above the bottom of any pipe while it is being jointed, except as otherwise permitted in writing.

3.4.1.4. No masonry shall be placed in water and no water shall be allowed to rise over masonry until the concrete or mortar has attained its initial set, nor shall water be allowed to run over completed masonry for four days.

3.4.1.5. At no time shall water be allowed to rise as so to set up unequal pressures in the structures until the concrete or mortar has set at least 24 hours and also until any danger of floatation has been removed.



3.4.1.6. Dewatering, if required, shall be continued during construction to keep the groundwater below the level of the backfill at all times until the backfill is completed.

### 3.4.2. **EXCAVATING TRENCHES**

3.4.2.1. All excavation for piping shall be open cut and tunneling shall not be permitted unless specifically called for on the plans.

3.4.2.2. Trench sides shall be approximately vertical between an elevation of one foot above the top of the pipe and the bottom of trench; otherwise, trench sides shall be as vertical as possible or as required to meet safety regulations.

3.4.2.3. CONTRACTOR shall excavate the pipe trench by hand where excavation by machinery would endanger existing utilities, or structures which otherwise might be saved by use of hand excavation.

3.4.2.4. Trench width shall be as narrow as practicable and shall not be widened by scraping or loosening material from the sides.

3.4.2.4.1. At no time shall the trench width within one (1) foot of the top of pipe exceed the external pipe diameter by more than twelve inches on either side.

3.4.2.5. Except where granular or concrete bedding is to be used, mechanical excavation shall be stopped above the final invert grade elevation and the remaining material hand excavated so that the pipe may be laid on a firm, undisturbed, native earth bed.

3.4.2.6. Bell holes shall be dug to permit the entire straight barrel of the pipe to rest on the trench bottom. Boulders or loose rocks, which might bear against the pipe, shall not be permitted in the trench bottom or backfill.

3.4.2.7. Where materials unsuitable for backfill such as muck, mud or other unstable material are excavated within the limits of excavation shown on the drawings, the unsuitable material shall be removed from the job site and disposed of by CONTRACTOR. Suitable class A-3 sand or selected backfill shall replace the unsuitable backfill and be compacted to minimum of 98% Modified Proctor Density.

3.4.2.8. Excavation in rock (if present) shall be made at least six inches below the finished grade of the pipe and the resultant over-excavation shall be filled and compacted with suitable material as approved by IBWS. No section of pipe shall rest directly on rock or concrete.

### 3.4.3. **JOINT TRENCHES**

3.4.3.1. Joint Trench construction shall not be allowed without specific written consent on a per project basis.

3.4.3.2. In all cases, water and sewer lines must be a minimum of 6 foot horizontal and 1.5 foot vertical from any electrical, communications, or gas lines.

3.4.3.3. ELECTRICAL MUST BE BELOW THE WATER/SEWER LINES.

3.4.3.4. In cases where 1.5-foot vertical cannot be met an 8-foot separation shall be required.

#### 3.4.4. **EXCAVATING BELOW NORMAL GRADE**

3.4.4.1. In the event CONTRACTOR through error or carelessness excavates below the elevation required, CONTRACTOR shall at his own expense, backfill with selected granular backfill as hereinafter specified and compact to obtain suitable bedding as specified.

3.4.4.2. In the event unstable or unsuitable bedding material is encountered at or below the limits of excavation noted on the drawings, such material shall be removed and replaced with suitable compacted granular backfill material.

#### 3.4.5. **BACKFILLING**

3.4.5.1. Attention is called to the various testing requirements of the particular pipe to be installed as specified under the pipe sections of these specifications.

3.4.5.2. Contractor shall be responsible for obtaining the necessary inspections before, during and after backfilling and shall re-excavate, refill, and reperform all such related work to obtain satisfactory test results.

3.4.5.3. Backfill shall be placed and compacted under the pipe haunches in uniform layers so as not to exceed six inches in depth on either side. Each layer shall be placed, then carefully and uniformly tamped, so as to eliminate the possibility of lateral displacement. The remainder of the backfill material shall then be placed in layers not exceed twelve inches (compacted thickness) and tamped to a compaction as specified hereinafter.

3.4.5.4. Whenever trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off, and finally made to conform to the surface of the ground.

3.4.5.5. Backfilling shall be carefully performed and surface restored to the elevation shown on the plans. In unpaved areas the surface of trenches shall conform and be equal in quality, character, and materials to the surface immediately prior to making the excavation.

3.4.5.6. Compaction shall be in accordance with the compaction requirements of this section. Fill material shall be within 2 % of optimum moisture content at time of compaction.

3.4.5.7. Where wet conditions are such that dewatering by normal pumping methods would not be effective, the procedure outlined below may be used when specifically authorized by IBWS in

writing and noted in the job diary. In such specifically authorized cases, backfill material used below the elevation at which mechanical tampers would be effective shall be of the AA STHO A-3 soil classification.

3.4.5.7.1. After the pipe is bedded properly, the A-3 material shall be placed, and rammed and compacted under the pipe haunches by the use of timbers or hand tampers. Hand tamping shall continue during the placing of the backfill until such time that the backfill has reached an acceptable elevation for mechanical tamping.

3.4.5.7.2. The mechanical tamping shall be done in such a manner and to such an extent as to transfer the compacting force into the previously hand-tamped fill.

3.4.5.8. If CONTRACTOR has compaction equipment with which the required density can be obtained in thicker lifts than permitted above and upon satisfactory evidence that the proposed equipment shall produce work equal in quality to that produced by the specified method, IBWS and ENGINEER may permit placement of granular material of soil groups A-1, A-2, or A-3 in lifts up to a maximum of one-foot compacted thickness.

3.4.5.9. CONTRACTOR shall be required to furnish equipment and labor to excavate and backfill test pits to be dug for the performance of density tests.

3.4.5.10. Use of thick lift compaction shall not be allowed for the first stage backfilling (up to one foot above top of pipe.).

#### 3.4.6. **COMPACTION AND TESTING**

3.4.6.1. Backfill material up to a level of one foot over the top of the pipe or bottom of structures shall be placed in layers not to exceed six inches compacted thickness and compacted to 95% of its maximum density within +/- 2% of optimum moisture content as determined by the Laboratory Modified Proctor Tests.

3.4.6.2. In areas of roadways or traffic areas, backfill material of one foot over the top of pipe and bottom of structures shall be placed in layers not to exceed 12 inches compacted thickness and compacted to 98% of its maximum density within +/- 2% of optimum moisture content as determined by the Laboratory Modified Proctor Test.

3.4.6.3. Compaction by water jetting or puddling shall not be permitted in roadways or other traffic areas.

3.4.6.4. On areas outside of roadways and outside of traffic areas, backfill material above one foot over the top of the pipe and above the bottom of structures shall be placed in layers not to exceed 12 inches compacted thickness and compacted to 95% of its maximum density within +/- 2% of optimum moisture content as determined by the Laboratory Modified Proctor Test.

3.4.6.5. Where pipe is laid or structures built on fill materials in lieu of undisturbed earth, the fill material shall be brought up to the bottom elevation of the pipe or structure in six inches

(compacted thickness) maximum layers. Each layer shall be compacted to 98% of the maximum density as determined by the Laboratory Modified Proctor Tests.

3.4.6.6. The method of compacting backfill shall be at CONTRACTORS discretion, subject to the approval of ENGINEER and IBWS, provided that the compaction requirements specified herein are obtained, except that consolidation by flooding shall not be permitted under or adjacent to paved or unpaved traffic areas.

3.4.6.7. If tests for in place density consistency fail to meet the requirements, ENGINEER or IBWS may require CONTRACTOR to change his method of compaction without claiming additional compensation.

3.4.6.8. Compaction control on all new construction shall be accomplished by in-place densities to determine the degree of compaction. Compaction control testing shall be performed at CONTRACTOR'S expense by a qualified independent testing laboratory approved by the ENGINEER. CONTRACTOR shall give the ENGINEER ample notice to notify the laboratory to perform tests as specified. Any compacted layer, which fails to meet the above compaction requirements, shall be removed, replaced and retested at CONTRACTOR'S expense.

3.4.6.9. Field density shall be made in locations approved by the ENGINEER, normally in each vertical layer, and using the following approximate spacing:

3.4.6.9.1. Under structures, pavement and slabs one per 2,500 square feet with at least two per structure or area.

3.4.6.9.2. In trenches, one every three hundred feet in continuous trenches under pavement or future pavement plus one at each intersection or one every five hundred feet in continuous trenches not under pavement.

### 3.4.7. **BACKFILL MAINTENANCE**

3.4.7.1. CONTRACTOR shall refill all backfill areas to compensate for settlement.

3.4.7.2. The surfaces of backfilled trenches shall be maintained in a safe and satisfactory condition at all times after being opened to traffic until the final acceptance of the work by IBWS.

**SECTION 4**

**DEWATERING**

## **SECTION 4 – DEWATERING**

### **4.1. SCOPE**

4.1.1. The work specified in this section of the specifications shall consist of supplying all labor, materials, and plans and performing all work necessary to lower and control the groundwater levels and hydrostatic pressures to permit all excavation and construction specified under this contract to be performed in the dry.

4.1.2. The control of all surface water shall be considered as part of the work.

### **4.2. GENERAL REQUIREMENTS**

4.2.1. It is the intent of these specifications that an adequate dewatering system be installed to lower and control the groundwater in order to permit excavation, construction of structures, and the placement of the fill materials, all to be performed under dry conditions.

4.2.2. The dewatering system shall be adequate to pre-drain the water-bearing strata above and below the bottom of the structure foundations, the drains, the sewers and all other excavations.

4.2.3. The system to be used shall reduce the hydrostatic head in the water-bearing strata below the structure foundations, the drains, sewers and all other excavations, to the extent that the water level and piezo metric water levels in the construction area remain below the prevailing excavation surface at all times.

4.2.4. The contractor shall be solely responsible for the arrangement, location, and depths of the dewatering system necessary to accomplish the work described under this section of the specifications.

4.2.5. The supply of all labor, materials, and plans, and the performance of all work necessary to carry out additional work for reinstatement of the structures of foundation soil resulting from such inadequacy or failure shall be undertaken by CONTRACTOR to the approval of IBWS and at no additional expense.

4.2.6. If the dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system, then loosening of the foundation strata or instability of slopes, or damage to the foundations or structures may occur.

### **4.3. EXECUTION**

4.3.1. Prior to any excavation below the groundwater level, the DEWATERING system shall be placed into operation to lower the water levels as required and then shall be operated 24 hours per day, seven days per week until all drains, sewers, and structures have been satisfactorily constructed, including placement of fill materials, and no longer require dewatering.

4.3.2. CONTRACTOR shall take any steps that he feels necessary to familiarize himself with the site conditions, the ground conditions and the groundwater conditions.

4.3.3. An adequate weight of fill material shall be in place to prevent buoyancy prior to discontinuing operation of the dewatering system.

4.3.4. No pipe shall be installed in standing water. A sufficient amount of bedding material shall be in place.

4.3.5. The control of all surface and subsurface water is considered as part of the dewatering requirements.

4.3.6. The control shall be adequate so that the stability of excavated and constructed slopes are not adversely affected by water, that erosion is controlled and that flooding of excavations or damage to the structures does not occur.

4.3.7. DEWATERING shall be performed in such a manner so as to cause no inconveniences whatsoever to IBWS, ENGINEER, or others engaged in work about the site.

4.3.8. All applicable Federal, State, and Local codes shall be met.

## **SECTION 5**

### **POTABLE WATER – PIPELINES**



## **SECTION 5 – POTABLE WATER – PIPELINES**

### **5.1. SCOPE**

5.1.1. CONTRACTOR shall furnish and install potable water piping system, complete, tested and ready for operation.

5.1.2. This section contains standard specifications for use in general procedures as specified hereinafter or as otherwise shown on the drawings.

### **5.2. GENERAL REQUIREMENTS**

5.2.1. All work shall be proved to be in first class working condition and constructed properly in accordance with the drawings and specifications.

5.2.2. All defects and leaks disclosed by the tests shall be remedied. All tests shall be performed by CONTRACTOR and observed by IBWS. Water for testing shall be furnished by CONTRACTOR.

5.2.3. CONTRACTOR shall submit to ENGINEER for approval before work begins, certificates of inspection in triplicate from the pipe MANUFACTURER that the pipe and the fittings supplied have been inspected at the plant and meet the requirements of these specifications.

5.2.3.1. Any materials outside of those listed in the specifications must be approved by IBWS in writing prior to work beginning to be considered an APPROVED EQUAL material.

5.2.3.2. ENGINEER shall submit to IBWS, documentation certifying that all materials meet current specifications.

5.2.4. All pipe sections shall be a minimum of twenty (20) feet in length.

5.2.5. All materials shall be free from defects impairing strength and durability and shall be the best of commercial quality for the purpose specified.

5.2.6. All materials have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

5.2.7. All pipe and fittings shall be clearly marked with the name or trademark of the MANUFACTURER, the batch number, the location of the plant, and strength designation, etc. and the pipe shall be of a color approved by the utility company.

5.2.8. Each section of pipe shall be marked with the date of completion of lining and inspection in accordance with these specifications, and its numerical sequence of application on that date. A permanent marker of identifiable color shall be used.

5.2.9. All pipe and fittings delivered to the job site shall be accompanied by independent TESTING LABORATORY REPORTS certifying that the pipe and fittings conform to ASTM Specifications.

5.2.10. CONTRACTOR shall submit a NOTARIZED STATEMENT OF CERTIFICATION from the pipe MANUFACTURER as to conformance with the aforementioned ASTM Specifications and Modifications thereto, at the time of submitting shop drawing data on the pipe and fittings.

### 5.3. **MATERIALS**

#### 5.3.1. **POLY-VINYL CHLORIDE (PVC)**

5.3.1.1. Pipe shall be clean, virgin Polyvinyl Chloride (PVC) pipe for potable water and shall have a bell type coupling with a thickened wall section integral with the pipe barrel.

5.3.1.2. Pipe shall be approved for potable water by the National Sanitation Foundation. All herein referenced standards shall be of the latest edition or revision.

5.3.1.3. PVC pipe joints shall be the manufacture's standard push-on bell type with rubber sealing ring for pipe sizes 2-3 inch and larger.

5.3.1.4. Ductile iron fittings shall be used for PVC pipe 3 inches and larger.

#### 5.3.1.5. **PVC 1120 SCHEDULE 40**

5.3.1.5.1. Pipe shall conform to ASTM D1785 - latest, for use in sizes under 2 inches.

5.3.1.5.2. The sustained pressure test shall be conducted in accordance with ASTM D1598 at test pressures given in ASTM D1785 when tested in accordance with ASTM D2672 (section 6.5).

5.3.1.5.3. The burst pressure test shall be conducted in accordance with ASTM D1599 at test pressures given in ASTM D1785, when determined in accordance with ASTM D2672 (section 6.6).

#### 5.3.1.6. **PVC PR200 / SDR21 (CLASS PIPE)**

5.3.1.6.1. Pipe shall conform to ASTM D2241- latest, for use in 2" up to 12" in size. IBWS may specifically approve use in other sizes on request.

5.3.1.6.2. Pipe is to be manufactured in I.P.S (steel) standard pipe equivalent outside diameters.

5.3.1.6.3. The pipe shall be designed for a hydrostatic working pressure of 200 psi at 73.4 degrees Fahrenheit and to pass without failure sustained pressure test of 420-psi minimum

when tested in accordance with ASTM D1598 and for a quick burst test of 630-psi minimum when tested in accordance with ASTM D1599.

5.3.1.6.4. The pipe shall be push on bell type with rubber sealing ring.

5.3.1.7. **PVC 150 PSI / DR18 (C-905)**

5.3.1.7.1. Pipe shall conform to AWWA Standard C-905-latest for use in diameters larger than 12-inches.

5.3.1.7.2. Pipe is to be cast iron pipe (D.I.P.S.) equivalent outside diameters.

5.3.1.7.3. The pipe shall be designed to pass without failure a sustained pressure test of 500 psi in conformance with ASTM D1598 and for a quick burst test of 755 psi in conformance with ASTM D1599.

5.3.1.7.4. In any case of conflict with standards specified herein, the requirements of AWWA Standard C905 shall prevail.

5.3.1.7.5. The pipe shall be push on bell type with rubber sealing ring.

5.3.2. **HIGH DENSITY POLY-ETHYLENE (HDPE)**

5.3.2.1. Pipe shall be DR 11.

5.3.2.2. HDPE pipe for water system use shall conform to AWWA C-901 (up to 3") and AWWA C-906 (4" and larger).

5.3.2.3. Material shall be PE 4710 meeting cell classification PE445574C and Standards ASTM D2737, ASTM D2239 or ASTM D3035.

5.3.2.4. Pipe shall be manufactured in accordance with ASTM D3035 (up to 3") or ASTM F714 (4" and larger) and shall be so marked.

5.3.2.5. All pipe shall be marked with a blue stripe.

5.3.2.6. Mechanical joint transitions with HDPE pipe stiffeners are not permitted.

5.3.2.7. All pipe joints shall be heat fused in accordance with the recommended procedures of the pipe MANUFACTURER.

5.3.2.8. Transitions to other types of pipe shall be by fused end transitions.

5.3.2.9. The fusion equipment operator shall receive training using the recommended procedure.

5.3.2.9.1. Certification of such training shall be provided to IBWS prior to the commencement of fusing/installation of any HDPE pipe and in the final certification submittals provided by the ENGINEER.

5.3.2.10. CONTRACTOR shall be responsible to verify that the fusion equipment is in good operating condition.

5.3.2.11. The fusion equipment shall be equipped with a Data Logger. Records of the welds (heater temperature, fusion pressure, and a graph of the fusion cycle) shall be provided to IBWS in the final certification submittals by the ENGINEER.

5.3.2.11.1. Fusion beads shall not be removed.

### 5.3.3. **DUCTILE IRON**

5.3.3.1. Pipe shall be fabricated by American Cast Iron Pipe Company or approved equal Class 350.

5.3.3.2. Pipe shall be ductile iron manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51.

5.3.3.3. Push-on joints and mechanical joints for such pipes shall be in accordance with ANSI/AWWA C111/A21.11.

5.3.3.4. Pipe shall have cement mortar lining and seal coating in accordance with ANSI/AWWA C104/A21.4.

### 5.3.4. **STANDARD JOINTS**

5.3.4.1. PVC pipe joints for pipe sizes 2-1/2 inches and smaller shall be extra heavy PVC or CPVC fittings solvent welded with PVC or CPVC cement.

5.3.4.2. All mechanical joint fittings shall have mega-lug restraint type retaining glands as manufactured by EBBA IRON.

### 5.3.5. **RESTRAINED JOINTS**

5.3.5.1. In addition to concrete thrust blocks, approved cast iron or ductile iron restraint type retainer glands shall be used.

5.3.5.2. Joint Restraints shall be required on all pipe located in paved areas.

5.3.5.3. Joint Restraints shall also be required for at least four joints on either side of a directional bore or per the PVC pipe MANUFACTURER's requirements.

5.3.5.4. Joint Restraints shall be used on at least three joints prior to the valve for a dead-end fire hydrant or a stub out.

5.3.5.5. Joint Restraints shall be used on at least two joints, or 40-feet, whichever is greater, downstream of tapping valves.

#### **5.3.6. SERVICE CONNECTIONS**

5.3.6.1. Service connections shall be FORD FS202 stainless band iron service saddles.

5.3.6.2. Where service headers are proposed for the purpose of installing a multiple meter vault (A.K.A. “meter bank”), the construction shall conform to the detail as shown on Regional Utilities Standard Potable Water Detail Sheet W-2.

5.3.6.3. All service connections shall terminate at the property lines and no more than 3-feet from the property corners unless directed by IBWS.

#### **5.3.7. MARKING SERVICES**

5.3.7.1. A “W” shall be stamped, not cut, into the back or high part of the curb directly over each service line or in the street or sidewalk where no curb is available.

5.3.7.2. The stamp shall be at least 3-inches tall and ¼-inch deep.

5.3.7.3. CONTRACTOR shall be responsible for installing blue four-inch ball markers, part number 1403, as manufactured by 3m. A marker ball shall be placed at each tap and in each meter box.

#### **5.3.8. SERVICE TUBING**

5.3.8.1. One-inch CTS service tubing shall be polyethylene, PE 4710 Resin Formulation, meeting AWWA specification C-901 pressure rated for 200 psi (DR9) with 1”x3/4” meter coupling curb stop. Tubing shall be black with a blue stripe.

#### **5.3.9. BALL MARKERS**

5.3.9.1. Contractor is to place a 4” ball marker as manufactured by 3m, part no.1403, beside each water main valve, each corp. stop tap at the main, and each curb stop in the buried meter box.

5.3.9.2. The marker ball shall be placed no more than 36-inches deep at any point.

#### **5.4. INSTALLATION**

5.4.1. All work shall be provided to be in first class condition and constructed properly in accordance with the drawings and specifications.

5.4.2. CONTRACTOR shall submit to IBWS, for approval, shop drawings including manufactures certifications of all pipe and fittings used on this project.

5.4.3. CONTRACTOR shall submit to ENGINEER and IBWS for approval before work begins, certificates of inspection in triplicate from the pipe MANUFACTURER that the pipe and fittings supplied have been inspected at the plant and meet the requirements of these specifications.

5.4.4. All water mains, fittings, and appurtenances shall be in conformance with all applicable State of Florida Department of Environmental Protection and American Water Works Association (AWWA) Standards.

5.4.5. CONTRACTOR shall be responsible for defective, damaged or unsound pipe already laid which are found to be defective or damaged and shall replace with new pipe.

5.4.6. All tests shall be performed by CONTRACTOR and observed by IBWS, Water for testing shall be furnished by CONTRACTOR.

5.4.7. Each section of the pipe shall rest upon the pipe bed for full length of its barrel, with recesses excavated to accommodate bells and joints. Any pipe, which has its grade or joint disturbed after lying, shall be taken up and relayed.

5.4.8. No pipe shall be laid when the trench conditions or weather is unsuitable for such work, except by permission of IBWS.

5.4.9. Pipe fittings shall be carefully handled to avoid damage, and if feasible while they are suspended over the trench before lowering, they shall be inspected for defects and to detect cracks.

5.4.10. Minimum cover on all piping shall be 36".

5.4.11. Maximum cover on all piping shall be 48", unless approved in writing by IBWS.

## 5.5. **CLEANING AND FLUSHING**

5.5.1. After a final inspection has been performed and has passed on the project CONTRACTOR shall be responsible for having a flush point opened and is responsible for where the water is to be dispersed. At this time the IBWS construction inspector shall open the main line valve to thoroughly flush out the line.

5.5.2. At this time the CONTRACTOR and IBWS' construction inspector shall check that ALL water services and fire hydrants are turned on and in working order.

## 5.6. **FIELD TESTING**

5.6.1. All piping to be operated under liquid pressure shall be tested in sections of approved length.

5.6.2. All field tests shall be made in the presence of ENGINEER and IBWS.

5.6.3. Testing shall consist of hydrostatic pressure testing at 150 psi.

5.6.4. For the test, CONTRACTOR shall furnish clean water, suitable temporary testing plugs and other necessary equipment and all labor required.

5.6.5. Pressure tests shall be of 2-hour duration, unless specified otherwise or notified in writing by IBWS.

5.6.6. Pressure tests shall be conducted with a pressure loss of not more than 2 psi regardless of length of pipe being tested.

5.6.7. The section of pipe to be tested shall be filled with water of approved quality and all air shall be expelled from the pipe. If hydrants, blow offs, or other outlets are not available at high points for releasing air, CONTRACTOR shall make the temporary taps at such points and shall plug said holes after completion of tests.

5.6.8. Specified test pressures shall be applied by means of a pump connected to the pipe in a manner satisfactory to IBWS.

5.6.9. The pump, pipe connection, and all necessary apparatus, including the proper gauges, shall be furnished by CONTRACTOR and shall be subject to the approval of ENGINEER and IBWS.

5.6.10. Pressure gauges shall be calibrated by an approved testing laboratory, with increments no greater than 2 psi.

5.6.11. Gauges used shall be of such size that pressures tested shall not register less than 10% or more than 90% of the gauge capacity.

5.6.12. All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be performed until it is satisfactory.

5.6.13. In the event a section fails to pass the test, CONTRACTOR shall locate, uncover (even to the extent of uncovering the entire section), and repair or replace the defective pipe, fitting, or joint.

5.6.14. Visible leaks shall be corrected regardless of total leakage.

5.6.15. Lines shall be repaired and retested as necessary until test requirements are achieved.

## 5.7. **DISINFECTION**

5.7.1. All water pipes and fittings at whatever size and wherever installed on potable water lines shall be thoroughly disinfected prior to being placed into service.

5.7.2. Disinfection shall follow the applicable provisions of the procedure established for the disinfection of water mains in AWWA C-651-latest, Florida Rule 62-555.345, F.A.C., and shall be in accordance with both Federal, State and Local requirements.

5.8. **WARRANTY**

5.8.1. CONTRACTOR shall provide a warranty on installation and workmanship for no less than one year from the date of FDEP certification.

5.9. **AS-BUILT WATER PLANS**

5.9.1.1. See Section 2.0 of this Specification



## **SECTION 6**

### **POTABLE WATER – VALVES & FITTINGS**

## **SECTION 6 – POTABLE WATER – VALVES & FITTINGS**

### **6.1. SCOPE**

6.1.1. CONTRACTOR shall provide, install, joint, and test all valves and appurtenances as shown on the drawings and herein specified.

6.1.2. All items furnished shall be new, unused, and shall be the products of manufactures having long experience in the manufacturing of the specified items.

### **6.2. GENERAL REQUIREMENTS**

6.2.1. All valves shall be NSF Standard 61 certified.

6.2.2. Valves over 12 inches shall have right angle drive assemblies.

6.2.3. Valves 3 inches and above in size shall be gate valves unless otherwise noted.

6.2.4. All water valves shall be marked with 3M water ball markers (3M part # 1403).

6.2.5. Valves installed within a water system shall open by turning to the left or counterclockwise, when viewed from the stem.

6.2.6. Where extension stems are required, substantial, adjustable wall brackets and extension stems shall be furnished and located as directed.

6.2.7. Extension stems shall be provided on all buried valves when the operating nut is deeper than 4-feet below final grade.

6.2.8. Interior and exterior of valves shall be fusion bonded epoxy coated in compliance with ANSI/AWWA C-550.

### **6.3. MATERIALS**

#### **6.3.1. GATE VALVES**

6.3.1.1. All valves shall be manufactured by American Flow Control or AVK.

6.3.1.2. All GATE VALVES shall be resilient wedge and shall meet the requirements of AWWA C-515 (sizes up to 12”) and AWWA C-550.

6.3.1.3. GATE VALVE sizes 3 to 12 inches in diameter shall be designed for 250-psi minimum working pressure.

6.3.1.4. GATE VALVE sizes over 12 inches in diameter shall be designed for 150-psi minimum working pressure.

6.3.1.5. When fully open, all GATE VALVES shall have a clear waterway equal to the nominal diameter of the pipe.

6.3.1.6. All GATE VALVE operating nuts or wheels shall have an arrow cast in the metal indicating the direction of opening.

6.3.1.7. All GATE VALVES shall have the manufacture's distinctive marking, pressure ratings, and year of manufacturing cast on the body.

6.3.1.8. Prior to shipment from the factory, each GATE VALVE shall be tested by applying it to a hydraulic pressure equal to twice the specified working pressure.

6.3.1.9. All buried GATE VALVES shall be resilient seat iron body non-rising stem type with two-inch operating nut and adjustable valve boxes.

6.3.1.10. GATE VALVES located above ground and inside structures shall be hand wheel operated, non-rising stem type with flanged ends and of the same general construction as buried valves.

#### **6.3.2. VALVE JOINTS**

6.3.2.1. All gate valves shall have mechanical joint ends to fit the pipe run in which they are to be used, except valves installed on slip joint pipe shall have mechanical joint ends unless otherwise specified.

6.3.2.2. Joint restraint type mechanical joint gland shall be used and shall be mega-lug type or approved equal.

6.3.2.3. Hydrostatic tests shall be performed to check all valve joints and conducted in strict accordance with AWWA requirements and Section 5.5 of this specification.

#### **6.3.3. CHECK VALVES**

6.3.3.1. CHECK VALVES shall conform to the requirements of AWWA C508, latest, "AWWA Standard for Swing-Check Valves for Ordinary Waterworks Service".

6.3.3.2. CHECK VALVES larger than two-inch nominal size shall be iron body, flanged ends, outside lever, spring loaded, swing type with straightaway passageway of full pipe area. The valve shall have renewable bronze seat ring and rubber faced disc.

6.3.3.3. CHECK VALVES shall be AVK manufactured.

6.3.3.4. CHECK VALVE sizes 2-inches in diameter and smaller shall be brass swing check valves, 200 psi working pressure, American Valve M 31, or APPROVED EQUAL.

#### **6.3.4. CUSHIONED CHECK VALVES**

6.3.4.1. The CHECK VALVE used on a high service pump discharge line shall be series 6011 oil-cushioned swing check valves with weight and lever as manufactured by APCO or APPROVED EQUAL.

**6.3.5. HOSE VALVES (BIBS)**

6.3.5.1. All garden hose valves or bibs shall be ¾ inch.

**6.3.6. FITTINGS**

6.3.6.1. Fittings shall be ductile iron and in accordance with the requirements of ANSI/AWWA C153/A21.53, and ANSI/AWWA C110/A21.10.

6.3.6.2. Interior and exterior of fittings shall be fusion bonded epoxy coated in compliance with ANSI/AWWA C-550.

6.3.6.3. All fittings shall be of DOMESTIC ORIGIN (American Made).

6.3.6.4. Ductile fittings and special castings shall conform to the type of pipe being installed and have a minimum working pressure rating of 150 psi. Fittings shall conform to specification (AWWA C153) latest.

6.3.6.5. Short body pattern fittings shall normally be installed. Long body fittings (AWWA C110) shall be used where the drawings specifically call for long body fittings or at the option of CONTRACTOR when the laying length is not controlled by short body patterns.

6.3.6.6. Fittings shall have joints that match the type of pipe furnished. Joints shall be made using restraint type retainer glands.

**6.3.7. TAPS**

6.3.7.1. IBWS shall perform all taps greater than 2" in diameter, unless written permission is given by IBWS.

6.3.7.2. CONTRACTOR shall perform all taps 2-inches diameter and less.

6.3.7.3. A representative of IBWS must be onsite prior to performing any and all taps.

6.3.7.4. CONTRACTOR shall provide at least five working days' notice to IBWS prior to performing the work.

6.3.7.5. At the time the line is to be tapped, it shall be the responsibility of CONTRACTOR to ensure that the tapping sleeve and valve is pressurized and can sustain the pressure test (See Section 6.3.7 of this specification).

6.3.7.6. In the event the line has not been tested prior to the arrival of IBWS at the job site, there shall be a \$50.00 service charge added to the cost of the tap and the tap shall be rescheduled. Should CONTRACTOR prefer IBWS to remain onsite in preparation for the work, a service charge equal to \$50.00 an hour shall apply so long as IBWS is on-site.

6.3.7.7. All taps EQUAL TO OR GREATER THAN 4" IN DIAMETER, irrespective of the diameter of the line to which you are tapping, shall consist of a single TAPPING SLEEVE and associated tapping valve.

6.3.7.7.1. The TAPPING SLEEVE and gland shall be Stainless Steel Wraparound "Fast Style", and shall be as manufactured by FORD METER CO. or APPROVED EQUAL and shall be furnished complete with all necessary accessories.

6.3.7.7.2. The TAPPING SLEEVE shall have a working pressure rating of 200 psi for sizes 4" through 12" and 150 psi for sizes 14" and larger, and shall conform to the applicable sections of AWWA Standard C110 of latest revision.

6.3.7.7.3. The TAPPING SLEEVE shall be of the split type for assembly on the pipe and the sleeve shall be sized for use with all classes of cast iron pipe.

6.3.7.7.4. The outlet flange shall be Class 125 Standard, with recess for standard tapping valves.

6.3.7.8. All taps SMALLER THAN 4" IN DIAMETER, irrespective of the diameter of the line to which you are tapping, shall consist of a single TAPPING SADDLE and associated tapping valve.

6.3.7.8.1. The TAPPING SADDLE shall be Fusion Bonded Epoxy Coated, and shall be as manufactured by FORD METER CO. or APPROVED EQUAL and shall be furnished complete with all necessary accessories.

6.3.7.9. The excavated area in which the tap shall be made must be a minimum of 4" below the bottom of the valve, at least seven feet in length and able to accommodate two people working.

6.3.7.10. The area where the tap shall be made must be completely dry. It is the responsibility of CONTRACTOR to pursue all means necessary to dewater the area in which the tap is to be made.

6.3.7.11. TAPPING VALVES shall meet all the requirements of Section 6.3 of this specification and shall be a mechanical joint outlet by tapping flange with a raised inner lip for alignment with the tapping sleeve.

6.3.7.12. Prior to tapping a potable water main, the drilling machine's pilot drill, shell cutter and cutter hub shall be sterilized in accordance with the following procedure:

6.3.7.12.1. Four gallons of potable water shall be combined with 8 oz. of sodium hypochlorite; the pilot drill, shell cutter and cutter hub shall be swabbed until clean or totally immersed in the

sterilizing solution and allowed to remain wet at least five minutes before tapping operation commences. It is not necessary to rinse the sterilizing solution from the tapping components prior to use.

#### **6.3.8. TAP HYDROSTATIC PRESSURE TEST**

6.3.8.1. After installing a tapping sleeve and valve, and prior to tapping a pressurized water main, a hydrostatic pressure test shall be performed.

6.3.8.2. The test shall be conducted by introducing water into a tap or test hole located on the neck of the outlet half of the sleeve with the tapping valve in the closed position. Sleeves that do not have a tap shall be tested with water supplied through a mechanical joint tapped plug connected to the open tapping valve. Upon completion, a watertight plug shall be inserted into the test hole.

6.3.8.3. The sleeve and valve shall be capable of maintaining test pressure of 150 psi for 30 minutes duration, with no sign of visible leaks.

6.3.8.4. All leaks shall be repaired by removing and replacing defective items with items free from defect, after which the sleeve and valve shall be retested. Such repair and retesting shall be done until the installation passes the specified test.

6.3.8.5. CONTRACTOR shall furnish and install any necessary and temporary restraints, gauges, pumps, and other incidental and appurtenant items necessary to complete this work, and shall remove same upon completion of the test.

#### **6.3.9. CORPORATION STOPS (LEAD FREE)**

6.3.9.1. CORPORATION STOPS shall be manufactured from lead free cast bronze with machined fitting surfaces, and in accordance with AWWA C-800, latest, in sizes 1 inch up to and including 2 inches.

6.3.9.2. The inlet connection shall be AWWA Standard corporation stop thread or iron pipe (I.P.) thread. CORPORATION STOPS with compression joint outlets for copper or plastic tubing shall be Ford type F 1000.

#### **6.3.10. CURB STOPS (LEAD FREE)**

6.3.10.1. CURB STOPS shall be manufactured from lead free cast bronze with machine fitting surfaces, and in accordance with AWWA C800, latest, in sizes 1 inch up to and including 2 inch.

6.3.10.2. CURB STOPS shall be a straight ball meter valve with pack joint, with lock wing cast on stop body and operating tee cap to provide for locking the stop in the closed position.

6.3.10.3. CURB STOPS shall be Ford type B43 with an HB-34 lever handle for 1-inch diameters.

6.3.10.3.1. Handle shall be installed where it will not cover the locking mechanism.

6.3.10.4. CURB STOPS shall be Ford type B41 for 1-1/4 – 2-inch diameters.

6.3.10.5. All curb stops shall be locked with the Highfield Lockseal lock. The lock shall be installed where the lock opening is on the top, easily accessible.

#### 6.3.11. **BALL VALVES (LEAD FREE)**

6.3.11.1. BALL VALVES shall be limited to 3/4 inch through 2 inch in size and shall have a lead-free cast bronze body, bronze tee head, stem with check, full round way opening and provisions for locking in a closed position.

6.3.11.2. BALL VALVES for use with copper services shall have an inlet connection with a flare nut fitting for type K copper tubing and an outlet connection with female iron pipe thread, FORD B-21 series or approved equal.

6.3.11.3. BALL VALVES for use with schedule 40 PVC pipe shall have inlet and outlet connections with female iron pipe threads. The latter shall require the use of brass nipples. Compression joints shall require insert stiffeners.

6.3.11.4. BALL VALVES used in conjunction with pitometer tap installations shall be cast bronze body with inlet and outlet opening with 1 1/4 inch female iron pipe thread. (Valve size 1 1/4 inch). The BALL VALVE shall be No. B11-455 with HP-4 handle as manufactured by Ford Meter Company, Inc., or approved equal.

#### 6.3.12. **VALVE BOXES**

6.3.12.1. CONTRACTOR shall furnish, assemble and place a valve box for each buried valve.

6.3.12.2. Adjustable valve boxes with a cast iron base shall be used, each with an adjustable length center and top section with cover. The sections shall be adjustable for elevation and shall be set to allow equal movement above and below finished grade.

6.3.12.3. The base shall be centered over the valve and shall be approximately on line with nut at top of the valve stem and the entire assembly shall be plumb.

6.3.12.4. The cover shall be marked "WATER" or "FIRE" as appropriate.

6.3.12.5. The castings shall be manufactured of clean, even grain, gray cast iron conforming to ASTM Designation A48, Class 20 B, gray iron castings; and shall be smooth, true to pattern, free from blow holes, sand holes, projections, or other harmful defects.

6.3.12.6. The valve boxes shall be coated with a single coat of coal tar pitch varnish before machining, so that machined seating surfaces shall be free from any coating. The seating

surfaced of both the cover and the jacket shall be machined to fit so that the cover shall not rock after it has been seated in any position in its associated jacket.

6.3.12.7. The location of the valve shall be marked in the high back of the curb with a “V”.

#### 6.3.13. **BACKFLOW PREVENTERS**

6.3.13.1. The following standards shall be referenced and adhered to in the design and application of BACKFLOW PREVENTERS:

6.3.13.1.1. IBSS: Cross Connection Control Program.

#### 6.3.14. **FIRE HYDRANTS**

6.3.14.1. The FIRE HYDRANTS shall be cast iron body, fully bronze mounted, for 150 psi working pressure, complying with AWWA C502-latest.

6.3.14.2. The FIRE HYDRANT inlet connection shall be mechanical joint type, with accessories for a six-inch pipe connection. The internal shutoff valve shall be five and a quarter inch diameter and the hose nozzles shall be bronze with American National Standard fire hose coupling screen threads.

6.3.14.3. The FIRE HYDRANT shall have two (2), two and half (2.5”) inch hose nozzles and one (1) four (4.5”) and half inch pumper nozzle.

6.3.14.4. The FIRE HYDRANT shall be ONLY American-Darling Model B-84-B.

6.3.14.5. The FIRE HYDRANT shall be yellow in color.

6.3.14.6. The FIRE HYDRANT shall be installed with an auxiliary six-inch gate valve at least 30-inches but no more than 10-feet from the FIRE HYDRANT valve.

6.3.14.7. The FIRE HYDRANT valve shall attach to the water main via a mechanical joint by swivel joint tee.

6.3.14.8. All FIRE HYDRANTS shall be restrained to the valve with a 24-inch-long x 6-inch diameter Swivel Adapter. The adapter shall have the Fusion Bonded Epoxy coating on the exterior and interior.

6.3.14.9. Thrust blocks shall be required as per IBWS, Standard Details.

6.3.14.10. FIRE HYDRANT installations more than 30-inches and no more than 10-feet from the valve, shall be restrained from the hydrant back to the valve, with no less than two grade 304 stainless steel ¾” diameter all thread rods per Regional Utilities’ standard details.



6.3.14.11. In the event that a FIRE HYDRANT is more than 10-feet from the water main, a second water valve shall be added to no less than 30-inches in front of the hydrant. The first valve will attach to the main as described in 6.3.14.7 and the second valve will be installed in accordance with 6.3.14.8.

6.3.15. **FLUSH POINT**

6.3.15.1. End of the line flush point shall be constructed per Regional Utilities' standard details as a 2-inch water service.

6.3.15.2. A 2-inch quick connect shall be installed on the curb stop.

**SECTION 7**  
**SEWER – GRAVITY**

## SECTION 7 – SEWER – GRAVITY

### 7.1. **SCOPE**

7.1.1. CONTRACTOR shall furnish and install all gravity sewer lines, manholes, fittings, and appurtenances required for a complete system as shown on the drawings and specified herein.

### 7.2. **GENERAL REQUIREMENTS**

7.2.1. All work shall be proved to be in first class working condition and constructed properly in accordance with the drawings and specifications.

7.2.2. All defects and leaks disclosed by the tests shall be remedied. All tests shall be performed by CONTRACTOR and observed by IBWS Water for testing shall be furnished by CONTRACTOR.

7.2.3. CONTRACTOR shall submit to ENGINEER for approval before work begins certificates of inspection in triplicate from the pipe MANUFACTURER that the pipe and the fittings supplied have been inspected at the plant and meet the requirements of these specifications.

7.2.4. Excavation and backfill are specified in Section 3 of this specification,  
*Excavation and Backfill for Utilities.*

7.2.5. Manholes and gravity sewer lines shall not be placed outside of paved areas without written approval from IBWS.

7.2.6. Manholes shall be no less than 48” deep.

7.2.7. Where feasible, allow for margin of error in design of sewers at minimum slopes and cover (i.e. 0.10-foot drop through manholes, or 0.42% slopes, or, a combination of both).

7.2.8. Gravity sewers shall have no greater than a 0.5-foot inside drop. In other situations, there shall be no greater than a 1.0-foot drop in incoming and outgoing sewer elevations unless a proper drop manhole assembly is used.

7.2.9. Gravity sewers shall have no less than a 90-degree angle between sewer runs unless specific prior approval is given and it is unavoidable.

7.2.10. All materials shall be free from defects impairing strength and durability and shall be the best of commercial quality for the purpose specified.

7.2.11. All materials have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

7.2.12. All pipe and fittings shall be clearly marked with the name or trademark of the MANUFACTURER, the batch number, the location of the plant, and strength designation, etc. and the pipe shall be of a color approved by the utility company.

7.2.13. Each pipe joint shall be marked with the date of completion of lining and inspection in accordance with these specifications, and its numerical sequence of application on that date. A permanent marker of identifiable color shall be used.

7.2.14. All pipe and fittings delivered to the job site shall be accompanied by independent TESTING LABORATORY REPORTS certifying that the pipe and fittings conform to the above-mentioned ASTM Specifications.

7.2.15. CONTRACTOR shall submit a NOTARIZED STATEMENT OF CERTIFICATION from the pipe MANUFACTURER as to conformance with the aforementioned ASTM Specifications and Modifications thereto, at the time of submitting shop drawing data on the pipe and fittings.

7.2.16. Where a sewer force main enters a lift station wet well that is also connected to gravity sewer, no less than two manholes upstream of the wet well, or any manhole within 400-feet of the wet well, shall be lined with the RAVEN epoxy coating per IBWS, specification 9.3.1.14.

### 7.3. **MATERIALS**

#### 7.3.1. **POLYVINYL CHLORIDE (PVC)**

7.3.1.1. Pipe shall be clean, virgin Polyvinyl Chloride (PVC) pipe for use in gravity sewer systems and shall have a bell type coupling with a thickened wall section integral with the pipe barrel.

7.3.1.2. All herein referenced standards shall be of the latest edition or revision.

7.3.1.3. PVC pipe joints shall be the manufacture's standard push-on bell type with rubber sealing ring for pipe sizes 2-3 inch and larger.

#### 7.3.1.4. **PVC SDR 26– MAIN LINE**

7.3.1.4.1. Polyvinyl Chloride sewer pipe for use in gravity sewer systems, shall conform to ASTM D3034-latest for PVC sewer pipe and fittings for sizes 6-inch through 12-inch in diameter, except as hereinafter modified.

7.3.1.4.2. The pipe material shall meet or exceed the approved cell class 12454, PVC compound conforming to ASTM D1784 - latest.

7.3.1.4.3. The bell shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.

7.3.1.4.4. The laying length shall not exceed 14 feet (+/-1") without specific written approval from IBWS.

#### 7.3.1.5. **PVC SDR 35– SERVICE LATERALS**

7.3.1.5.1. Polyvinyl Chloride sewer pipe for use in gravity sewer systems, shall conform to ASTM D3034-latest for PVC sewer pipe and fittings for sizes 6-inch through 12-inch in diameter, except as hereinafter modified.

7.3.1.5.2. The pipe material shall meet or exceed the approved cell class 12454, PVC compound conforming to ASTM D1784 - latest.

7.3.1.5.3. The bell shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.

7.3.1.5.4. The laying length shall not exceed 14 feet (+/-1") without specific written approval from IBWS.

#### 7.3.1.6. **ELASTOMERIC GASKET JOINT**

7.3.1.6.1. Provision shall be made for contraction and/or expansion at each joint with a solid cross section rubber ring. The rubber ring shall be factory assembled and secured in the bell in such a manner so as to prevent sliding and rolling when the spigot end of the adjoining pipe is installed.

7.3.1.6.2. Manual cuts to the pipe shall be to MANUFACTURER standards to prevent damage to the gasket.

#### 7.3.1.7. **FITTINGS**

7.3.1.7.1. All fittings and accessories shall be manufactured in accordance with ASTM D3034.

7.3.1.7.2. Saddle TEEs or saddle WYEs shall not be permitted except by special written approval from ENGINEER and IBWS.

7.3.1.7.3. Gravity sewer main fittings shall be of the bell and spigot configuration.

7.3.1.7.4. Gravity sewer service laterals shall be SDR-35 pipe with solvent weld fittings.

7.3.1.7.5. 90-degree fittings shall not be used in gravity sewer situations.

#### 7.3.2. **DUCTILE IRON**

7.3.2.1. Ductile iron pipe sizes 6 inch through 48-inch diameter shall conform to AWWA Standard C151 – latest.

7.3.2.2. Minimum pipe strength shall be Class 350.

7.3.2.3. The pipe shall have design values of 60,000-psi tensile strength, 42,000-psi yield strength, and 10% minimum elongation.

7.3.2.4. The wall thickness shall be in accordance with Table 51.2 and the corresponding class designation in Table 51.3 of the above referenced specification using wall thickness for laying condition “b” and thickness as required to the depth of cut, shown on the drawings.

7.3.2.5. In addition to the standard markings required by AWWA Standard C151-, the utility company may require each joint of pipe to be marked for the depth of cut it is used on the project, in which case, such markings shall be stenciled on the pipe exterior.

#### 7.3.2.6. **JOINTS**

7.3.2.6.1. Joints for ductile iron pipe shall conform to AWWA Standard C111, Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings, of the push-on type, unless otherwise specified or shown on the drawings.

#### 7.3.2.7. **FITTINGS**

7.3.2.7.1. Fittings shall conform to AWWA Standard C110 American Standard for Cast Iron Fittings, 2.0-inch diameter through 48.0-inch diameter, for water and other liquid, Class 150, mechanical joint unless otherwise noted on the drawings.

#### 7.3.2.8. **COATING**

7.3.2.8.1. All ductile iron pipe and fittings for sewer use shall be furnished with a factory applied coating Protecto 401 ceramic epoxy.

#### 7.3.2.9. **LINING**

7.3.2.9.1. The interior of all ductile iron pipe and fittings for sewer use shall be furnished with a factory applied lining. The lining material shall be Protecto 401 Ceramic Epoxy, unless otherwise directed by ENGINEER and approved by IBWS in writing.

7.3.2.9.2. The lining system shall be applied in accordance with the manufactures standard specifications and requirements.

7.3.2.9.3. The Lining the system shall cover the interior surface of the pipe, extending from the plain or beveled end, to the rear of the gasket socket. The surface shall be adequately prepared prior to lining.

7.3.2.9.4. The lining shall be allowed to cure at least 5 days after the final cast. However, the minimum time shall be increased if the drying temperature is below 65 degrees Fahrenheit.

7.3.2.9.5. The MANUFACTURER shall furnish notarized certificates of compliance stating that the lining conforms to all requirements of these specifications.

### 7.3.3. **GRAVITY SERVICE LATERAL TAP**

7.3.3.1. Connecting a 6" sewer service lateral to an existing gravity sewer main shall be made using the Inserta TEE Lateral Connection System for the type of pipe being connected to.

7.3.3.2. A hole saw shall be used to make a 6-1/2" hole in the side of the existing PVC gravity sewer main.

7.3.3.3. Refer to MANUFACTURER'S installation instructions.

### 7.3.4. **PRECAST CONCRETE MANHOLES**

7.3.4.1. MANHOLES shall meet the latest requirements of ASTM C478 *Specification for Precast Reinforced Concrete Manhole Sections*.

7.3.4.2. Minimum wall thickness shall be five inches.

7.3.4.3. Cement shall meet the latest requirements of ASTM C 150 *Specification for Portland Cement, TYPE II*.

7.3.4.4. Minimum concrete strength shall 4000 PSI at 28 days.

7.3.4.5. The required minimum strength of concrete shall be confirmed by making and testing four standard cylinders at seven (7) days and at (28) days. The test results shall be submitted to the ENGINEER prior to any manhole being installed.

7.3.4.6. Rings shall be custom made with openings to meet indicated pipe alignment conditions and invert elevations.

7.3.4.7. Openings shall be adequately sealed with approved non-shrinking grout, applied and cured in strict conformance with the MANUFACTURER's recommendations so that there shall be zero leakage around pipes and joints.

7.3.4.8. Approval of ENGINEER and IBWS shall be obtained before placing any order for manholes.

7.3.4.9. The top of a manhole structure shall be no more than 18-inches below final grade.

7.3.4.10. The trough shall be no less than 8-inches in diameter.

### 7.3.4.11. **BASES**

7.3.4.11.1. MANHOLE BASES shall be cast integrally with the bottom manhole section.

7.3.4.11.2. The base section shall be set in a 12-inch-thick leveling course of #4 or #57 stone with filter fabric above and below the stone, extending at least 12-inches outside the base.

7.3.4.11.3. In order to permit adjustment of the precast base section and ensure full bearing on the leveling course, said section shall be placed just prior to initial set.

#### 7.3.4.12. **JOINTS**

7.3.4.12.1. Joint contact surfaces shall be formed with machine castings; they shall be exactly parallel with a 2-degree slope and nominal 1/16-inch clearance with the tongue equipped with a proper recess for the installation of an “o” ring rubber gasket, conforming to the latest edition of C443, Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gasket or Pre-Molded Plastic Joint Sealer with Joints Pre- Primed.

7.3.4.12.2. Each joint shall be grouted on the inside with approved grouting materials.

#### 7.3.4.13. **COATING**

7.3.4.13.1. The interior and exterior surfaces of each manhole shall be given two (2) coats of a waterproof bituminous coating approved by ENGINEER and IBWS.

7.3.4.13.2. Total minimum dry film thickness shall be 12 mils. Each coat shall be applied at a rate of no less than 1 gallon per 100 square feet.

7.3.4.13.3. The waterproofing materials shall be applied by brush or spray and in accordance with the instructions of the MANUFACTURER.

7.3.4.13.4. Time shall be allowed between each coat to permit sufficient drying so that the application of the second coat has no effect on the first coat.

7.3.4.13.5. The paint shall be applied at the place of fabrication.

7.3.4.13.6. Additional coating or touch up work shall be required after manhole installation if so directed by ENGINEER and/or IBWS.

#### 7.3.4.14. **RISER ADJUSTMENT RINGS**

7.3.4.15. CRETEX Expanded Polypropylene adjustment rings shall be used for all manhole risers.

7.3.4.16. Refer to MANUFACTURER’S installation instructions at [https://youtu.be/w\\_ZEAw-OVFU](https://youtu.be/w_ZEAw-OVFU)

#### 7.3.5. **CAST IRON MANHOLE FRAMES AND COVERS**



7.3.5.1. Shall be U.S. Foundry E 170 with NPPB pick bar.

7.3.5.2. Castings shall be made of good quality, strong, tough, and even.

7.3.5.3. Sand holes and defects of any nature which would render them unfit for the service for which they are intended shall not be allowed.

7.3.5.4. Castings shall meet the requirements of ASTM A48, latest Specifications for Gray Iron Castings, Class No. 30, or Grade 65-45-12, Ductile Iron Castings. In either Case, manhole frame and cover shall be designed to withstand an HS20-44 loading defined in the AASHTO Specifications.

7.3.5.5. Before being shipped from the foundry, castings shall be given one (1) coat of coal-tar pitch varnish applied in a satisfactory manner so as to make a smooth coating, tough, tenacious and not brittle or with any tendency to scale off.

7.3.5.6. Frames and covers shall be machined or ground at touching surfaces so as to seat firmly and prevent rocking. Any set not matching perfectly shall be rejected.

7.3.5.7. A RainGuard ABS insert shall be installed in all manhole frames and covers to prevent excess storm water inflow.

#### 7.4. **INSTALLATION**

7.4.1. The method of pipe laying shall be subject to the approval of ENGINEER and IBWS.

7.4.2. Each pipe length shall be inspected and tested before being laid to ensure that it is sound and of good quality.

7.4.3. The pipe laying shall proceed upgrade; beginning at the lower end of the sewer, with the pipe bell ends facing upgrade.

7.4.4. Upon identification of any defective pipe which may have been installed, CONTRACTOR shall immediately act to remove and replace the damaged or defective material with sound pipe.

7.4.5. Extreme care shall be taken to keep the pipe in exact alignment and elevation.

7.4.6. Pipe shall be laid to conform accurately to the lines and grades indicated on the drawings.

7.4.7. CONTRACTOR assumes complete responsibility for locating all underground utilities in advance of construction, to ensure that no conflicts occur with the proposed line and grade.

7.4.7.1. Minor changes in alignment, but not the grade, shall be permitted to avoid unforeseen underground facilities only if approved by ENGINEER and IBWS, provided that straight alignment can be maintained between manholes.

7.4.7.2. If a conflict is discovered between an existing utility and the proposed grade, CONTRACTOR shall furnish ENGINEER all pertinent information, so that remedial design can be performed and approved by IBWS.

#### **7.4.8. SURVEYS AND GRADE STAKES**

7.4.8.1. CONTRACTOR is responsible for providing; protecting and the accuracy of all survey and grade stakes.

#### **7.4.9. LAYING AND JOINTING**

7.4.9.1. The pipe shall be laid on an unyielding foundation with uniform bearing under the full length of the barrel of the pipe.

7.4.9.2. The bedding shall be shaped to conform to the outside of the pipe.

7.4.9.3. Suitable excavation shall be made to receive, where applicable, the bell of each pipe, which shall be carefully laid true to line and grade.

7.4.9.4. All adjustments to line and grade must be made by scraping away or filling in under the barrel of the pipe and not by wedging or blocking up any portion of the pipe.

7.4.9.5. The spigot end of each pipe shall not abut against the base of unevenness of any kind along the bottom halves of the pipe.

7.4.9.6. Prior to joining the pipes, the mating ends shall be thoroughly cleaned of any debris, dirt, or foreign material.

7.4.9.7. If the pipe is to be cut to length, it shall be cut and beveled per them MANUFACTURER's specifications.

7.4.9.8. The pipe shall be adjoined in accordance with the recommendations from the MANUFACTURERS of the pipe and gaskets.

7.4.9.9. In all jointing operations the trench must be dewatered when joints are made, unless otherwise approved in writing by ENGINEER, and kept dewatered until sufficient time has elapsed to assure efficient hardening of the jointing material, or as may be required.

7.4.9.10. CONTRACTOR shall make all necessary precautions to prevent floatation of the pipe due to flooding in the trench.

7.4.9.11. The pipe shall not be driven down to grade by striking it with the end of shovel, handle, timber, rammer, or other unyielding object.

7.4.9.12. Openings such as stubs, tees or other services along the lines shall be securely closed by means of an approved gasketed leak proof STOPPER that fits into the bell of the pipe and is recommended by the pipe MANUFACTURER.

7.4.9.12.1. This STOPPER shall be jointed in such a manner that it may be removed at some future time without injury to the pipe itself.

7.4.9.13. At the close of each work day, and at other times when pipe is not being laid, the end of the pipe shall be temporarily closed with a close-fitting STOPPER approved by ENGINEER and IBWS.

#### 7.4.10. **SERVICE CONNECTIONS**

7.4.10.1. All gravity sewer services shall be 6" diameter single services unless otherwise approved by IBWS. Services shall be constructed of SDR35 PVC pipe.

7.4.10.2. All service connections shall terminate at the property lines and no more than 3-feet from the property corners unless directed by IBWS.

7.4.10.3. All service connections shall be constructed using solvent weld fittings. The solvent weld fittings shall start at the first fitting upstream of the tee wye.

7.4.10.4. All service connections shall terminate at the property line with a single stub up with a cleanout cap per the standard detail sheet.

7.4.10.5. Any service connection located in a paved area shall have a brass traffic rated cleanout cap installed.

7.4.10.6. All service connections shall be stubbed up at least 24-inches and no more than 36-inches above final grade.

7.4.10.7. Unless authorized by ENGINEER in writing, or shown on the drawings, service connections shall not be tied into new or existing manholes.

#### 7.4.11. **MARKING SERVICE LINES**

7.4.11.1. An "S" shall be stamped, not cut, into the back or high part of the curb directly over each service line or in the street or sidewalk where no curb is available.

7.4.11.2. The stamp shall be at least 3-inches tall and ¼-inch deep.

7.4.11.3. CONTRACTOR shall be responsible for installing a green four-inch ball marker, part number 1404, as manufactured by 3m. The service ball shall be placed at the cleanout and no more than 36 inches deep.

#### 7.4.12. **MANHOLE INSTALLATION**

#### 7.4.12.1. **INSTALLING SECTIONS**

7.4.12.1.1. Precast concrete sections shall be set so the manhole shall be vertical and with sections in true alignment.

7.4.12.1.2. Joint surfaces of the base or previously set section shall have an O-ring installed in the recess or shall be sealed with approved pre-molded plastic joint sealer. Joints shall be preprimed.

7.4.12.1.3. Manholes shall only be set in a properly de-watered environment.

#### 7.4.12.2. **NON-SHRINKING MORTAR**

7.4.12.2.1. All holes in sections used for their handling, all interior and exterior joints and the annular space between the wall and entering pipes shall be thoroughly plugged with an approved non-shrinking mortar, applied and cured in strict conformance with the MANUFACTURER's recommendations so that there shall be zero leakage through openings around pipes.

7.4.12.2.2. The mortar shall be finished smooth and flush with the adjoining interior and exterior manhole wall surfaces.

7.4.12.2.3. As soon as mortar is hydrated to the point where it shall not be marred by such application, and within two hours after installing mortar, CONTRACTOR shall install an approved membrane curing compound, conforming to ASTM C309, latest, to the finished mortar surface both inside and outside the manhole.

#### 7.4.12.3. **GRADE ADJUSTMENT**

7.4.12.3.1. For grade adjustment in setting the manhole frame, the CRETEX EPP Adjustment Rings shall be used. Refer to section 7.3.5.13.

#### 7.4.12.4. **SETTING MANHOLE FRAMES**

7.4.12.4.1. Manhole frames and covers shall be set to conform accurately to the finished ground or pavement surface as established by the contract drawings, unless otherwise directed by ENGINEER.

7.4.12.4.2. Frames on manhole cones shall be set on top of the CRETEX EPP Adjustment Rings using the same butyl sealant to secure the frame to the top ring. Refer to the CRETEX installation instructions in section 7.3.5.13.

#### 7.4.12.5. **FLOW CHANNELS IN MANHOLE BASE**

7.4.12.5.1. Shall be conformed of Class C concrete and/or brick rubble and mortar while the manholes are under construction.

7.4.12.5.2. Cut off pipes at inside face of the manholes and construct the invert to the shape and sizes of the pipe indicated. All inverts shall follow the grades of the pipe entering the manhole.

7.4.12.5.3. Changes in direction of the sewer and entering branch or branches shall be laid out in smooth curves of the longest radius possible, which is tangent to the centerline of adjoining pipelines.

7.4.12.5.4. Flow channels shall be at least 8-inches wide so that a sewer camera can pass through the channel.

#### 7.4.12.6. **CONCRETE MANHOLE BOOTS**

7.4.12.6.1. Precast concrete manholes shall have leak-proof boots installed where pipes enter or exit.

7.4.12.6.2. The boots shall be watertight and shall allow for a limited amount of differential settlement.

7.4.12.6.3. All boot bands, bolts, etc. shall be stainless steel.

#### 7.4.13. **STUB-OUTS**

7.4.13.1. Where shown on the drawings, stub-outs shall be provided for the connection of future sewer lines to manholes.

7.4.13.2. The end of each stub-out shall be provided with a bell and which shall be closed by an approved stopper as specified herein before.

7.4.13.3. Each stub-out shall be accurately referenced to the center of the manhole, and the actual invert elevation of each end of the stub-out shall be accurately recorded on the as-built drawings.

7.4.13.4. IBWS shall not be responsible for the condition of the stub out at the time of the future connection.

#### 7.4.14. **BEDDING AND BACKFILL**

7.4.14.1. Immediately after the pipe has been jointed and inspected, sufficient backfill shall be performed to protect the pipe adequately from injury or movement.

7.4.14.2. Where so indicated on the drawings, or directed by ENGINEER or IBWS, the pipe shall be supported by compacted granular fill or concrete cradle or encasing according to the applicable detail shown on the plans.

7.4.14.3. Pipe bedded in compacted granular fill shall not be supported on blocking, wedges, bricks, or anything except the bedding material. Where concrete cradle or encasement is

required, the pipe shall be supported on solid concrete blocks or precast concrete saddles which shall become part of the completed cradle or encasement.

7.4.14.4. Where no other bedding is indicated, pipe shall be placed on a shaped bed of undisturbed material.

#### **7.5. CLEANING AND FLUSHING**

7.5.1. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing materials into the pipelines.

7.5.2. As the work progresses, the interior of the sewer shall be cleaned of all dirt, jointing material, and superfluous materials of every description.

7.5.3. CONTRACTOR shall flush all sewer lines constructed with clean water prior to a final inspection to assure complete removal of all debris and foreign material, and to the satisfaction of ENGINEER and IBWS.

7.5.4. A visual inspection and approval by IBWS shall be required.

#### **7.6. FIELD TESTING**

7.6.1. All work constructed shall be subject to visual and internal television inspections for faults or defects and any other deviations or omissions shall be corrected at once.

7.6.2. All tests shall be made by CONTRACTOR who shall provide any necessary equipment for testing and televising the system as directed by IBWS.

7.6.3. All costs for testing defined within, but not limited to, this section shall be the responsibility of CONTRACTOR.

#### **7.6.4. CAMERA INSPECTION**

7.6.4.1. All gravity sewer mains and service laterals shall be camera inspected by a qualified third-party camera inspector. Camera inspections shall be witnessed by IBWS. Camera inspections performed by the contractor installing the pipe shall not be accepted if IBWS cannot witness.

7.6.4.1.1. Camera Inspection shall be scheduled with IBWS at least five working days prior to the inspection.

7.6.4.2. Camera inspection shall be just before final paving and after all underground utilities (conduit, gas mains) have been installed but prior to FDEP certification.

7.6.4.2.1. It is recommended that the CONTRACTOR perform a preliminary camera inspection immediately after installation to identify any issues and make repairs under the ENGINEER's

direction. CONTRACTOR and ENGINEER shall consult with IBWS about any issues found in the preliminary inspection.

7.6.4.2.2. Gravity mains and laterals shall not contain bellies that hold more than ½-inch of water.

7.6.4.2.3. All joints and fittings shall have no leaks visible.

7.6.4.3. Contractor shall provide a color video, DVD format or USB Flash Drive, recording of all footage televised.

7.6.4.3.1. Video equipment used shall CLEARLY show all pipe and joints being inspected. Any pipe or fittings not clearly shown shall be rejected.

7.6.4.3.2. The speed of the camera shall not exceed 30-feet per minute.

7.6.4.4. Video equipment shall include on-screen character generation showing the following information.

7.6.4.4.1. Location of camera at all times, in reference to beginning manhole.

7.6.4.4.2. Location of entry manhole and sewer line being examined

7.6.4.4.3. Date of examination

7.6.4.5. Gravity mains and service laterals shall be jetted and clean from debris and mud prior to inspection.

7.6.4.6. Gravity mains shall be inspected upstream so that each joint can be clearly viewed.

7.6.4.7. Camera inspection shall require water to be introduced to the laterals and mains prior to the inspections to highlight deformities.

7.6.4.8. Water shall be added to the laterals and mains at least 2 hours but no more than 24 hours prior to inspection and must be witnessed by IBWS.

7.6.4.9. A minimum of 500 gallons shall be added to the main lines.

7.6.4.9.1. A minimum of 10 gallons shall be added to each lateral.

7.6.4.10. Upon completion, each section of sewer lines shall show a straight run, free of structural defects and joint misalignment between manholes.

7.6.4.10.1. At the beginning of each main inspection, a light shall be flashed from the next manhole back towards the camera for a minimum of 15 seconds to highlight any deformities.

7.6.4.11. Videos of gravity mains shall be labeled from manhole to manhole in accordance with the approved set construction plans. Video file names that are not properly labeled shall be rejected.

7.6.4.12. Videos of service laterals shall be labeled to match the approved set of construction plans. Video file names that are not properly labeled shall be rejected.

7.6.4.13. Camera operator shall supply a written report identifying any issues or certifying the system has passed inspection. Video submittals without written reports shall be rejected.

#### **7.6.5. MANHOLE TESTING**

7.6.5.1. IBWS will only accept a vacuum test after the manhole has been completely constructed and final pavement installed. It is recommended that the CONTRACTOR vacuum tests the structures prior to final pavement to check for issues, plugging pinholes and seams with non-shrinking mortar. Any deficiencies shall be repaired before the project will be accepted.

7.6.5.2. Brace the inlet and outlet pipes/plugs to prevent movement during the test. Use air inflated plugs in good condition.

7.6.5.3. The vacuum test shall be performed using equipment approved by the ENGINEER. The equipment shall be in good operating condition. No gauges are to have any broken glass or other visible abnormalities. The test shall be performed by trained personnel familiar with the equipment and the test.

7.6.5.4. The test shall have a minimum duration of two minutes (dependent on manhole depth, see 7.6.5.5 below). The vacuum shall be pumped down to 10 inches (250 mm) of mercury on an approved gauge, and held. At the time the removal of air is stopped, the test time shall begin.

7.6.5.5. Any manhole that has a vacuum drop to nine inches (225 mm) of mercury or less, within the following time intervals, shall have failed the test.

0 – 10 ft. deep: less than 2 minutes.

10 ft. – 15 ft. deep: less than 2-1/2 minutes.

15 ft. – 20 ft. deep: less than 3 minutes.

7.6.5.6. Manhole vacuum test shall be per ASTM C-1244.

#### **7.6.6. DEFLECTION TEST**

7.6.6.1. All PVC pipe shall be inspected for deflection.

7.6.6.2. Maximum allowable deflection shall be equal to 5%, or manufactures recommendations, whichever is less.



7.6.6.3. IBWS may require verification of compliance with this deflection test by requiring a mandrel at 95% of pipe inside diameter be pulled through the installed pipeline.

7.7. **WARRANTY**

7.7.1. CONTRACTOR shall provide a warranty on installation and workmanship for no less than one year from the date of FDEP certification.

7.8. **AS-BUILT SEWER PLANS**

7.8.1. CONTRACTOR shall provide as built plans to IBWS in accordance with Section 2.0 of this specification.

## **SECTION 8**

### **SEWER - FORCE MAINS & APPURTENANCES**

## **SECTION 8 – SEWER - FORCE MAINS AND APPURTENANCES**

### **8.1. SCOPE**

8.1.1. This section contains standard specifications for use in the design and construction of SEWAGE FORCE MAINS AND APPURTENANCES as required by IBWS.

8.1.2. CONTRACTOR shall furnish and install sewage force main piping system, valves and vents complete, tested and ready for operation.

### **8.2. GENERAL REQUIREMENTS**

8.2.1. All work shall be proved to be in first class condition and constructed properly in accordance with the drawings and the specifications.

8.2.2. CONTRACTOR shall submit to ENGINEER and IBWS for approval before work begins, certificates of inspections in triplicate from the pipe MANUFACTURER that the pipe and fittings supplied have been inspected at the plant and meet the requirements of these specifications.

8.2.3. All pipe and fittings shall be clearly marked with the name of the MANUFACTURER, the batch number, the location of the plant, strength designation and pressure rating.

8.2.4. It shall be the responsibility of CONTRACTOR to keep extra fittings on hand to make vertical and/or horizontal adjustments as a result of unknown interferences to avoid unnecessary delays to the project.

8.2.5. All defects and leaks disclosed by any test shall be remedied. All tests shall be performed by CONTRACTOR and observed by IBWS.

8.2.6. Water for testing shall be furnished by CONTRACTOR.

8.2.7. See Section 3 and 4 of this specification for “*Excavation and Backfill*” and “*Dewatering*.”

8.2.8. All herein referenced standards shall be the latest edition or revision.

8.2.9. All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purpose specified.

8.2.10. All valves shall be Dezurik Plug Valves, except tapping valves which shall be manufactured by American Flow Control.

8.2.11. All materials shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

8.2.12. Unless otherwise indicated on the drawings, pipe materials for force main shall be as follows:

8.2.12.1. PVC Class 200, SDR 21 for pipes 2" up to 12" in diameter.

8.2.12.2. PVC DR 25, C905 165psi for pipes 14" in diameter and larger

8.2.12.3. Ductile iron fittings shall be used for PVC pipe 3 inches and larger.

8.2.12.3.1. 90-degree fittings shall not be used except in the lift station valve vault.

8.2.12.4. Solvent weld fittings shall be used for PVC pipe 2 inches and smaller.

8.2.13. The entire product of any MANUFACTURER or of any one plant may be rejected when, in the opinion of ENGINEER or IBWS, the methods of MANUFACTURER fail to secure uniform results acceptable to the requirements of these specifications

8.2.14. All pipe and fittings shall be subject to the inspection at time of delivery and also in the field just prior to installation.

8.2.15. All pipe and fittings which in the opinion of ENGINEER or IBWS do not conform to these specifications shall be rejected and shall be removed by CONTRACTOR.

8.2.15.1. Pipes crossing ditches, culverts, rivers, creeks, etc., shall be considered as buried pipe.

### 8.3. **MATERIALS**

#### 8.3.1. **MATERIAL SPECIFICATIONS**

8.3.1.1. Pipe material shall be tested in and for conformity with the latest editions of the following:

#### **ITEM SPECIFICATIONS NUMBER OF TEST**

DUCTILE IRON PIPE ANSI A21.50 (AWWA C150) Sworn Statement  
AND FITTINGS ANSI A21.51 (AWWA C151)  
ANSI A21.10 (AWWA C110)  
POLYVINYL ASTM D-1598 Sworn Statement  
CHLORIDE PIPE ASTM D-1599  
ASTM D-1784  
ASTM D-2122  
ASTM D-2241  
ASTM D-2837  
PS-22-70

### **8.3.2. POLYVINYL CHLORIDE (PVC)**

8.3.2.1. Pipe shall be virgin Polyvinyl Chloride (PVC) pipe for and shall have a bell type coupling with a thickened wall section integral with the pipe barrel.

8.3.2.2. The pipe material shall be clean, virgin, NSF approved class 12454-0A or 12454-B PVC compound conforming to ASTM resin specification D-1784.

8.3.2.3. The pipe shall be tested at levels meeting the requirements of the U.S. department of commerce public standard 22-70, and shall conform to the physical standards and specifications of the plastic pipe institute.

8.3.2.4. The pipe shall be designed for a hydrostatic working pressure of 160 psi at 73.4 degrees Fahrenheit and to pass without failure sustained pressure of 340-psi minimum when tested in accordance with ASTM D-1598 and for a quick burst test of 500-psi minimum when tested in accordance with ASTM D-159a.

8.3.2.5. Pipe shall conform to ASTM D-2241-latest, for use in sizes 4 inches up to and including 12 inches in diameter.

8.3.2.6. The pipe shall be of the “bell ring” type.

8.3.2.7. Pipe shall be manufactured in I.P.S. (steel) standard pipe equivalent outside diameters.

8.3.2.8. Pipe shall be green in color.

### **8.3.3. HIGH DENSITY POLYETHYLENE PIPE (HDPE)**

8.3.3.1. Pipe shall be DR11.

8.3.3.2. HDPE pipe for sewer force main use shall conform to AWWA C-901 (up to 3”) and AWWA C-906 (4” and larger).

8.3.3.3. HDPE pipe for force main system use shall be PE 3608 meeting cell classification PE445574C per ASTM D3035 and NSF 14.

8.3.3.4. Pipe shall be manufactured in accordance with ASTM F714 and shall be so marked.

8.3.3.5. All pipe joints shall be heat fused in accordance with the recommended procedures of the pipe MANUFACTURER and by a qualified heat fusing equipment operator. Refer to section 2 for requirements.

8.3.3.6. Transitions to other types of pipe shall be by fused end transitions.

8.3.3.7. Mechanical joint transitions with HDPE pipe stiffeners shall not be allowed.

8.3.3.8. All pipe shall be as manufactured by Performance Pipe or approved equal.

#### 8.3.4. **DUCTILE IRON, CLASS 350**

8.3.4.1. Pipe shall be ductile iron manufactured in accordance with the requirements of ANSI.

8.3.4.2. Pipe shall be Protecto 401 ceramic epoxy coated inside and out.

8.3.4.3. Push-on joints and mechanical joints for such pipes shall be in accordance with ANSI/AWWA C111/A21.11.

8.3.4.4. Pipe shall be manufactured by American or written approved equal Class 350.

8.3.4.5. Fittings shall be ductile iron and in accordance with the requirements of ANSI/AWWA C153/A21.53, and ANSI/AWWA C110/A21.10.

8.3.4.6. Pipe fittings shall have seal coating, where applicable, in accordance with ANSI/AWWA C104/A21.4.

8.3.4.7. Mechanical joints shall conform to ANSI/AWWA C111/A21.11.

#### 8.3.5. **FITTINGS**

8.3.5.1. Ductile iron fittings and special castings shall conform to the type for pipe being installed and have a minimum working pressure of 350 psi. 8.3.5.2. Fittings shall conform to ANSI specification A21.10 (AWWA C110) latest.

8.3.5.3. Fittings shall be of DOMESTIC ORIGIN (American Made).

8.3.5.4. Short body pattern fittings shall normally be installed.

8.3.5.5. Long body fittings shall be used where the drawings specifically call for long body fittings or at the option of CONTRACTOR when the laying length is not controlled by short body patterns.

8.3.5.6. Fittings shall be mechanical joint fittings unless otherwise specified or indicated on the drawings.

8.3.5.7. Restraint type mechanical joint retainer glands shall be used on all mechanical joints. These shall be mega-lug restraints or approved equal.

8.3.5.8. Joint Restraints shall be used on all joints located in paved areas.

8.3.5.9. 90-degree fittings shall not be used except in the lift station wet well and valve vault.

#### 8.3.6. **JOINTS**

8.3.6.1. PVC pipe joints shall be the manufacture's standard push-on bell type with rubber sealing ring installed in strict accordance with the pipe manufacture's recommendations.

8.3.6.2. Sealing rings shall be in conformance with ASTM F477.

8.3.6.3. All bolts, nuts, studs and other uncoated parts of joints for underground installation shall be 316 stainless steel.

#### **8.3.7. LININGS AND COATINGS**

8.3.7.1. All ductile iron pipe, fittings and specials for sewer use shall have an exterior coating of and shall be lined with Protecto 401 Ceramic Epoxy or equal.

#### **8.4. INSTALLATION**

8.4.1. Force mains shall be constructed of the materials specified and as shown on the drawings.

8.4.2. Pipe shall be laid with spigot ends pointing in the direction of flow.

8.4.3. Each section of pipe shall rest on the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints.

8.4.4. Any pipe which has its grade or joint disturbed after lying shall be taken up and relayed.

8.4.5. No pipe shall be laid when the trench conditions or weather is unsuitable for such work, except by permission by IBWS.

8.4.6. Pipe fittings shall be carefully handled to avoid damage, and if feasible while they are suspended over the trench before lowering, they shall be inspected to detect defects and cracks.

8.4.7. Defective, damaged, or unsound pipe or fittings shall be rejected. Any section of pipe already laid, which is found to be defective or damaged, shall be replaced.

#### **8.4.8. SURVEYS AND GRADE STAKES**

8.4.8.1. CONTRACTOR shall be responsible for setting grade stakes, lines, and levels.

8.4.8.2. CONTRACTOR or Contractor's surveyor shall provide centerline of construction and shall establish a benchmark.

8.4.8.3. Any reference points, points of intersections, property corners, or bench marks, which are disturbed during construction, shall be restored by a land surveyor registered to practice in the State of Florida, and all cost thereof shall be borne of CONTRACTOR.

8.4.8.4. CONTRACTOR shall assume all responsibility for the correctness of the grade and alignment stakes.

#### 8.4.9. **PIPE BEDDING**

8.4.9.1. Pipe bedding shall be in accordance with Section 3.0 of this specification and IBWS Standard Pressure Sewer Detail Sheet S-1

#### 8.4.10. **PIPE COVER**

8.4.10.1. The minimum cover over all piping shall not be less than 36 inches except where specifically shown on the construction drawings and approved by IBWS.

8.4.10.2. The maximum cover over all piping shall not be greater than 48 inches except where specifically shown on the construction drawings and approved by IBWS.

#### 8.4.11. **THRUST BLOCKING**

8.4.11.1. Suitable concrete reaction or THRUST BLOCKING shall be applied on all pressure pipe lines (except for those having screwed or flanged joints) at all tees, plugs, caps, and at bends deflecting 22-1/2 degrees or more.

8.4.11.2. Concrete used for THRUST BLOCKS shall be 2,500-psi minimum.

8.4.11.3. Schedule and details for required thrust blocks are included on IBWS standard details and shall be required as part of the approved drawings.

8.4.11.4. All mechanical joint fittings shall have restraint type mechanical joint retainer glands.

#### 8.4.12. **TAPS**

8.4.12.1. IBWS shall perform all taps greater than 2" in diameter, unless approval is giving to CONTRACTOR by IBWS General Manager.

8.4.12.2. CONTRACTOR shall perform all taps 2-inches diameter and less.

8.4.12.3. A representative of IBWS must be onsite prior to performing any and all taps.

8.4.12.4. CONTRACTOR shall provide at least five working days' notice to IBWS prior to performing the work.

8.4.12.5. At the time the line is to be tapped, it shall be the responsibility of CONTRACTOR to ensure that the tapping sleeve and valve is pressurized and can sustain the pressure test (See Section 8.6 for this specification).

8.4.12.6. In the event the line has not been tested prior to the arrival of IBWS at the job site, there shall be a \$50.00 service charge added to the cost of the tap and the tap shall be rescheduled. Should CONTRACTOR prefer IBWS to remain onsite in preparation for the work, a service charge equal to \$50.00 an hour shall apply so long as IBWS is on-site.



8.4.12.7. All taps EQUAL TO OR GREATER THAN 4" IN DIAMETER, irrespective of the diameter of the line to which you are tapping, shall consist of a single TAPPING SLEEVE and associated tapping valve.

8.4.12.7.1. The TAPPING SLEEVE and gland shall be Stainless Steel Wraparound "Fast Style", and shall be as manufactured by FORD METER CO. or APPROVED EQUAL and shall be furnished complete with all necessary accessories.

8.4.12.7.2. The TAPPING SLEEVE shall have a working pressure rating of 200 psi for sizes 4" through 12" and 150 psi for sizes 14" and larger, and shall conform to the applicable sections of AWWA Standard C110 of latest revision.

8.4.12.7.3. The TAPPING SLEEVE shall be of the split type for assembly on the pipe and the sleeve shall be sized for use with all classes of cast iron pipe.

8.4.12.7.4. The outlet flange shall be Class 125 Standard, with recess for standard tapping valves.

8.4.12.8. All taps 3-INCH AND SMALLER IN DIAMETER, irrespective of the diameter of the line to which you are tapping, shall consist of a single TAPPING SADDLE and associated corporation stop.

8.4.12.8.1. The TAPPING SADDLE shall be Fusion Bonded Epoxy Coated, and shall be an FS202 with a stainless steel as manufactured by FORD METER CO. or APPROVED EQUAL and shall be furnished complete with all necessary accessories.

8.4.12.9. The excavated area in which the tap shall be made must be a minimum of 4" below the bottom of the valve, at least seven feet in length and able to accommodate two people working.

8.4.12.10. The area where the tap shall be made must be completely dry. It is the responsibility of CONTRACTOR to pursue all means necessary to dewater the area in which the tap is to be made.

8.4.12.11. TAPPING VALVES shall meet all the requirements of Section 6.3.1 of his specification and shall be a mechanical joint outlet by tapping flange with a raised inner lip for alignment with the tapping sleeve.

#### **8.4.13. LOW PRESSURE SERVICE CONNECTIONS (2-INCH & LESS)**

8.4.13.1. Low pressure service connections shall conform to the detail as shown on IBWS' Standard Pressure Sewer Detail Sheet PS- 1.

8.4.13.2. Each service shall be pressure/flow tested to check that the service operates normally.

#### **8.5. CLEANING AND FLUSHING**

8.5.1. Prior to pressure testing, all force mains shall be flushed out to remove air from the lines.

8.5.2. At the time of flushing the line CONTRACTOR shall be responsible for having a flush point opened and shall be responsible for where the water is to be dispersed.

#### 8.6. **FIELD TESTING**

8.6.1. All piping to be operated under liquid pressure shall be tested in sections of approved length.

8.6.2. All field tests shall be made in the presence of ENGINEER and IBWS.

8.6.3. Pipelines laid in excavations other than trench excavations or pipelines embedded in concrete, shall be tested prior to backfilling of the excavated material or placing of the concrete.

8.6.4. Hydrostatic testing shall consist of a pressure test.

8.6.5. For this test, CONTRACTOR shall furnish clean water, suitable temporary testing plugs and other necessary equipment and all labor required.

8.6.5.1. In no case shall CONTRACTOR connect the force main to any water main to obtain water for testing.

8.6.5.2. Water may be obtained via a jumper meter with a RPZ and there shall be an AIR GAP between the two mains.

8.6.5.3. Water must be re-pumped from a holding tank into the force main so as to eliminate any cross-connection or potential backflow.

8.6.6. Pressure tests shall be of 2-hour duration at 120 psi, unless specified otherwise or notified in writing by IBWS.

8.6.7. Pressure tests shall be conducted with a pressure loss of not more than 2 psi regardless of length of pipe being tested.

8.6.8. The section of pipe to be tested shall be filled with water of approved quality and all air shall be expelled from the pipe. If hydrants, blow offs, or other outlets are not available at high points for releasing air, CONTRACTOR shall make the temporary taps at such points and shall plug said holes after completion of tests.

8.6.9. Specified test pressures shall be applied by means of a pump connected to the pipe in a manner satisfactory to IBWS.

8.6.10. The pump, pipe connection, and all necessary apparatus, including the proper gauges, shall be furnished by CONTRACTOR and shall be subject to the approval of ENGINEER and IBWS.

8.6.11. Pressure gauges shall be calibrated by an approved testing laboratory, with increments no greater than 2 psi.

8.6.12. Gauges used shall be of such size that pressures tested shall not register less than 10% nor more than 90% of the gauge capacity.

8.6.13. All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be performed until it is satisfactory.

8.6.14. In the event a section fails to pass the test, CONTRACTOR shall do everything possible to locate, uncover (even to the extent of uncovering the entire section), and repair or replace the defective pipe, fitting, or joint.

8.6.15. Visible leaks shall be corrected regardless of test results.

8.6.16. Lines shall be repaired and retested as necessary until test requirements are achieved.

#### 8.7. **WARRANTY**

8.7.1. CONTRACTOR shall provide a warranty on installation and workmanship for no less than one year from the date of FDEP certification.

**SECTION 9**  
**SEWER – NON-CLOG PUMP STATIONS**

## SECTION 9 – SEWER – NON-CLOG PUMP STATIONS

### 9.1. **SCOPE**

9.1.1. This section contains standard specifications for use in the design and construction of SUBMERSIBLE SEWAGE NON-CLOG PUMP STATIONS as required IBWS.

9.1.2. CONTRACTOR shall furnish and install all WET WELLS, PUMPS, VALVES, ELECTRICAL COMPONENTS AND CONTROL PANELS and all other LABOR, TESTING AND EQUIPMENT necessary to complete an operational PUMP STATION.

### 9.2. **GENERAL REQUIREMENTS**

9.2.1. All work shall be proved to be in first class condition and constructed properly in accordance with the drawings and the specifications.

9.2.2. CONTRACTOR shall submit to ENGINEER OF RECORD and IBWS for approval before work begins, certificates of inspections in triplicate from the SUBCONTRACTOR that the materials supplied have been inspected at the respective places of fabrication and meet the requirements of these specifications.

9.2.3. All materials including, but not limited to, concrete structures, pumps, pipes, valves, fittings, lids, panels and electrical equipment shall be clearly marked with the name of the MANUFACTURER, batch/serial number, strength/capacity designation and/or pressure rating.

9.2.4. It shall be the responsibility of CONTRACTOR to keep extra fittings on site to make vertical and/or horizontal adjustments as a result of unknown interferences so as to avoid any unnecessary delays to the project.

9.2.5. All defects and leaks disclosed by any test shall be remedied. All tests shall be performed by CONTRACTOR and observed by IBWS.

9.2.6. All SUBMERSIBLE PUMPS shall be manufactured by Wilo EMU

9.2.7. In order to ensure proper performance and compatibility of interacting components within these specifications; all submersible pumps, control panels, access frames, guide rails, and lifting systems shall be the product of one MANUFACTURER or furnished by the SUBMERSIBLE NON-CLOG PUMP MANUFACTURER for sole source responsibility.

9.2.8. Water for testing shall be furnished by CONTRACTOR.

9.2.9. All hardware associated with the lift station shall be 316 stainless steel.

9.2.10. See Section 3.0 and 4.0 of this specification for “*Excavation and Backfill Procedures*” and “*Dewatering Procedures*.”

9.2.11. All herein referenced standards shall be the latest edition or revision.

### 9.3. **MATERIALS**

#### 9.3.1. **WET WELL**

9.3.1.1. All NON-CLOG PUMP STATIONS located in a public and/or FDOT Right-of-Way must be designed and constructed of reinforced concrete as per detail drawing LS-1.

9.3.1.2. IBWS requires that all lift stations are constructed as per these specifications and detail drawing LS-1.

9.3.1.3. WET WELLS shall meet the latest requirements of ASTM C478 *Specification for Precast Reinforced Concrete Manhole Sections*.

9.3.1.4. Minimum wall thickness shall be seven inches.

9.3.1.5. Cement shall meet the latest requirements of ASTM C 150 *Specification for Portland Cement, TYPE II*.

9.3.1.6. Minimum concrete strength shall 4000 PSI at 28 days.

9.3.1.7. The required minimum strength of concrete shall be confirmed by making and testing four standard cylinders at seven (7) days and at (28) days. The test results shall be submitted to the ENGINEER prior to any manhole being installed.

9.3.1.8. Rings shall be custom made with openings to meet indicated pipe alignment conditions and invert elevations.

9.3.1.9. Openings shall be adequately sealed with water tight boots or approved non-shrinking grout, applied and cured in strict conformance with the MANUFACTURER's recommendations so that there shall be zero leakage around pipes and joints.

9.3.1.10. Approval of ENGINEER and IBWS shall be obtained before placing any order for manholes.

#### 9.3.1.11. **BASES**

9.3.1.11.1. WET WELL BASES shall be cast integrally with the bottom manhole section.

9.3.1.11.2. The base section shall be set in a 12-inch leveling course of #4 or #57 stone with filter fabric above and below the stone, extending at least 12-inches outside the base.

9.3.1.11.3. In order to permit adjustment of the precast base section and ensure full bearing on the leveling course, said section shall be placed just prior to initial set.

9.3.1.11.4. Wet well shall be installed in a properly de-watered environment.

9.3.1.12. **JOINTS**

9.3.1.12.1. Joint contact surfaces shall be formed with machine castings; they shall be exactly parallel with a 2-degree slope and nominal 1/16-inch clearance with the tongue equipped with a proper recess for the installation of an “o” ring rubber gasket, conforming to the latest edition of C443, Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gasket or Pre-Molded Plastic Joint Sealer with Joints Pre-Primed.

9.3.1.12.2. Each joint shall be grouted on the inside with approved grouting materials.

9.3.1.13. **HATCH**

9.3.1.13.1. CONTRACTOR shall furnish and install one access door on wet well.

9.3.1.13.2. The access door shall be Type ASP300 as manufactured by U.S. Foundry and Manufacturing Corp., Miami, FL with the size being at least 48-inch x 36-inch.

9.3.1.13.3. Door leaf shall be .250” thick aluminum floor plate reinforced to 300 p.s.f. live load.

9.3.1.13.4. The access door shall be equipped with a flush aluminum drop handle which does not protrude above the cover and an automatic hold open arm with red vinyl grip on a release handle.

9.3.1.13.5. Hinges shall be all stainless steel with tamper-proof stainless-steel bolts and nuts, and be removable for maintenance after the access door is cast in place.

9.3.1.13.6. For security, the access door shall be equipped with a staple for padlock.

9.3.1.13.7. Access door shall be furnished with mill finish.

9.3.1.13.8. The frame shall be extruded aluminum with an integral anchor flange and seat.

9.3.1.14. **INTERIOR COATING**

9.3.1.14.1. Interior of the wet well shall be coated with 100 MIL of RAVEN 405 moisture tolerant blue epoxy resin.

9.3.1.14.2. Coating shall be applied by an authorized RAVEN applicator according to the manufacturer’s specifications.

9.3.1.14.3. Wet well must be constructed in place and plumbed prior to coating.

9.3.1.15. **EXTERIOR COATING**

9.3.1.15.1. The exterior surface shall be given two (2) coats of KOPCOAT COAL TAR EPOXY 300-M, 9 MILS each.

9.3.1.15.2. The waterproofing materials shall be applied by brush or spray and in accordance with the instructions of the MANUFACTURER.

9.3.1.15.3. Time shall be allowed between each coat to permit sufficient drying so that the application of the second coat has no effect on the first coat.

9.3.1.15.4. The paint shall be applied at the place of fabrication.

9.3.1.15.5. Additional coating or touch up work shall be required after WET WELL installation if so directed by ENGINEER and/or IBWS.

9.3.1.16. All hardware associated with the lift station shall be 316 stainless steel.

### 9.3.2. **VALVE VAULTS**

9.3.2.1. Refer to section 9.3.1 for concrete specifications.

9.3.2.2. Valve Vault shall be coated inside and out with KOP-COAT COAL TAR EPOXY 300-M at (2) coats at 9 MILS each.

9.3.2.3. Valve vault shall use same type of hatch used for wet well.

9.3.2.4. Valve vault shall be sized accordingly to allow room for workers and tools.

### 9.3.3. **VALVES AND FITTINGS**

9.3.3.1. Refer to section 8 of this document and detail drawing LS-1 for specifications on valves and fittings.

### 9.3.4. **SUBMERSIBLE NON-CLOG PUMP**

9.3.4.1. All SUBMERSIBLE NON-CLOG PUMPS shall be *Wilo EMU Model FA Pumps*.

9.3.4.2. The NON-CLOG PUMPS shall be designed and constructed to pump sewage, storm water, sludge, and other water-based liquids without injurious damage during operation.

9.3.4.3. The NON-CLOG PUMPS shall be capable of passing 3-inch diameter solid non-deformable without clogging.

9.3.4.4. The NON-CLOG PUMPS shall be designed for continuous operation under submerged conditions without leakage to a depth of up to 65 feet.



9.3.4.5. The NON-CLOG PUMP design shall be such that the lifting cover, stator housing, and volute casing are constructed of ASTM A48, Class 30, gray cast iron.

9.3.4.5.1. The volute shall be of centerline discharge design and shall be fitted with ANSI 125-pound compatible discharge flange which shall be capable of withstanding 150% of the pump shutoff head in accordance with the Hydraulic Institute Standards.

9.3.4.5.2. The interfaces between the major castings shall be machined for metal contact and shall be additionally protected with circular cross section Buna-N O-rings.

9.3.4.5.3. All the nuts, bolts, washers and other fastening devices shall be constructed of type 316 stainless steel.

9.3.4.5.4. All exposed surfaces of the castings shall be coated with a single coat of PVC type varnish that is resistant to sewage.

9.3.4.6. The NON-CLOG PUMP impeller, both statically and dynamically balanced, shall be of double shrouded non-clog design having smooth surfaces and free from acute angles in the flow path.

9.3.4.6.1. The NON-CLOG PUMP impeller shall be constructed of ASTM A339 ductile cast iron.

9.3.4.6.2. The NON-CLOG PUMP impeller and volute both shall be equipped with AISI type 316 stainless steel wear rings that are heat treated to differing Brinell hardness to prevent friction welding.

9.3.4.6.3. Pump-out vanes shall be located on the backside of the NON-CLOG PUMP impeller to help reduce pressure on the lower mechanical seal.

### 9.3.5. **MOTOR**

9.3.5.1. The motor shall be designed with a service factor of 1.25 over and above the nameplate horsepower as standard.

9.3.5.2. The motor shall be warranted for ten (10) evenly spaced starts per hour when used with across the line starters, and unlimited starts per hour when used with variable frequency drives or soft start starters.

### 9.3.6. **PUMP GUIDE RAIL**

9.3.6.1. Furnish a minimum of one (1) GUIDE RAIL for each pump to permit raising and lowering.

9.3.6.1.1. The GUIDE RAIL shall be constructed of type 316L stainless steel that shall reach from the top of the base elbow to the upper guide rail holder on the access frame or on the vertical face of the concrete opening.

9.3.6.1.2. The single GUIDE RAIL system shall be supplied by the pump manufacturer.

9.3.6.1.3. GUIDE RAILS that are longer than 10 feet shall have a cross brace system installed for support.

### 9.3.7. **PUMP POWER & CONTROL CABLES**

9.3.7.1. The power supply shall be: 120/208/240-volt, DELTA 3 phase, 4 wire, 60 hertz for pumps up to 25 hp.

9.3.7.2. The power supply shall be 277/480 volt, 3 phase, wye, 60 hertz for pumps over 25 hp with soft starts.

9.3.7.3. Soft starts are acceptable for 20 hp pumps and larger.

9.3.7.4. The power and control cables shall enter the motor housing through an isolated chamber that is completely isolated from the oil filled stator chamber.

9.3.7.5. The Hypalon power and control cable jackets shall be sealed via a compressible Buna-N grommet flanked by washers forming the first isolation point of the assembly.

9.3.7.6. The cables shall be terminated on the individually o-ringed brass terminal lugs of the terminal board thereby sealing the cable entry chamber completely from the stator housing to the extent that any and all moisture that happens to find its way into the cable entry chamber is trapped there.

9.3.7.7. The terminal board is designed to short out in the event that moisture has found its way into the cable entry chamber thus signaling that the motor must have service without the costly complete overhaul that occurs with pumps that do not have isolated terminal boards.

### 9.3.8. **PUMP POWER & CONTROL PANEL**

9.3.8.1. Monitoring and control system to be designed to function with pumping units and to be factory wired and tested.

9.3.8.2. Primary control system shall be by RELAY LOGIC using Float Level Switches.

9.3.8.2.1. The FIRST LEVEL SWITCH (lowest) stops the lead pump and the lag pump if it is energized, when the level drops below this point, and triggers the alternator.

9.3.8.2.2. The SECOND LEVEL SWITCH (lead) starts one pump as the liquid rises to close this circuit. Which pump starts at this level is determined by the alternator.

9.3.8.2.3. The THIRD LEVEL SWITCH (lag) causes both pumps to run as the liquid level rises to this point.

9.3.8.2.4. The FOURTH LEVEL SWITCH (highest) illuminates the alarm indicator.

9.3.8.3. ALL panels shall come constructed and pre-wired to use both RELAY LOGIC and a DATA FLOW telemetry unit if so desired.

9.3.8.4. Each panel shall be supplied with an electrical schematic permanently fastened to the inside of the enclosure door.

9.3.8.5. All internal wiring shall be neat and concealed in 1" x 2" tall white wire way.

9.3.8.5.1. Control wiring shall be red 14-gauge minimum.

9.3.8.5.2. Power shall be black 10-gauge minimum.

9.3.8.5.3. Neutral wiring shall be white.

9.3.8.5.4. Ground wiring shall be green.

9.3.8.5.5. Each wire shall terminate in screw or lug terminal connection.

9.3.8.6. Every panel shall be tested to perform as designed through the entire sequence of operation before it leaves the factory.

9.3.8.7. Every panel shall include a permanent sticker that is signed by the person who built, wired, and tested the panel.

9.3.8.8. **ENCLOSURE**

9.3.8.8.1. Shall be a NEMA 4X 316 stainless steel construction to provide protection against rain, sleet and snow.

9.3.8.8.2. Door shall be fastened securely with pad-lockable stainless steel draw latches, spring loaded for smoother action.

9.3.8.8.3. Standard size shall be 36" high x 24" wide and 10" deep unless larger panel is warranted by component sizes or heat generation considerations.

9.3.8.8.4. Control panel shall have an air gap installed by the manufacturer on the bottom of the panel. The air gap shall be constructed of 316 stainless steel or aluminum.

9.3.8.9. **DEADFRONT**

9.3.8.9.1. Shall be clear plexi-glass see through design to give operator visual inspection of panel without opening DEADFRONT or interrupting operation of pumping station.

9.3.8.10. **ALARM SYSTEM**

9.3.8.10.1. An ALARM SYSTEM shall be provided for all pumping stations.

9.3.8.10.2. The ALARM SYSTEM shall be activated in cases of power failure, high water elevation.

9.3.8.10.3. ALARM shall be 90 decibels in sound, with a silence push button.

9.3.8.10.4. ALARM shall be supplied with a battery back-up power system.

9.3.8.10.5. ALARMS for Large Collection Pumping Stations shall be telemetered, including identification of the alarm condition, to a municipal facility that is manned 24 hours a day. If such a facility is not available and 2-hour holding capacity is not provided, the alarm shall be telemetered to city offices during normal working hours and to the home of the person(s) in responsible charge of the lift station during off duty hours.

9.3.8.10.6. Audio visual ALARM SYSTEMS with a self-contained power supply may be acceptable in some cases in lieu of the telemetering system outlined above, depending upon location, station holding capacity, and inspection frequency.

9.3.8.10.7. The ALARM LIGHT shall be a red XENON strobe light. The light shall be mounted on top of the enclosure with a neoprene gasket. The light shall be visible over all obstacles.

9.3.8.10.8. An AUDIBLE ALARM shall be provided in addition to the ALARM LIGHT.

9.3.8.10.9. ALARM LADDER DIAGRAM shall show, and construction shall be, that all the alarm conditions (phase failure, power failure, pump failure, high level or any case of pump station malfunction) engage the audible and visual alarm system. If telemetered, the telemetry shall report all the required alarm conditions.

9.3.8.11. **SURGE SUPPRESSER**

9.3.8.11.1. Shall be ASCO APT TE Series to operate up to 136,500-amp total peak surge current.

9.3.8.12. **PHASE FAILURE RELAY**

9.3.8.12.1. Shall be Time Mark Model NO. 257B, plug in and 8 pin design.

9.3.8.12.2. The relay shall provide against phase loss, phase reversal and low voltage. The relay shall cut control panel when a failure is detected.

9.3.8.13. **TRANSFER SWITCH**

9.3.8.13.1. Shall be mounted inside the control panel through the Lexan door.

9.3.8.13.2. Shall be rated for 100 amp or 200 amp (depending on horsepower) 3 pole, and rated for 600 volts.

9.3.8.13.3. Switch handle shall interlock with the Lexan door so that the door cannot be opened with the power on.

9.3.8.14. **PUMP CONTROLS**

9.3.8.14.1. Shall be by relay logic using a Time-Mark 2611-120 alternating relay for non-telemetered stations.

9.3.8.14.2. Shall be by DATA FLOW SYSTEMS controller with relay logic as backup for telemetered stations.

9.3.8.14.3. All panels shall come constructed and wired for both options.

9.3.8.15. **GENERATOR RECEPTACLE**

9.3.8.15.1. Shall be a Hubbell Pin and Sleeve type Model 4100R9W for 240-volt, 3 phase, and equivalent type for 460-volt, 3 phase.

9.3.8.15.2. Shall be weather proof and mounted on the exterior of the enclosure.

9.3.8.16. **MOTOR CIRCUIT PROTECTORS**

9.3.8.16.1. Shall be Square D Type FAL 100-amp frame or as required and provided for each pump for instantaneous trip on a short circuit fault.

9.3.8.17. **MOTOR STARTERS**

9.3.8.17.1. MOTOR STARTERS shall be Square D NEMA rated, sized to match each pump horsepower.

9.3.8.17.2. The overload shall be thermal melting alloy type. IEC rated starters shall not be accepted. Overloads shall not be adjustable or of the solid-state type.

9.3.8.17.3. Soft Start starters are required on pumps 20 horse power and larger.

9.3.8.18. **ELAPSED TIME METERS**

9.3.8.18.1. Shall be 6 digit non-re-settable.

9.3.8.18.2. The meters shall be mounted on the deadfront for each pump to record hours of operation.

9.3.8.19. **GROUND FAULT INTERRUPTER**

9.3.8.19.1. Shall be a 15A, 120-volt device provided for a convenience outlet to operate power tools.

9.3.8.19.2. The GFI shall be mounted on the deadfront and protected by a 1 pole, 15A circuit breaker mounted on the back plate.

9.3.8.20. **TRANSFORMER**

9.3.8.20.1. Shall be a 1 KVA, 460/240 – 120-volt, 1 phase.

9.3.8.20.2. The transformer shall provide all 120-volt power to operate the control circuit and the GFI.

9.4. **INSTALLATION**

9.4.1. Each PUMP shall be supplied with a universal COUPLING constructed of ASTM A48, Class 309 gray cast iron which bolts to the pump discharge flange.

9.4.1.1. The COUPLING shall be capable of sliding down the pump guide rail and attaching to the base DISCHARGE ELBOW that shall be also constructed of ASTM A48, Class 30 gray cast iron so that no personnel entry into the wet pit is required to connect the pump coupling to the DISCHARGE ELBOW.

9.4.2. The pump SEAL to the elbow shall be accomplished by the cantilevered effect of the COUPLING being suspended by the rounded fit on top of the DISCHARGE ELBOW.

9.4.2.1. The effect shall be such that sealing forces of the COUPLING to DISCHARGE ELBOW are 1.5 times higher than the weight of the pump and coupling alone.

9.4.2.2. The cantilever effect also requires that no part of the PUMP rest directly on the floor of the sump to obstruct flow into the suction eye of the pump.

9.4.3. The SEAL at the COUPLING to DISCHARGE ELBOW interface shall be made by a replaceable Buna-N sealing rubber.

9.4.3.1. Machined metal-to-metal sealing surface is not considered an equal and is not acceptable.

9.4.3.2. The SEAL rubber shall be constructed so that it comprises the flat gasket between the PUMP and COUPLING and the seal at the COUPLING to DISCHARGE ELBOW connection.

9.4.3.3. This sealing system must guarantee a positive leak proof seal in the wet pit PUMP installation.

## 9.5. **FIELD TESTING**

9.5.1. Each pump and motor shall be given the following tests at the factory prior to shipment.

9.5.1.1. The mechanical and electrical integrity of the pump shall be established by the use of physical inspection and the use of a megger of verification of the stator resistance to short circuit.

9.5.1.2. The power leads shall be connected to the motor in accordance to the jobsite voltage and the pump started to verify rotation and no-load amp readings.

9.5.1.3. Any undue noise or vibration shall be cause for discontinuing the test and further investigation.

9.5.1.4. If requested, the pump shall be installed in the test tank on a wet pit discharge elbow and complete hydraulic tests conducted.

9.5.1.5. The KW input, power factor, flowrate and head shall be measured and recorded.

9.5.1.6. The pump shall be operated at the duty point for the project and checked for compliance with Hydraulic Institute Standards prior to being certified.

9.5.1.7. The pump shall then be removed and given a physical inspection and additional megger insulation test to verify the mechanical and electrical integrity.

9.5.1.8. Copies of hydraulic test results are maintained at the factory and supplied when requested.

## 9.6. **PUMP WARRANTY**

9.6.1. The MANUFACTURER shall WARRANT the pump to be supplied to the OWNER for a period of five (5) years under normal use.

9.6.2. The WARRANTY includes 100% coverage for the parts and labor for the first year and then 50% coverage for the second to the fifth year.

9.6.3. This WARRANTY shall not be limited by duty cycle or hours of running time.

9.6.4. The applicable WARRANTY shall be in preprinted form and shall be a part of these specifications.

## **SECTION 10**

### **SEWER - GRINDER PUMP STATIONS**



## **SECTION 10 – SEWER - GRINDER PUMP STATIONS**

### **10.1. SCOPE**

10.1.1. This section contains standard specifications for use in the design and construction of SUBMERSIBLE SEWAGE GRINDER PUMP STATIONS as required by IBWS.

10.1.2. CONTRACTOR shall furnish and install WET PITS, PUMPS, VALVES, and ELECTRICAL CONTROL PANELS complete, tested and ready for operation.

10.1.3. GRINDER PUMPS are defined as centrifugal submersible pumps designed to reduce material found in normal domestic and light industrial sewage into a finely ground slurry.

10.1.3.1. The slurry produced by a GRINDER PUMP is then pumped through small diameter piping into a gravity interceptor or wastewater treatment facility.

10.1.3.2. The temperature of the liquid being pumped is 104 degrees F continuous, 160 degrees F intermittent and shall be capable of running dry for extended periods.

### **10.2. GENERAL REQUIREMENTS**

10.2.1. All GRINDER PUMPS shall be Barnes SGV Double Seal, Oil Filled Motor, 3 phase grinder pumps.

10.2.2. All work shall be proved to be in first class condition and constructed properly in accordance with the drawings and the specifications.

10.2.3. CONTRACTOR shall submit to ENGINEER OF RECORD and IBWS for approval before work begins, certificates of inspections in triplicate from the SUBCONTRACTOR that the materials supplied have been inspected at the respective places of fabrication and meet the requirements of these specifications.

10.2.4. All materials including, but not limited to, concrete structures, pumps, pipes, valves, fittings, lids, panels and electrical equipment shall be clearly marked with the name of the MANUFACTURER, batch/serial number, strength/capacity designation and/or pressure rating.

10.2.5. It shall be the responsibility of CONTRACTOR to keep extra fittings on site to make vertical and/or horizontal adjustments as a result of unknown interferences so as to avoid any unnecessary delays to the project.

10.2.6. All defects and leaks disclosed by any test shall be remedied. All tests shall be performed by CONTRACTOR and observed by IBWS.

10.2.7. In order to ensure proper performance and compatibility of interacting components within these specifications; all submersible pumps, control panels, access frames, guide rails, and

lifting systems shall be the product of one MANUFACTURER or furnished by the GRINDER PUMP MANUFACTURER for sole source responsibility.

10.2.8. Water for testing shall be furnished by CONTRACTOR.

10.2.9. See Section 3 and 4 of this specification for “*Excavation and Backfill*” and “*Dewatering*.”

10.2.10. All herein referenced standards shall be the latest edition or revision.

### 10.3. **MATERIALS**

#### 10.3.1. **WET WELL**

10.3.1.1. All GRINDER PUMP STATIONS located in a public and/or FDOT Right-of-Way must be designed and constructed of reinforced concrete as per detail drawing GS-1.

10.3.1.2. Regional Utilities requires that all GRINDER PUMP STATIONS are constructed as per these specifications and detail drawing GS-1.

10.3.1.3. WET WELLS shall meet the latest requirements of ASTM C478 *Specification for Precast Reinforced Concrete Manhole Sections*.

10.3.1.4. Minimum wall thickness shall be seven inches.

10.3.1.5. Cement shall meet the latest requirements of ASTM C 150 *Specification for Portland Cement, TYPE II*.

10.3.1.6. Minimum concrete strength shall 4000 PSI at 28 days.

10.3.1.7. The required minimum strength of concrete shall be confirmed by making and testing four standard cylinders at seven (7) days and at (28) days. The test results shall be submitted to the ENGINEER prior to any manhole being installed.

10.3.1.8. Rings shall be custom made with openings to meet indicated pipe alignment conditions and invert elevations.

10.3.1.9. Openings shall be adequately sealed with water tight boots or approved non-shrinking grout, applied and cured in strict conformance with the MANUFACTURER’s recommendations so that there shall be zero leakage around pipes and joints.

10.3.1.10. Approval of ENGINEER and IBWS shall be obtained before placing any order for manholes.

#### 10.3.1.11. **BASES**

10.3.1.11.1. WET WELL BASES shall be cast integrally with the bottom manhole section.

10.3.1.11.2. The base section shall be set in a 12-inch leveling course of #4 or #57 stone with filter fabric above and below the stone, extending at least 12-inches outside the base.

10.3.1.11.3. In order to permit adjustment of the precast base section and ensure full bearing on the leveling course, said section shall be placed just prior to initial set.

10.3.1.12. **JOINTS**

10.3.1.12.1. Joint contact surfaces shall be formed with machine castings; they shall be exactly parallel with a 2-degree slope and nominal 1/16-inch clearance with the tongue equipped with a proper recess for the installation of an "o" ring rubber gasket, conforming to the latest edition of C443, Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gasket or Pre-Molded Plastic Joint Sealer with Joints Pre- Primed.

10.3.1.12.2. Each joint shall be grouted on the inside with approved grouting materials.

10.3.1.13. **INTERIOR/EXTERIOR COATING**

10.3.1.13.1. The interior and exterior surface shall be given two (2) coats of KOP-COAT COAL TAR EPOXY 300-M, 9 MILS each.

10.3.1.14. **HATCH**

10.3.1.14.1. CONTRACTOR shall furnish and install one access door on wet well.

10.3.1.14.2. The access door shall be Type ASP300 as manufactured by U.S. Foundry and Manufacturing Corp., with the size being 36" X 36" and an actual opening of 32" X 35".

10.3.1.14.3. Door leaf shall be .250" thick aluminum floor plate reinforced to 300 PSF live load.

10.3.1.14.4. The access door shall be equipped with a flush aluminum drop handle which does not protrude above the cover and an automatic hold open arm with red vinyl grip on a release handle.

10.3.1.14.5. Hinges shall be all stainless steel with tamper-proof stainless-steel bolts and nuts, and be removable for maintenance after the access door is cast in place.

10.3.1.14.6. For security, the access door shall be equipped with a staple for padlock.

10.3.1.14.7. Access door shall be furnished with mill finish.

10.3.1.14.8. The frame shall be extruded aluminum with an integral anchor flange and seat.

10.3.2. **VALVE VAULT**

10.3.2.1. Refer to section 10.3.1 for concrete specifications.

10.3.2.2. Valve Vault shall be coated inside and out with KOP-COAT COAL TAR EPOXY 300-M at (2) coats at 9 MILS each.

10.3.2.3. Valve vault shall use same type of hatch specified for wet well.

10.3.2.4. Valve vault shall be sized accordingly to allow room for workers and tools.

### 10.3.3. **VALVES AND FITTINGS**

10.3.3.1. Refer to detail drawing GS-1 for specifications on valves and fittings.

### 10.3.4. **SUBMERSIBLE GRINDER PUMP**

10.3.4.1. The volute, seal plates, impeller and motor housing shall be constructed of high-quality ASTM 48 Class 30 cast iron.

10.3.4.2. Pump(s) shall be painted with a water based air-dry enamel of 2.0 mil minimum thickness.

10.3.4.3. All exposed hardware shall be 300 series stainless steel.

10.3.4.4. The pump construction shall contain no points of critical clearance nor require periodic adjustment or replacement to maintain reasonable operating efficiency.

10.3.4.5. Discharge connection shall be a standard 2" NPT in the vertical position. All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding "O"-Ring sealing arrangements.

10.3.4.6. The impeller shall be of the recessed vortex design.

10.3.4.7. Pumps with standard centrifugal semi open impeller designs shall not be acceptable.

10.3.4.8. The impeller shall be of 85-5-5-5 bronze construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics.

10.3.4.9. The grinder mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a countersunk flat head cap screw, and a shredding ring containing a minimum of fifteen flow passages with cutting edges.

10.3.4.10. The shredding ring shall be reversible to provide twice the cutting-edge life. Both the shredding ring and radial cutter shall be of 440C stainless steel hardened to a minimum of Rockwell C55 and shall be finish ground for a fine cutting edge.

10.3.4.11. Two stage cutter mechanisms requiring external adjustment for proper clearance are not acceptable.

10.3.4.12. The unit shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere.

10.3.4.13. The seal shall be commercially available and not a proprietary design of the MANUFACTURER.

10.3.4.14. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N.

10.3.4.15. The pump shall have a three-bearing design consisting of an upper ball bearing, an intermediate ball bearing restrained for the purpose of carrying the thrust loads, and a lower bronze sleeve bearing to carry radial loads and prevent shaft deflection imposed by the pump impeller and grinder operation.

10.3.4.16. Bearings shall operate in an oil bath atmosphere for superior life.

10.3.4.17. Permanently lubricated bearings are not acceptable.

#### 10.3.5. **PUMP MOTOR**

10.3.5.1. The pump shall be designed to be non-overloading throughout the entire pump curve.

10.3.5.2. Three phase motors shall be of the dual voltage 230/460 design.

10.3.5.3. Motor designs incorporating shrink or press fit assembly between the stator and motor housing shall not be acceptable.

10.3.5.4. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

10.3.5.5. The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage to the heat being generated.

10.3.5.6. Air filled motors shall not be acceptable.

10.3.5.7. The motor windings shall be Class B insulation.

10.3.5.8. The motor shall meet the standard NEMA design B for three phase. The motor shaft shall be of 416 stainless steel.

10.3.5.9. Protection against excessive temperature shall be provided by a heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel.

#### 10.3.6. **PUMP GUIDE RAIL**

10.3.6.1. The guide rail assemblies shall consist of 316 stainless steel upper guide rail brackets and pump guide brackets with the slide rail assemblies of 11-gauge 316 stainless steel.

10.3.6.2. The stationary and moveable portions of the hydraulically sealed discharge coupling assemblies shall be machined cast iron.

10.3.6.3. The upper guide rail bracket(s) shall mount to the basin cover and position the lower end of the guide rail.

10.3.6.4. The stainless-steel rail shall support the pump at a distance of four (4) inches from the basin floor to provide unrestricted flow of material into the pump.

10.3.6.5. Stainless steel guide brackets shall be attached to the pump for positioning of the unit on the guide rail during installation or removal of the unit within the basin.

#### 10.3.7. **PUMP POWER & CONTROL CABLES**

10.3.7.1. Pump power supply shall be 120/208/240 Volts, DELTA 3 Phase, 4 Wire, 60 Hertz.

10.3.7.2. The pump shall be equipped with 25 feet of type S spliced power cable, and 25 feet of sensor cable type SO.

10.3.7.3. All incoming lead wires shall be spliced in the motor terminal housing.

10.3.7.4. After splicing, the terminal housing shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing.

10.3.7.5. A secondary rubber pressure grommet shall be provided as an additional sealing point and strain relief at the point of cable entry.

#### 10.3.8. **PUMP POWER & CONTROL PANEL**

10.3.8.1. Monitoring and control system to be designed to function with pumping units and to be factory wired and tested.

10.3.8.2. Primary control system shall be by RELAY LOGIC using Float Level Switches.

10.3.8.2.1. The FIRST LEVEL SWITCH (lowest) stops the lead pump and the lag pump if it is energized, when the level drops below this point, and triggers the alternator.

10.3.8.2.2. The SECOND LEVEL SWITCH (lead) starts one pump as the liquid rises to close this circuit. Which pump starts at this level is determined by the alternator.

10.3.8.2.3. The THIRD LEVEL SWITCH (lag) causes both pumps to run as the liquid level rises to this point.

10.3.8.2.4. The FOURTH LEVEL SWITCH (highest) illuminates the alarm indicator.

10.3.8.3. ALL panels shall come constructed and pre-wired to use both RELAY LOGIC and a DATA FLOW telemetry unit if so desired.

10.3.8.4. Each panel shall be supplied with an electrical schematic permanently fastened to the inside of the enclosure door.

10.3.8.5. All internal wiring shall be neat and concealed in 1" x 2" tall white wire way.

10.3.8.5.1. Control wiring shall be red 14-gauge minimum.

10.3.8.5.2. Power shall be black 10-gauge minimum.

10.3.8.5.3. Neutral wiring shall be white.

10.3.8.5.4. Ground wiring shall be green.

10.3.8.5.5. Each wire shall terminate in screw or lug terminal connection.

10.3.8.6. Every panel shall be tested to perform as designed through the entire sequence of operation before it leaves the factory.

10.3.8.7. Every panel shall include a permanent sticker that is signed by the person who built, wired, and tested the panel.

#### 10.3.8.8. **ENCLOSURE**

10.3.8.8.1. Shall be a NEMA 4X 316 stainless steel construction to provide protection against rain, sleet and snow.

10.3.8.8.2. Door shall be fastened securely with pad-lockable stainless steel draw latches, spring loaded for smoother action.

10.3.8.8.3. Standard size shall be 36" high x 24" wide and 10" deep unless larger panel is warranted by component sizes or heat generation considerations.

10.3.8.8.4. Control panel shall have an air gap installed by the manufacturer and fastened to the bottom of the panel. The air gap shall be constructed of 316 stainless steel or aluminum.

#### 10.3.8.9. **DEADFRONT**

10.3.8.9.1. Shall be clear plexi-glass see through design to give operator visual inspection of panel without opening DEADFRONT or interrupting operation of pumping station.

#### 10.3.8.10. **ALARM SYSTEM**

10.3.8.10.1. An ALARM SYSTEM shall be provided for all pumping stations.

10.3.8.10.2. The Alarm system shall be activated in cases of power failure, high water level, or any cause of pump station malfunction.

10.3.8.10.3. Alarm shall be 90 decibels in sound, with a silence push button.

10.3.8.10.4. Alarm shall be supplied with a battery back-up power system.

10.3.8.10.5. ALARMS for stations in environmentally critical areas shall be telemetered, including identification of the alarm condition, to a municipal facility that is manned 24 hours a day. If such a facility is not available and 2-hour holding capacity is not provided, the alarm shall be telemetered to IBWS' offices during normal working hours and to the home of the person(s) in responsible charge of the lift station during NON-Business hours.

10.3.8.10.6. Audio visual Alarm systems with a self-contained power supply may be acceptable in some cases in lieu of the telemetering system outlined above, depending upon location, station holding capacity, and inspection frequency.

10.3.8.10.7. The Alarm Light shall be a red XENON strobe and shall be mounted on top of the enclosure with a neoprene gasket. Light shall be visible over all obstacles.

10.3.8.10.8. The audible Alarm shall be provided in addition to the alarm light.

10.3.8.10.9. ALARM Ladder diagram shall show, and construction shall be, that all the alarm conditions (phase failure, power failure, pump failure, high water level or any cause of pump station malfunction) engage the audible and visual alarm system. If telemetered, the telemetry shall report all the required alarm conditions.

#### 10.3.8.11. **SURGE SUPPRESSER**

10.3.8.11.1. Shall be ASCO APT TE Series, to operate up to 136,500-amp total peak surge current.

#### 10.3.8.12. **PHASE FAILURE RELAY**

10.3.8.12.1. Shall be Time Mark Model NO. 257B, plug in and 8 pin design.

10.3.8.12.2. The relay shall provide against phase loss, phase reversal and low voltage.



10.3.8.13. **TRANSFER SWITCH**

10.3.8.13.1. Shall be mounted inside the control panel through the Lexan door.

10.3.8.13.2. Shall be rated for 100 amp or 200 amp (depending on horsepower) 3 pole, and rated for 600 volts.

10.3.8.13.3. Switch handle shall interlock with the Lexan door so that the door cannot be opened with the power on.

10.3.8.14. **PUMP CONTROLS**

10.3.8.14.1. Shall be by relay logic using a Time-Mark 2611-120 alternating relay.

10.3.8.15. **GENERATOR RECEPTACLE**

10.3.8.15.1. Shall be a Hubbell Pin and Sleeve type Model 4100R9W for 240-volt, 3 phase and rated at 100 Amps.

10.3.8.15.2. Shall be weather proof and mounted on the exterior of the enclosure.

10.3.8.16. **MOTOR CIRCUIT PROTECTORS**

10.3.8.16.1. Shall be Square D Type FAL 100-amp frame or as required and provided for each pump for instantaneous trip on a short circuit fault.

10.3.8.17. **MOTOR STARTERS**

10.3.8.17.1. MOTOR STARTERS shall be Square D NEMA rated, sized to match each pump horsepower.

10.3.8.17.2. The overload shall be thermal melting alloy type. IEC rated starters shall not be accepted.

10.3.8.18. **ELAPSED TIME METERS**

10.3.8.18.1. Shall be 6 digit non-re-settable.

10.3.8.18.2. The meters shall be mounted on the dead front for each pump to record hours of operation.

10.3.8.19. **GROUND FAULT INTERRUPTER**

10.3.8.19.1. Shall be a 15A, 120-volt device provided for a convenience outlet to operate power tools.

10.3.8.19.2. The GFI shall be mounted on the dead front and protected by a 1 pole, 15A circuit breaker mounted on the back plate.

#### 10.3.8.20. **TRANSFORMER**

10.3.8.20.1. Shall be a 1 KVA, 460/240 – 120-volt, 1 phase.

10.3.8.20.2. The transformer shall provide all 120-volt power to operate the control circuit and the GFI.

#### 10.4. **INSTALLATION**

10.4.1. The stationary fitting shall have a Neoprene diaphragm clamped between the stainless-steel rail and the stationary cast iron discharge.

10.4.2. The cast iron moveable fitting, when in position, shall be held against the stationary fitting by the construction of the stainless-steel rail, aligning the movable fitting to the flexible diaphragm for proper sealing of the two surfaces under pressure.

10.4.3. The flexible diaphragm shall also serve as an anti-siphon device. A stainless-steel lifting cable with a minimum breaking strength of 2100 pounds shall be provided for pump installation and removal.

10.4.4. The discharge piping shall consist of 2-inch Schedule 40 stainless steel pipe. A ball check valve shall be installed in the vertical position between the pump discharge and the moveable fitting.

10.4.5. Each valve shall be 2 inches in size and shall consist of three major components; body, access plug, and ball.

10.4.6. The design of the valve shall be such that it keeps solids, stringy material, grit, rags, etc. moving without the need for back flushing.

10.4.7. In the operating mode, the ball shall not impede flow through the valve.

10.4.8. The operating flow area shall be equal to the nominal size of the valve. The ball shall clear the waterway providing “full flow” equal to the nominal size. It shall be non-clog design.

10.4.9. There shall not be outside levers, weights, springs, dashpots or other accessories required for a swing (clapper) type check valve.

10.4.10. The ball shall be natural rubber and be resistant to material normally found in sewage. The body and access plug shall be gray cast iron, ASTM Class 30. All fasteners shall be stainless steel. Inlet and outlet ports shall be 2-inch NPT threaded.

10.4.11. A 2-inch brass true union ball valve shall be installed in the discharge piping of each pump to provide shut-off capabilities during pump removal. Each valve shall be mounted in a separate valve box adjacent to the wet well for ease of access and maintenance.

#### 10.5. **TESTING**

10.5.1. The pump MANUFACTURER shall perform the following inspections and tests in accordance with the Hydraulic Institute Type B standards before shipment from the factory.

10.5.2. A check of the motor voltage and frequency shall be made as shown on the nameplate.

10.5.3. A motor and cable insulation test for moisture content or insulation defects shall be made per UL criteria.

10.5.4. The pump shall be completely submerged and run to determine that the unit meets predetermined hydraulic performance points.

10.5.5. A written report shall be available showing the aforementioned tests have been performed in accordance with the specifications.

10.5.6. The pump(s) shall be tested by a qualified representative of the MANUFACTURER, and shall be inspected and approved by IBWS.

#### 10.6. **WARRANTY**

10.6.1. The MANUFACTURER shall WARRANT the pump to be supplied to the OWNER for a period of five (5) years under normal use.

10.6.2. The WARRANTY includes 100% coverage for the parts and labor for the first year and then 50% coverage for the second to the fifth year.

10.6.3. This WARRANTY shall not be limited by duty cycle or hours of running time.

10.6.4. The applicable WARRANTY shall be in preprinted form and shall be a part of these specifications.