**SECTION 000101 - PROJECT TITLE PAGE**

**PROJECT MANUAL**

**FOR**

# CARPENTER'S PARK PHASE 1 SPLASH PAD

**PROJECT NUMBER: #2019.01.01 ITB**

**CITY OF MILTON, FL**

**CARPENTER'S PARK**
**MUNSON HWY**
**MILTON , FL 32572**

**DATE: (JANUARY 26, 2019)**

**PREPARED BY:**

**TSW**

**END OF SECTION**

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# *City of Milton*

**P.O. Box 909**
**MILTON, FL 32572**
*Phone: (850) 983-5438*
*Fax: (850) 983-5415*


## M E M O R A N D U M

TO: Interested Parties

FROM: Diane Ebentheuer, Purchasing Officer

RE: **#2019.01.01 ITB - Carpenter's Park Phase 1 Splash Pad**

DATE: January 26, 2019

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The City of Milton is accepting bids for a Splash Pad located at Carpenter's Park in the City of Milton. The bid documents contain the necessary information for preparing and submitting your proposal for this effort.

All information is available under the bid links at the City's website www.MiltonFL.org/322/Purchasing. For assistance gaining access to the sites, contact the customer support at the numbers listed on the page.

All bidders must review the Scope of Services and Project Description as described in this document to ensure their ability to perform as indicated.

The deadline for submitting your proposal is **February 12, 2019** at **1:00 p.m. CST**, at City Hall, Milton Florida. All interested parties are encouraged to attend.

Interpretations of the proposal, clarification of proposal specifications and requirements or changes to the ITB which have a material effect will be documented and communicated to bidders only by written addenda posted on the Florida Purchasing Alliance and Vendor Registry. Questions should be submitted in writing and directed to Diane Ebentheuer at purchasing@mymiltonflorida.com no later than Wednesday, February 6, 2019 at 1pm. Answers will be posted by Friday, February 8, 2019 at 1pm.

Diane Ebentheuer

Diane Ebentheuer, Purchasing Officer/Risk Manager

# INSTRUCTIONS FOR BIDS

I. Bids must be received by **February 12, 2019 at 1:00 p.m. (CST)**

II. **Proposals must be Sealed and Delivered to**:
**City of Milton**
**Attn: Purchasing Dept.**
6738 Dixon Street,
Milton, Florida 32570

**Or Mailed to:**
**City of Milton**
**Attn: Purchasing Dept.**
P. O. Box 909
Milton, FL 32572

III. Proposals must be **marked with the following:**

**# 2019.01.01 ITB - Carpenter's Park Phase 1 Splash Pad**

Bids must be complete and include:

A. Bidders Declaration – 002113 - 3
B. Bid Form – 004100
C. Alternates Form - 004323
D. Non Collusion Affidavit (***City Website)***
E. Conflict of Interest Disclosure Form ***(City Website)***
F. Public Entity Crime form F.S. 287.133(3)(A) (***City Website)***

***City Website address:*** www.MiltonFL.org/322/Purchasing

Please provide one original and four copies of your bid.

All proposals submitted shall be subject to acceptance or rejection and the City of Milton specifically reserves the right to accept or reject any or all proposals, to waive any technicalities and formalities in the proposal process and award the bid in part or in any manner deemed to be in the best interest of the City. The City of Milton is exempt from sales tax.

Interested Parties shall submit all required forms and information simultaneously with sealed proposal, which forms and information become a part of the property of the City of Milton and will not be returned to the firm unless a written request to withdraw is received prior to **February 12, 2019 @ 1:00 p.m. (CST).**

# *REQUIREMENTS FOR BIDDERS*

These items apply to and become a part of the terms and conditions of the proposal submitted. Any exceptions must be in writing.

Notice is hereby given that the City of Milton will receive sealed proposals from interested parties until **February 12, 2019 at 1:00 p.m.** at its offices located at City Hall, Milton, Florida.

Any Bid received thereafter will **not** be considered.

Bids will be publicly opened and read at the City of Milton, City Hall on the day and at the hour specified.

The purchaser may consider as non-responsive, any bid in which there is an alteration of, or departure from the proposal form hereto attached.

The bid will be awarded to the lowest reliable firm complying with the conditions of the invitation for bid. The firm to whom award is made will be notified at the earliest possible date. The City of Milton reserves the right to reject the proposal of a firm who has previously failed to perform properly or complete on time, contracts of a similar nature, or the proposal of a firm who, in the sole opinion and discretion of the City of Milton is not in a position to perform the contract, or whose name appears on the United States Comptroller General's list of ineligible contractors.

Bids may be withdrawn by written request, provided such withdrawals are received prior to bid opening date.

**NOTE:** Unless stated on the Bid form, the bid submitted will assume all specifications will be met. Please note on the proposal form all exceptions.

The successful bidder will be required to submit additional forms, which are available on the City's website at www.MiltonFL.org/322/Purchasing at the bottom of the Page, prior to award.

- Certificate of Non Discrimination;
- Drug Free Workplace Declaration;
- Prompt Payment Affidavit;
- Taxpayer Identification Number;
- Certificate of Insurance, with City named as additional insured

The successful bidder shall provide a Performance Bond as described in 007300 – Supplementary Conditions.

# BIDDERS DECLARATION

The firm understands, agrees and warrants:

That the firm has carefully read and fully understands the full scope of the specifications.

That the bidder has the capability to successfully undertake and complete the responsibilities and obligations in said specifications.

That the firm has liability insurance and a declaration of insurance form must be provided before any work will begin.

That this proposal may be withdrawn by requesting such withdrawal in writing at any time prior to **February 12, 2019 at** 1**:00 p.m.** but may not be withdrawn after such date and time.

That the City of Milton reserves the right to reject any or all proposals and to accept that proposal which will, in its opinion, best serve the public interest. The City of Milton reserves the right to waive any technicalities and formalities in the proposal process.

That by submission of this proposal the firm acknowledges that the City of Milton has the right to make any inquiry or investigation it deems appropriate to substantiate or supplement information supplied by the firm.

If a partnership, a general partner must sign.

If a corporation, the authorized corporate officer(s) must sign and the corporate seal must be affixed to this bid.

**BIDDER: _____**

Company Name

_____ _____

Name Title

_____ _ _____

Name Title

**SECTION 004100 - BID FORM**

**THE PROJECT AND THE PARTIES**

**1.01 TO:**

A. City of Milton, FL (Owner)
6738 Dixon St.
Milton, FL 32570

**1.02 FOR:**

A. Project: Carpenter's Park Phase 1 Splash Pad

B. Owner's Project Number: #2019.01.01 ITB
Carpenter's Park
Munson Hwy
Milton, FL 32570

**1.03 DATE: _____ (BIDDER TO ENTER DATE)**

**1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)**

A. Bidder's Full Name _____
1. Address _____
2. City, State, Zip_____

**1.05 OFFER**

A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Bid Documents prepared by _____ for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

B. _____
_____ dollars
($_____), in lawful money of the United States of America.

C. All applicable federal taxes are included and State of Florida taxes are excluded from the Bid Sum.

**1.06 ACCEPTANCE**

A. This offer shall be open to acceptance and is irrevocable for thirty days from the bid closing date.

**1.07 CONTRACT TIME**

A. If this Bid is accepted, we will:

B. Complete the Work by the 17th day of May, 2019.

C. Liquidated damages are $1,000 per day.

**1.08 BID FORM SUPPLEMENTS**

A. The following information is included with Bid submission and entered on Alternative Form - 004323:
1. Alternates: Alternate 01 - Concrete Paving and Structures,, Alternate 02 - Site Furniture Group 1; Alternate 03 - Drinking Fountains, Alternate 04 - Site Furniture Group 2, Alternate 05 - Parking Lot Striping, Alternate 06 - Interior Restroom Upgrades, Alternate 07 - Crosswalk.

**1.09 BID FORM SIGNATURE(S)**

The Corporate Seal of

_____

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

_____

(Authorized signing officer, Title)

(Seal)

_____

(Authorized signing officer, Title)

**END OF SECTION 004100**

**SECTION 004323 - ALTERNATES FORM**

**PARTICULARS**

**1.01 THE FOLLOWING IS THE LIST OF ALTERNATES REFERENCED IN THE BID SUBMITTED BY:**

**1.02 (BIDDER) _____**

**1.03 TO (OWNER ): CITY OF MILTON, FL**

**1.04 DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.**

**ALTERNATES LIST**

**ALTERNATE # 1: (DEDUCT) $ _____**

**ALTERNATE # 2: (DEDUCT) $ _____**

**ALTERNATE # 3: (DEDUCT) $ _____**

**ALTERNATE # 4: (DEDUCT) $ _____**

**ALTERNATE # 5: (DEDUCT) $ _____**

**ALTERNATE # 6: (DEDUCT) $ _____**

**ALTERNATE # 7: (DEDUCT) $ _____**

**END OF SECTION**

## SECTION 004373 - PROPOSED SCHEDULE OF VALUES FORM

### PARTICULARS

### 1.01 PROPOSED SCHEDULE OF VALUES FORM

A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.

B. Arrange schedule of values consistent with format of AIA Document G703.

**END OF SECTION**

**SECTION 006000 - PROJECT FORMS**

**ADMINISTRATIVE FORMS**

**2.01 ADMINISTRATIVE FORMS: ADDITIONAL ADMINISTRATIVE FORMS ARE SPECIFIED IN DIVISION 01 GENERAL REQUIREMENTS.**

**2.02 COPIES OF AIA STANDARD FORMS MAY BE OBTAINED FROM THE AMERICAN INSTITUTE OF ARCHITECTS; HTTP://WWW.AIA.ORG/CONTRACTDOCS/PURCHASE/INDEX.HTM; DOCSPURCHASES@AIA.ORG; (800) 942-7732.**

**2.03 PRECONSTRUCTION FORMS:**

A. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."

B. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."

**2.04 INFORMATION AND MODIFICATION FORMS:**

A. E-builder Forms

**2.05 PAYMENT FORMS:**

A. Schedule of Values Form: AIA Document G703, "Continuation Sheet."

B. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."

C. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."

D. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."

E. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."

**END OF SECTION**

**SECTION 007200 - GENERAL CONDITIONS**

**FORM OF GENERAL CONDITIONS**

**1.01 STANDARDS**

A. The project shall be built in accordance with the City of Milton Public Works Manual.

B. All other areas shall be build in accordance with the standards of those entities having jurisdiction including County Highways and Waters of the State of Florida.

**1.02 COORDINATION WITH THE CITY: THE GENERAL CONTRACTOR SHALL WORK WITH THE CITY TO COORDINATE THEIR WORK WITH OTHER WORK IN THE PROJECT AREA THAT THE OWNER MAY ELECT TO UNDERTAKE DURING THE COURSE OF THE PROJECT.**

**1.03 DEVIATIONS**

A. The Architect is authorized by the Owner to approve "minor" deviations from the requirements of the Contract Documents. "Minor" deviations are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Deviations which are not "minor" may be authorized only by the Owner through the Change Order procedures.

B. Any deviation from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal and, in a letter transmitting the Submittal to the Architect, the Contractor shall direct the Architect's attention to, and request specific approval of, the deviation. Otherwise, the Architect's approval of a Submittal does not constitute approval of deviations from the requirements of the Contract Documents contained in the Submittal.

C. The Contractor shall bear all costs and expenses of any changes to the Work, changes to work performed by the Owner or separate contractors, or additional services by the Architect required to accommodate an approved deviation unless the Contractor has specifically informed the Architect in writing of the required changes and a Change Order has been issued authorizing the deviation and accounting for such resulting changes and costs.

**1.04 LIQUIDATED DAMAGES**

A. Time is the essence of the Contract. Any delay in the completion of the Work required by the Contract Documents may cause inconvenience to the public and loss and damage to the Owner including but not limited to interest and additional administrative, architectural, inspection and supervision charges. By executing the Construction Contract, the Contractor agrees that the Contract Time is sufficient for the achievement of Substantial Completion.

B. The Contract Documents may provide in the Construction Contract or elsewhere for a certain dollar amount for which the Contractor and its Surety (if any) will be liable to the Owner as liquidated damages for each calendar day after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work. If such daily liquidated damages are provided for, Owner and Contractor, and its Surety, agree that such amount is reasonable and agree to be bound thereby.

C. A daily liquidated damage amount of $1000 per day or a time charge equal to ten percent interest per annum on the total Contract Sum may be made against the Contractor for the entire period after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work.

D. The amount of liquidated damages due under either paragraph B or C, above, may be deducted by the Owner from the moneys otherwise due the Contractor in the Final Payment, not as a

penalty, but as liquidated damages sustained, or the amount may be recovered from Contractor or its Surety. If part of the Work is substantially completed within the Contract Time and part is not, the stated charge for liquidated damages shall be equitably prorated to that portion of the Work that the Contractor fails to substantially complete within the Contract Time. It is mutually understood and agreed between the parties hereto that such amount is reasonable as liquidated damages.

**1.05 TERMINATION BY THE OWNER FOR CAUSE**

A. Causes: The Owner may terminate the Contractor's right to complete the Work, or any designated portion of the Work, if the Contractor:
   1. (a) should be adjudged bankrupt, or should make a general assignment for the benefit of the Contractor's creditors, or if a receiver should be appointed on account of the Contractor's insolvency to the extent termination for these reasons is permissible under applicable law;
      a. (b) refuses or fails to prosecute the Work, or any part of the Work, with the diligence that will insure its completion within the Contract Time, including any extensions, or fails to complete the Work within the Contract Time;
         1) (c) refuses or fails to perform the Work, including prompt correction of Defective Work, in a manner that will insure that the Work, when fully completed, will be in accordance with the Contract Documents;
         2) (d) fails to pay for labor or materials supplied for the Work or to pay Subcontractors in accordance with the respective Subcontract;
         3) (e) persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction, or the instructions of the Architect or Owner; or
         4) (f) is otherwise guilty of a substantial breach of the Contract.

B. Procedure for Unbonded Construction Contracts :
   1. Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor written notice to cure the condition within a reasonable, stated time, but not less than ten calendar days after the Contractor receives the notice.
      a. Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor written notice that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven calendar days after the Contractor's receipt of the written Notice of Termination.
      b. If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a seven calendar day Notice of Termination without giving the Contractor another Notice to Cure.
      c. At the expiration of the seven calendar days of the termination notice, the Owner may:
         1) take possession of the site, of all materials and equipment stored on and off site, and of all Contractor-owned tools, construction equipment and machinery, and facilities located at the site, and
         2) finish the Work by whatever reasonable method the Owner may deem expedient.

d. The Contractor shall not be entitled to receive further payment under the Contract until the Work is completed.
e. If the Owner's cost of completing the Work, including correction of Defective Work, compensation for additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees due to the default and termination, is less than the unpaid balance of the Contract Sum, the excess balance less liquidated damages for delay shall be paid to the Contractor. If such cost to the Owner including attorney's fees, plus liquidated damages, exceeds the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner. Final Resolution of any claim or Dispute involving the termination or any amount due any party as a result of the termination shall be pursuant to Article 24.
f. Upon the Contractor's request, the Owner shall furnish to the Contractor a detailed accounting of the Owner's cost of completing the Work.

**1.06**

**RELATED REQUIREMENTS**

**2.01 SECTION 007300 - SUPPLEMENTARY CONDITIONS.**

**2.02 SECTION 014216 - DEFINITIONS.**

**END OF SECTION 007200**

# SUPPLEMENTARY CONDITIONS

## I. PERFORMANCE BOND

a. A PERFORMANCE BOND and PAYMENT BOND each in the amount of 100 percent of the contract price, with a corporate surety approved by OWNER, will be required for the faithful performance of the contract, when the AGREEMENT is executed. Attorneys-in-fact who sign PAYMENT BONDS and PERFORMANCE BONDS must file with each BOND a current certified copy of their power of attorney.

b. Certificate of Insurance, as specified herein, shall be submitted at the time of signing the AGREEMENT.

c. The BIDDER to whom the contract is being awarded will be required to execute the AGREEMENT and obtain the PERFORMANCE BOND, PAYMENT BOND, and Insurance on or before ten (10) calendar days following delivery of the notice of award to the BIDDER. If the BIDDER fails to properly execute the AGREEMENT or obtain the required PERFORMANCE BOND, PAYMENT BOND, or Insurance within the allotted time, the OWNER may consider the BIDDER in default.

d. The OWNER after receipt of acceptable PERFORMANCE BOND, PAYMENT BOND, Insurance Certificates and the AGREEMENT signed by the CONTRACTOR to whom the contract is being awarded shall sign the AGREEMENT and return to such CONTRACTOR an executed duplicate of the AGREEMENT.

e. The CONTRACTOR shall thereupon record the PAYMENT and PERFORMANCE BONDS at the Santa Rosa County Courthouse and return the recorded originals to the OWNER within seven (7) days.

f. The NOTICE TO PROCEED shall be issued within ten (10) days of the receipt of the recorded bonds by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period; the time may be extended by mutual agreement between the OWNER and the CONTRACTOR.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original, this _____ day of_____, 2019.

_____ (SEAL)
Attest: Principal (Bidder)

_____
_____ Signature

_____
Typed Name

_____
Title

_____ (SEAL)
Attest: Surety

_____
_____ Signature Attorney-in-Fact

_____
Typed Name

(Attach Certified and Dated Copy of Power of Attorney)
DO NOT DATE PERFORMANCE BOND. BOND DOCUMENT WILL BE DATED BY CITY.
(Bond must not be dated prior to date of Agreement)

**SECTION 011000 - SUMMARY**

**PART 1 GENERAL**

**1.01 PROJECT**

A. Project Name: Carpenter's Park Phase 1 Splash Pad

B. Owner's Name: City of Milton, FL.

C. Architect/Landscape Architect's Name: TSW.

D. The Project consists of the construction of an interactive water feature and associated equipment, accessability upgrades to an exising restroom, sidewalks for access to the facilities, and landscaping.

**1.02 CONTRACT DESCRIPTION**

A. Contract Type: A single prime contract based on a Stipulated Price.

**1.03 OWNER OCCUPANCY**

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

**1.04 CONTRACTOR USE OF SITE AND PREMISES**

A. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

**END OF SECTION**

# SECTION 012000 - PRICE AND PAYMENT PROCEDURES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Change procedures.

C. Procedures for preparation and submittal of application for final payment.

### 1.02 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect/Landscape Architect for approval.

C. Forms filled out by hand will not be accepted.

### 1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect/Landscape Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit one electronic and three hard-copies of each Application for Payment.

### 1.04 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect/Landscape Architect will issue instructions directly to Contractor.

C. For other required changes, Architect/Landscape Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.

1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect/Landscape Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within ____ days.

E. Contractor may propose a change by submitting a request for change to Architect/Landscape Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect/Landscape Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect/Landscape Architect.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.

H. Execution of Change Orders: Architect/Landscape Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

**1.05 APPLICATION FOR FINAL PAYMENT**

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

**END OF SECTION**

# SECTION 012300 - ALTERNATES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Description of Alternates.

B. Procedures for pricing Alternates.

### 1.02 RELATED REQUIREMENTS

A. Document 002113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

B. Document 004323 - Alternates Form: List of Alternates as supplement to Bid Form.

### 1.03 SCHEDULE OF ALTERNATES

A. Alternate No. 1 - Concrete Paving and Structures,: Furnish and install all proposed materials and work associated with exterior concrete paving and cast in place concrete work including base, concrete sidewalks, walls, steps, detectable warning surfaces, and reinforcing as required by the plans. Site grading shall be covered in the base bid. This work shall not include any concrete work within the area marked Interactive Water Feature, or railings associates with stairs.

B. Alternate No. 2 - Site Furniture Group 1: Furnish and install all proposed materials and work associated with the site furniture near the Interactive Water Feature to include: 5 Benches, 8 Umbrellas, and 8 Tables.

C. Alternate No. 3 - Drinking Fountains: Furnish and install all proposed materials and work associated with 2 Drinking Fountains including all required utilities from the from the point of connection at the water meter.

D. Alternate No. 4 - Site Furniture Group 2: Furnish and install all proposed materials and work associated the site furniture to include: 12 Bike Racks, 6 Trash Cans, and 1 Bench.

E. Alternate No. 5 - Parking Lot Striping: Furnish and install all proposed materials and work associated the new thermoplastic striping within the existing parking lot. Work shall include removal of existing striping.

F. Alternate No. 6 - Restroom Upgrades: Furnish and install all proposed materials and work associated with interior upgrades to the restroom building.

G. Alternate No. 7 - Crosswalk: Furnish and install all proposed materials and work associated with the new pedestrian cross walk at Munson Highway. This work will include all signage, beacons, and pavement striping.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION - NOT USED

**END OF SECTION**

# SECTION 012500 - SUBSTITUTION PROCEDURES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

### 1.02 RELATED REQUIREMENTS

A. Section 012300 - Alternates, for product alternatives affecting this section.

### 1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.
   6. Agrees to reimburse Owner and Architect/Landscape Architect for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:
   1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

E. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

### 3.02 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Architect/Landscape Architect will consider requests for substitutions only within 15 days after date of Agreement.

B. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.
   3. When acceptance will require revisions to the Contract Documents.

**3.03 RESOLUTION**

A. Architect/Landscape Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect/Landscape Architect will notify Contractor in writing of decision to accept or reject request.
   1. Architect/Landscape Architect's decision following review of proposed substitution will be noted on the submitted form.

**3.04 ACCEPTANCE**

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

**3.05 CLOSEOUT ACTIVITIES**

A. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

**END OF SECTION**

# SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. General administrative requirements.
B. Electronic document submittal service.
C. Preconstruction meeting.
D. Site mobilization meeting.
E. Progress meetings.
F. Construction progress schedule.
G. Contractor's daily reports.
H. Progress photographs.
I. Submittals for review, information, and project closeout.
J. Number of copies of submittals.
K. Requests for Interpretation (RFI) procedures.
L. Submittal procedures.

### 1.02 RELATED REQUIREMENTS

A. Section 007200 - General Conditions: Dates for applications for payment.
B. Section 007200 - General Conditions: Duties of the Construction Manager.
C. Section 013216 - Construction Progress Schedule: Form, content, and administration of schedules.

### 1.03 REFERENCE STANDARDS

A. AIA G716 - Request for Information; 2004.
B. AIA G810 - Transmittal Letter; 2001.

### 1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
B. Make the following types of submittals to Architect/Landscape Architect:
    1. Requests for Interpretation (RFI).
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Test and inspection reports.
    5. Design data.
    6. Manufacturer's instructions and field reports.
    7. Applications for payment and change order requests.
    8. Progress schedules.
    9. Coordination drawings.
    10. Correction Punch List and Final Correction Punch List for Substantial Completion.
    11. Closeout submittals.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE**

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Contractor and Architect/Landscape Architect are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Architect/Landscape Architect's consultants are to be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.

C. Project Closeout: Architect/Landscape Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

**3.02 PRECONSTRUCTION MEETING**

A. Schedule meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect/Landscape Architect.
   3. Contractor.
   4. Civil Engineer.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Submission of initial Submittal schedule.
   6. Designation of personnel representing the parties to Contract, Civil Engineer and Architect/Landscape Architect.
   7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   8. Scheduling.

9. Scheduling activities of a Geotechnical Engineer.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Landscape Architect, Owner, participants, and those affected by decisions made.

**3.03 SITE MOBILIZATION MEETING**

A. Owner will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
1. Contractor.
2. Owner.
3. Architect/Landscape Architect.
4. Contractor's superintendent.
5. Major subcontractors.

C. Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Landscape Architect, Owner, participants, and those affected by decisions made.

**3.04 PROGRESS MEETINGS**

A. Schedule and administer meetings throughout progress of the work at maximum monthly intervals.

B. Attendance Required:
1. Contractor.
2. Owner.
3. Architect/Landscape Architect.
4. Contractor's superintendent.
5. Major subcontractors.
6. Civil Engineer.
7. Landscape Architect will attend by phone..

C. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to work.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Landscape Architect, Owner, participants, and those affected by decisions made.

## 3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

## 3.06 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
1. Date.
2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. Material deliveries.
5. Safety, environmental, or industrial relations incidents.
6. Meetings and significant decisions.
7. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
8. Testing and/or inspections performed.
9. List of verbal instruction given by Owner and/or Architect/Landscape Architect.
10. Signature of Contractor's authorized representative.

## 3.07 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect/Landscape Architect.

D. In addition to periodic, recurring views, take photographs of each of the following events:

E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.

2. Consult with Architect/Landscape Architect for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
2. File Naming: Include project identification, date and time of view, and view identification.
3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

**3.08 REQUESTS FOR INTERPRETATION (RFI)**

A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to Owner.
a. Use AIA G716 - Request for Information or equal format.
3. Prepare using software provided by the Electronic Document Submittal Service.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
2. Discrete and consecutive RFI number, and descriptive subject/title.
3. Issue date, and requested reply date.
4. Annotations: Field dimensions and/or description of conditions which have engendered the request.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.

1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Highlight items requiring priority or expedited response.
4. Highlight items for which a timely response has not been received to date.
5. Identify and include improper or frivolous RFIs.

H. Review Time: Architect/Landscape Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

## 3.09 SUBMITTAL SCHEDULE

A. Submit to Architect/Landscape Architect for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule specified in Section - 013216 - Construction Progress Schedule.
2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.

## 3.10 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect/Landscape Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

## 3.11 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.

5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect/Landscape Architect's knowledge as contract administrator or for Owner.

## 3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

## 3.13 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
1. Small Size Sheets, Not Larger Than 8-1/2 by 11 inches (215 by 280 mm): Submit the number of copies that Contractor requires, plus two copies that will be retained by Architect/Landscape Architect.

B. Documents for Information: Submit two copies.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect/Landscape Architect.
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

## 3.14 SUBMITTAL PROCEDURES

A. General Requirements:
1. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
2. Transmit using approved form.
a. Use Form AIA G810 or similar.

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

**3.15 SUBMITTAL REVIEW**

A. Submittals for Review: Architect/Landscape Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect/Landscape Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect/Landscape Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect/Landscape Architect's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Revise and Resubmit".
         1) Resubmit revised item, with review notations acknowledged and incorporated.
      b. "Rejected".
         1) Submit item complying with requirements of Contract Documents.

E. Architect/Landscape Architect's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

**END OF SECTION**

## SECTION 013216 - CONSTRUCTION PROGRESS SCHEDULE

## PART 1 GENERAL

### 1.01 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

### 1.02 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

C. Within 10 days after joint review, submit complete schedule.

### 1.03 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Sheet Size: Multiples of 8-1/2 x 11 inches (216 x 280 mm).

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. Provide legend for symbols and abbreviations used.

### 3.02 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

### 3.03 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect/Landscape Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

### 3.04 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

### 3.05 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect/Landscape Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

**END OF SECTION**

# SECTION 014000 - QUALITY REQUIREMENTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Quality assurance.

B. References and standards.

C. Testing and inspection agencies and services.

D. Contractor's construction-related professional design services.

E. Contractor's design-related professional design services.

F. Control of installation.

G. Mock-ups.

H. Defect Assessment.

### 1.02 RELATED REQUIREMENTS

A. Document 007200 - General Conditions: Inspections and approvals required by public authorities.

### 1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2016.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2015a.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.

G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

H. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

### 1.04 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.

1. Design Services Types Required:
    a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor’s sole responsibilities for construction means, methods, techniques, sequences, and procedures.
    b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

## 1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

## 1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
   1. Interactive Water Feature.

## 1.07 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

## 1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in Florida.

C. Contractor's Quality Control (CQC) Plan:
   1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
      a. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.

## 1.09 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Landscape Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect/Landscape Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

## 1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:

1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 CONTROL OF INSTALLATION**

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Landscape Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 MOCK-UPS**

A. Accepted mock-ups establish the standard of quality the Architect/Landscape Architect will use to judge the Work.

B. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

C. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

D. Accepted mock-ups shall be a comparison standard for the remaining Work.

E. Where mock-up has been accepted by Architect/Landscape Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect/Landscape Architect.

**3.03 TESTING AND INSPECTION**

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect/Landscape Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect/Landscape Architect and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Architect/Landscape Architect.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
    a. To provide access to Work to be tested/inspected.
    b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    c. To facilitate tests/inspections.
    d. To provide storage and curing of test samples.
4. Notify Architect/Landscape Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect/Landscape Architect.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**3.04 DEFECT ASSESSMENT**

A. Replace Work or portions of the Work not complying with specified requirements.

**END OF SECTION**

**SECTION 014216 - DEFINITIONS**

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Other definitions are included in individual specification sections.

**1.02 DEFINITIONS**

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

D. Provide: To furnish and install.

E. Supply: Same as Furnish.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

# SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary sanitary facilities.

C. Temporary Controls: Barriers, enclosures, and fencing.

D. Security requirements.

E. Vehicular access and parking.

F. Waste removal facilities and services.

### 1.02 TEMPORARY UTILITIES - SEE SECTION 015100

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

### 1.03 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

### 1.04 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

### 1.05 FENCING

A. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

### 1.06 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

### 1.07 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

### 1.08 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

**1.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

## SECTION 016000 - PRODUCT REQUIREMENTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Transportation, handling, storage and protection.

B. Product option requirements.

C. Substitution limitations.

D. Maintenance materials, including extra materials, spare parts, tools, and software.

### 1.02 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

## PART 2 PRODUCTS

### 2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

### 2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made using or containing CFC's or HCFC's.
   2. Made of wood from newly cut old growth timber.
   3. Containing lead, cadmium, or asbestos.

### 2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers as "basis of design": Use a product of one of the manufacturers named and meeting specifications, substitutions may be proposed that meet or exceede the design quality, materials, and performance.

### 2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

## PART 3 EXECUTION

### 3.01 SUBSTITUTION LIMITATIONS

A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

B. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

### 3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### 3.03 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

F. Comply with manufacturer's warranty conditions, if any.

G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

H. Prevent contact with material that may cause corrosion, discoloration, or staining.

I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

# SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Cutting and patching.

C. Surveying for laying out the work.

D. Cleaning and protection.

E. Starting of systems and equipment.

F. Demonstration and instruction of Owner personnel.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

H. General requirements for maintenance service.

### 1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 014000 - Quality Requirements: Testing and inspection procedures.

### 1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

### 1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.
   1. Minimum of ___ years ofdocumented experience.

B. For surveying work, employ a land surveyor registered in Florida and acceptable to Architect/Landscape Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in Florida. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

## 1.06 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Perform dewatering activities, as required, for the duration of the project.

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
   2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

# PART 2 PRODUCTS

## 2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

**3.02 PREPARATION**

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

**3.03 LAYING OUT THE WORK**

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect/Landscape Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect/Landscape Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Landscape Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

**3.04 GENERAL INSTALLATION REQUIREMENTS**

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

**3.05 CUTTING AND PATCHING**

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.

6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.

I. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

## 3.06 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

## 3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### 3.08 SYSTEM STARTUP

A. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

B. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

C. Verify that wiring and support components for equipment are complete and tested.

D. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

E. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### 3.09 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

### 3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### 3.11 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### 3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Accompany Landscape Architect/Civil Engineer on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect/Landscape Architect when work is considered ready for Architect/Landscape Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect/Landscape Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect/Landscape Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect/Landscape Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect/Landscape Architect when work is considered finally complete and ready for Architect/Landscape Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect/Landscape Architect listed in executed Certificate of Substantial Completion.

**3.13 MAINTENANCE**

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

**END OF SECTION**

# SECTION 017800 - CLOSEOUT SUBMITTALS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

### 1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

### 1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect/Landscape Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect/Landscape Architect comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

**3.02 OPERATION AND MAINTENANCE DATA**

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

**3.03 WARRANTIES AND BONDS**

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

**END OF SECTION**

# SECTION 024100 - DEMOLITION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

### 1.02 RELATED REQUIREMENTS

A. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

C. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

D. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

E. Section 312323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

### 1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

### 1.04 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

### 1.05 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

### 1.06 PREDEMOLITON MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

### 1.07 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:

1. Areas for temporary construction and field offices.

C. Informational Submittals
   1. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.
   2. Schedule of Selective Demolition Activities: Indicate the following:
      a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
      b. Interruption of utility services. Indicate how long utility services will be interrupted.
      c. Coordination for shutoff, capping, and continuation of utility services.
      d. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
   3. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, which might be misconstrued as damage caused by demolition operations.
   4. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

E. Closeout Submittals
   1. Inventory: Submit a list of items that have been removed and salvaged.

## 1.08 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Landscape Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Landscape Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

## 1.09 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

## 1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

# PART 2 PRODUCTS

## 2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

## PART 3 EXECUTION

### 3.01 SCOPE

A. Remove other items as indicated on drawings.

B. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 312200.

### 3.02 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Survey of Existing Conditions: Record existing conditions by use of measured drawings.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

### 3.03 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 017000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Provide, erect, and maintain temporary barriers and security devices.
   3. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
      a. Remove temporary barricades and protections where hazards no longer exist.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

E. Protect existing structures and other elements that are not to be removed.
   1. Prevent movement or settlement of adjacent structures.
   2. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. If hazardous materials are discovered during removal operations, stop work and notify Architect/Landscape Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

H. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.

2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

I. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

J. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete. Contractor shall be responsible for any damage, repairs, or replacement of items scheduled to remain that are damaged at an additional cost to the Owner.

K. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

**3.04 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS**

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

D. Asphalt Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Hand Removal: Where noted in the plans, remove paving by hand to protect nearby existing tree.

**3.05 EXISTING UTILITIES**

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

**3.06 SELECTIVE DEMOLITION FOR ALTERATIONS**

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect/Landscape Architect before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

**3.07 DEBRIS AND WASTE REMOVAL**

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction and recycle or dispose of them; do not burn or bury.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

**3.08 CLEANING**

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

**END OF SECTION**

# SECTION 033000 - CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete Walls

C. Concrete reinforcement.

D. A. Section includes cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads, light pole bases, flagpole bases, thrust blocks, manholes, and footings.

G. Concrete curing.

### 1.02 RELATED REQUIREMENTS

A. Section 032000 - Concrete Reinforcing.

B. City of Milton Public Works Manual, current edition for concrete paving and related items.

### 1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

D. ACI 305R - Hot Weather Concreting; 2010.

E. ACI 306R - Cold Weather Concreting; 2010.

F. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

G. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).

H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

I. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009 (Reapproved 2015).

J. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).

K. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

L. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

M. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

N. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

O. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

Q. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

R. ASTM C845/C845M - Standard Specification for Expansive Hydraulic Cement; 2012.

S. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.

T. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

U. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2014.

V. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

**1.04 DEFINITIONS**

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

**1.05 PREINSTALLATION MEETINGS**

A. Pre-installation Conference: Conduct conference at Project site.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   2. Contractor's superintendent.
   3. Independent testing agency responsible for concrete design mixtures.
   4. Ready-mix concrete manufacturer.
   5. Concrete Subcontractor.
   6. Special concrete finish Subcontractor.

B. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

**1.06 SUBMITTALS**

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

D. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Landscape Architect.

F. Samples: Submit samples of underslab vapor retarder to be used.

G. Samples: Submit two, 12 inch (305 mm) long samples of waterstops and construction joint devices.

H. Test Reports: Submit report for each test or series of tests specified.

**1.07 QUALITY ASSURANCE**

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
   2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

E. Follow recommendations of ACI 305R and as follows when concreting during hot weather.
   1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

F. Follow recommendations of ACI 306R when concreting during cold weather.
   1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
   2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Follow recommendations of ACI 306R when concreting during cold weather.

**1.08 MOCK-UP**

A. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
   1. Build panel approximately 200 sq. ft. (18.6 sq. m) for slab-on-grade and 100 sq. ft. (9.3 sq. m) for formed surface in the location indicated or, if not indicated, as directed by Architect.
   2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.09 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

### 1.10 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## PART 2 PRODUCTS

### 2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
   3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches (38 mm) of concrete surface.

### 2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
   1. Type: Deformed billet-steel bars.
   2. Finish: Galvanized in accordance with ASTM A767/A767M, Class I, unless otherwise indicated.
   3. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch (1.29 mm).
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches (38 mm) of weathering surfaces.

### 2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire cement for entire project from same source.

B. Blended, Expansive Hydraulic Cement: ASTM C845/C845M, IS.

C. Fine and Coarse Aggregates: ASTM C 33. Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
   1. Acquire aggregates for entire project from same source.
   2. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
   3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

E. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M. Synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
   1. Color(s): As selected by Architect/Landscape Architect from manufacturer's full range.

F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

**2.04 ADMIXTURES**

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement. Use chemicals certified by manufacturer to be compatible with other admixtures. Do not use calcium chloride or admixtures containing calcium chloride.

B. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

C. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

D. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

E. Retarding Admixture: ASTM C494/C494M Type B.

F. Water Reducing Admixture: ASTM C494/C494M Type A.

G. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

H. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

I. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

**2.05 FIBER REINFORCEMENT**

A. Carbon-Steel Fiber: ASTM A 820/A 820M, Type 1, cold-drawn wire, deformed, minimum of 1.5 inches (38 mm) long, and aspect ratio of 35 to 40.

B. Carbon-Steel Fiber: ASTM A 820/A 820M, Type 2, cut sheet, deformed, minimum of 1.5 inches (38 mm) long, and aspect ratio of 35 to 40.

C. Synthetic Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

D. Synthetic Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

E. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm) long.

**2.06 VAPOR RETARDERS**

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Sheet Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

C. Sheet Vapor Retarder: ASTM E 1745, Class C. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

D. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

E. Bituminous Vapor Retarder: 110-mil- (2.8-mm-) thick, semiflexible, seven-ply sheet membrane consisting of reinforced core and carrier sheet with fortified asphalt layers, protective weathercoating, and removable plastic release liner. Furnish manufacturer's accessories, including bonding asphalt, pointing mastics, and self-adhering joint tape.
   1. Water-Vapor Permeance: 0.0011 grains/h x sq. ft. x inches Hg (0.063 ng/Pa x s x sq. m); ASTM E 154.
   2. Tensile Strength: 140 lbf/inch (24.5 kN/m); ASTM E 154.
   3. Puncture Resistance: 90 lbf (400N); ASTM E 154.

## 2.07 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:.
      a. Types I and II, nonload bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

B. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

C. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 or aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.

D. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

E. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

F. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.
   1. Size: not less than 0.022-inch- (0.55-mm-) thick.

## 2.08 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

D. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.

E. Moisture-Retaining Sheet: ASTM C171.
   1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch (0.102 mm).
   2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard (1.71 kg/sq m).

F. Water: Potable, not detrimental to concrete.

## 2.09 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.10 CONCRETE MIX DESIGN

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
   2. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
      a. Fly Ash: 25 percent.
      b. Combined Fly Ash and Pozzolan: 25 percent.
      c. Slag Cement: 50 percent.
      d. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
      e. Silica Fume: 10 percent.
      f. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
      g. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
   3. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
   4. Admixtures: Use admixtures according to manufacturer's written instructions.
      a. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
      b. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

c. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
d. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

5. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

## 2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: 4000 psi minimum concrete.
1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.40.
3. Slump Limit: 4 inches (100 mm) plus or minus 1 inch (25 mm).
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.

## 2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

## 2.13 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
1. Colored Concrete: Add pigments in strict accordance with manufacturer's instructions to achieve consistent color from batch to batch.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

## 3.02 PREPARATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).
1. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

2. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
3. Class B, 1/4 inch (6 mm), Class C, 1/2 inch (13 mm), and Class D, 1 inch (25 mm) for rough-formed finished surfaces.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. Chamfer exterior corners and edges of permanently exposed concrete.

H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

L. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

## 3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

B. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

C. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

G. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

H. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780/A 780M. Use galvanized-steel wire ties to fasten zinc-coated steel reinforcement.

I. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

## 3.04 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved its 28-day design compressive strength.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

## 3.05 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
   1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

## 3.06 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Before placing concrete ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices have been installed and inspected, and will not be disturbed during concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If

a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

## 3.07 SLAB JOINTING

A. Locate joints as indicated on the drawings. Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting

action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
   2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 321373 "Joint Sealants," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

**3.08 CONCRETE FINISHING**

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal, until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
   2. Grout Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
   3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

E. Finishing Floors and Slabs: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
   1. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
      a. Apply scratch finish to surfaces indicated to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.
   2. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

a. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

3. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   a. Apply a trowel finish to surfaces indicated, exposed to view, or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
   b. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
      1) Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
      2) Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
      3) Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
      4) Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.
   c. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).
4. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
   a. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
5. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
   a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
6. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate or aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
   a. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate or aluminum granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
   b. After broadcasting and tamping, apply float finish.
   c. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate or aluminum granules.
7. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
   a. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
   b. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.

c. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

## 3.09 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:
   1. Coordinate sizes and locations of concrete bases with actual equipment provided.
   2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
   3. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
   4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
   5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
   6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

## 3.10 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven

days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

## 3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

## 3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

## 3.13 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:
1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
   2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
   6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   7. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
      b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
   8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
      b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
   9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
   10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
   11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
   12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

**3.14 PROTECTION**

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

B. A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

**3.15 SCHEDULE - CONCRETE TYPES AND FINISHES**

A. Site Walls: 3,000 pounds per square inch (20.7 MPa) 28 day concrete, rubbed finish with honeycomb filled surface.

**END OF SECTION**

## SECTION 033511 - CONCRETE FLOOR FINISHES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs.

### 1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

### 1.04 SUBMITTALS

A. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

B. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

### 1.05 MOCK-UP

A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.

B. Mock-Up Size: 5 feet (1.5 m) square.

C. Locate HVAC / EL Room.

D. Mock-up may remain as part of the work.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

### 1.07 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet (2.5 m) above the floor surface over each 20 foot (6 m) square area of floor being finished.

## PART 2 PRODUCTS

### 2.01 COATINGS

A. High Gloss Clear Coating: Transparent, non-yellowing, water- or solvent-based coating.
   1. Location: Police vestibule, conference room, kitchen, Office 2, Office 1, HVAC / EL, and Chase.
   2. Composition: Acrylic polymer-based.
   3. Nonvolatile Content: 15 percent, minimum, when measured by volume.
   4. Products:
      a. Dayton Superior Corporation; AggreGloss® J25: www.daytonsuperior.com/#sle.
      b. Euclid Chemical Company: ULTRAGUARD: www.euclidchemical.com/#sle.
      c. The QUIKRETE Companies; QUIKRETE® Concrete & Masonry High Gloss Sealer: www.quikrete.com/#sle.
      d. W. R. Meadows, Inc; Deck-O-Grip W/B (slip-resistant): www.wrmeadows.com/#sle.

B. Colored Coating: Pigmented coating recommended by manufacturer for finishing concrete floors and slabs. System must include natural aggregate for slip resistance.
   1. Location: Restroom 4, Women's Restroom, Men's Restroom, and Restroom Vestibule
   2. Type: High solids epoxy; two-component.
   3. Gloss: High gloss.
   4. Color(s): As selected by Architect/Landscape Architect from manufacturer's standard range.
   5. Products:

a. Dayton Superior Corporation; Spec Cote 100: www.daytonsuperior.com/#sle.
b. Kaufman Products Inc; SurePoxy HiBild: www.kaufmanproducts.net/#sle.

C. Natural Aggregate: Silica sand for slip resistance.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

**3.02 GENERAL**

A. Apply materials in accordance with manufacturer's instructions.

**3.03 COATING APPLICATION**

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

**END OF SECTION**

# SECTION 040511 - MORTAR AND MASONRY GROUT

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

### 1.02 RELATED REQUIREMENTS

A. Section 042600 - Single-Wythe Unit Masonry: Installation of mortar and grout.

### 1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.

B. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2010.

C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

D. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

E. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

F. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

I. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2015.

J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

K. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

L. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2015a.

M. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2016.

N. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.

O. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2014).

P. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2016.

Q. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014a.

R. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2015.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.

E. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.

F. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

## 1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

## 1.07 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

# PART 2 PRODUCTS

## 2.01 MORTAR AND GROUT APPLICATIONS

A. At Contractor's option, mortar and grout may be made from factory premixed dry materials with addition of water only or ready-mixed.

B. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Exterior, Loadbearing Masonry: Type M or S.
   3. Exterior, Non-loadbearing Masonry: Type N.
   4. Interior, Loadbearing Masonry: Type M or S.
   5. Interior, Non-loadbearing Masonry: Type N.
   6. Pointing Mortar for Prefaced or Specially Faced Unit Masonry: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.

C. Grout Mix Designs:
   1. Bond Beams and Lintels: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; provide premixed type in accordance with ASTM C 94/C 94M.
   2. Engineered Masonry: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; provide premixed type in accordance with ASTM C 94/C 94M.

## 2.02 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Color: White.
   2. Water repellent mortar shall be used for the Project Masonry.

B. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Type: Fine.
   2. Water repellent grout shall be used for the Building masonry.

C. Portland Cement: ASTM C150/C150M.

1. Type: Type I - Normal; ASTM C150/C150M.
2. Color: White.

D. Masonry Cement: ASTM C91/C91M.
1. Type: Type N; ASTM C91/C91M.

E. Hydrated Lime: ASTM C207, Type S.

F. Quicklime: ASTM C5, non-hydraulic type.

G. Mortar Aggregate: ASTM C144.

H. Grout Aggregate: ASTM C404.

I. Water: Clean and potable.

J. Bonding Agent: Latex type.

K. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar at the time of manufacture.
1. Performance of Mortar with Integral Water Repellent:
a. Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours:
1) No water visible on back of wall above flashing at the end of 24 hours.
2) No flow of water from flashing equal to or greater than 0.032 gallons per hour (0.05 L per hour) at the end of 24 hours.
3) No more than 25 percent of wall area above flashing visibly damp at end of test.
b. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
c. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
d. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
2. Use only in combination with masonry units produced with integral water repellent admixture.

## 2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, re-temper only within two hours of mixing.

## 2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

## 2.05 PRECONSTRUCTION TESTING

A. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

B. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

### 3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Do not install grout in lifts greater than 16 inches (400 mm) without consolidating grout by rodding.

### 3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches (300 mm).
   2. Limit height of masonry to 16 inches (400 mm) above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Place grout for spanning elements in single, continuous pour.

### 3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 014000 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

**END OF SECTION**

# SECTION 042600 - SINGLE-WYTHE UNIT MASONRY

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Concrete masonry units.

B. Reinforcement, anchorage, and accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 040511 - Mortar and Masonry Grout: Mortar and grout for single wythe unit masonry.

B. Section 079200 - Joint Sealants: Sealing control and expansion joints.

### 1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

F. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2016.

G. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.

H. BIA Techical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

I. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

### 1.04 SUBMITTALS

A. Product Data: Provide data for decorative masonry units and fabricated wire reinforcement.

B. Samples: Submit four samples of decorative block units to illustrate color, texture and extremes of color range.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

### 1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

### 1.07 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

## PART 2 PRODUCTS

### 2.01 CONCRETE MASONRY UNITS

A. Exterior Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depths as indicated on drawings for specific locations.
   2. Finish: the standard block shall be painted to match the existing exterior finish of the bathroom
   3. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.

### 2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 040511.

### 2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
   1. Blok-Lok Limited: www.blok-lok.com.
   2. Hohmann & Barnard, Inc: www.h-b.com/sle.
   3. WIRE-BOND: www.wirebond.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa) yield strength, deformed billet bars; galvanized.

C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

D. Single Wythe Joint Reinforcement: Truss type; 1 steel wire, hot dip galvanized after fabrication to 2, Class B; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure.

E. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in (32 mm) width, 0.105 in (2.7 mm) thick, lengths as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A153/A153M, Class B.

F. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from masonry face.
   1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch (25 mm) width x 0.024 in (0.61 mm) thick, with trapezoidal wire ties 0.1875 inch (4.75 mm) thick, hot dip galvanized to ASTM A153/A153M, Class B.
   2. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch (6.3 mm) thick, with trapezoidal wire ties 0.1875 inch (4.75 mm) thick, hot dip galvanized to ASTM A153/A153M, Class B.

### 2.04 ACCESSORIES

A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com.
      b. Hohmann & Barnard, Inc: www.h-b.com/sle.
      c. WIRE-BOND: www.wirebond.com.
      d. Substitutions: See Section 016000 - Product Requirements.

B. Drip Edge: Stainless steel; compatible with membrane and adhesives.

C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### 3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### 3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
   3. Mortar Joints: Flush.

### 3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

### 3.05 REINFORCEMENT AND ANCHORAGE

A. Install horizontal joint reinforcement 16 inches (400 mm) on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches (150 mm).

E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches (400 mm) on center.

F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches (600 mm) horizontally and 16 inches (400 mm) vertically.

G. Install anchors to structural framing at not more than 16 inches (400 mm) on center.

**3.06 MASONRY FLASHINGS**

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up at least 1 inch (25.4 mm), minimum, to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

**3.07 LINTELS**

A. Install loose steel lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

**3.08 GROUTED COMPONENTS**

A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.

B. Place and consolidate grout fill without displacing reinforcing.

**3.09 CONTROL AND EXPANSION JOINTS**

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Size control joints as indicated on drawings; if not shown, 3/4 inch (19 mm) wide and deep.

**3.10 BUILT-IN WORK**

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

**3.11 TOLERANCES**

A. Maximum Variation from Alignment of Columns: 1/4 inch (6 mm).

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).

C. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).

E. Maximum Variation of Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch (6 mm).

**3.12 CUTTING AND FITTING**

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

**3.13 FIELD QUALITY CONTROL**

A. An independent testing agency, as specified in Section 014000 - Quality Requirements, will conduct field tests.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

**3.14 CLEANING**

A. Remove excess mortar and mortar smears as work progresses.

B. Clean soiled surfaces with cleaning solution.

C. Use non-metallic tools in cleaning operations.

**3.15 PROTECTION**

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

# SECTION 057000 - EXTERIOR METAL GUARDRAILS AND HANDRAILS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Railing and guardrail assemblies.

B. Wall-mounted handrails.

C. Free-standing railings at steps.

### 1.02 RELATED REQUIREMENTS

A. Section 055100 - Metal Stairs: Handrails other than those specified in this section.

B. Section 062000 - EXTERIOR FINISHED CARPENTRY: Wood support post.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.

C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

D. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2015.

E. ASTM A555/A555M - Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods; 2005 (Reapproved 2014).

F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

G. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).

H. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.

I. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

J. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).

L. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2007.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.

C. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

D. Samples: Submit one (1) of each item below for each type and condition shown.
   1. Railing: 12 inch (305 mm) long section of handrail illustrating color, finish and connection detail.

E. Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.

F. Manufacturer's Installation Instructions.

G. Maintenance Data: Manufacturer's instructions for care and cleaning.

H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

A. Installer Qualifications: Company specializing in installing decorative stairs and railing systems and acceptable to manufacturer.

B. Templates: Supply installation templates, reinforcing and required anchorage devices.

C. Mock-Ups: Construct an example of each item specified. Locate mock-ups where directed. Mock-ups may remain as part of the work.

**1.06 MOCK-UP**

A. Provide mock-up of stair, railing system, wall-mounted handrail, and guardrail, 8 feet (0.30 m) long by 3 feet (0.9144 m) tall, illustrating each type of material, cladding and finish. .

B. See Section 014000 - Quality Requirements for additional requirements.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

**1.07 DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials in factory provided protective coverings and packaging.

B. Protect materials against damage during transit, delivery, storage, and installation at site.

C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.

D. Prior to installation, store materials and components under cover, in a dry location.

**1.08 FIELD CONDITIONS**

A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C).

B. Maintain ambient temperature of space at minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C) for 24 hours before, during, and after railing installation.

**1.09 WARRANTY**

A. Warranty: Manufacturer's standard one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 RAILING SYSTEMS**

A. Railing Systems - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.

1. Performance Requirements: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
    a. Lateral Force: 75 lb (333 N) minimum, at any point, when tested in accordance with ASTM E935.
    b. Distributed Load: 50 lb/ft (0.73 kN per m) minimum, applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
    c. Concentrated Loads on Intermediate Rails: 50 psf (0.22 kgs per sq m), minimum.
    d. Concentrated Load: 200 lbs (888 N) minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.

e. Handrails: Comply with applicable accessibility requirements of ADA Standards.

2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
4. Field Connections: Provide sleeves to accommodate site assembly and installation.
5. Welded and Brazed Joints: Make exposed joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
   a. Ease exposed edges to small uniform radius.
   b. Welded Joints:
      1) Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
      2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.

B. Stainless steel cabling & wood post railing: Engineered, post supported railing system with cable infill.
   1. Configuration: Guardrail with separate handrail.
   2. Top Rail: 1 by 8 inch (0.0254 by 0.2032 mm), rectangular hardwood. The top rail shall be sloped. See landscape drawings.
   3. Grip Rail: Round, aluminum, 1-1/2 inch IPS / 1.9 inch OD (38.1 mm IPS / 48.26 mm OD) diameter Schedule 40.
   4. Decorative Flanges for Embedded Posts: Circular, collared cover plate without screw holes.
   5. Wall Mounted Components: Components necessary to support railing with 1-1/2 inch (38 mm) clearance from wall, and as follows:
      a. Underslung support brackets: Supports at 60 inches (1524 mm), maximum.
      b. Wall return without support: Terminates 1/4 inch (6 mm) from side wall.
   6. Handrail Brackets: Same metal as railing.
   7. Fasteners: Concealed.
   8. Infill at Cable Railings: Stainless steel cable.
      a. Material: ASTM A666, Type 316.
      b. Mounting: Mechanically attached to frame.
   9. End and Intermediate Posts: Same material and size as top rails.
      a. Horizontal Spacing: As indicated on drawings.
      b. Mounting: Mechanically attached.

C. Stainless Railing System with cable infill:
   1. Description: Post and cable railing system.
   2. Configuration: Guardrail with separate handrail.
   3. Stainless Steel Tube: Type 316 stainless steel.
      a. Guardrail Post: 2 inch (52 mm) outside diameter.
      b. Handrail: 1-1/2 inch (38 mm) outside diameter.
      c. Top Rail: 2 inch (51 mm) outside diameter.
   4. Cable: ASTM A555/555M.
      a. Fabricate from ASTM A666 stainless steel, Type 316.
      b. Size: 3/16 inch (5 mm) diameter.
   5. Fittings: Type 316 stainless steel, non-swedge.
   6. Fasteners: Stainless steel.
   7. Finishes:
      a. Exposed, Machined Stainless Steel Fittings: No. 4 bright finish.
   8. Fabrication:
      a. Corners: Mitered and welded; grind smooth to match adjacent finish.
      b. Exposed Joints: Butt tight and flush.

c. Splices: Provide interior sleeves; fasteners allowed at splice connections

D. Wall-Mounted Handrail:
1. 1-1/2 inch (38 mm) diameter stainless steel; No. 4 bright finish.
2. Internal Connection Sleeves: Sleeve, material compatible with handrail and top cap material.
3. Handrail Brackets: Manufacturer's standard stainless steel brackets.
a. Mounting: Wall.
b. Finish: No. 4 bright finish.
4. Comply with ADA Standards.

## 2.02 MATERIALS

A. Stainless Steel Components:
1. ASTM A666, Type 304.
2. Stainless Steel Tubing: ASTM A554, Type 304, 16 gage, 0.0625 inch (1.59 mm) minimum metal thickness, 1-1/2 inch (38 mm) diameter.
3. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
4. Stainless Steel Finish: No. 4 Bright Polished finish.

B. Wood for Railings: Comply with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 7 - Stairwork & Rails, at manufacturer's standard grade.
1. Species: To be selected by Architect/Landscape Architect.

## 2.03 ACCESSORIES

A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.

B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
1. For anchorage to concrete, provide inserts to be cast into concrete for bolting anchors.
2. For anchorage to masonry, provide brackets to be embedded in masonry for bolting anchors.
3. For anchorage to stud walls, provide backing plates for bolting anchors.
4. Exposed Fasteners: No exposed bolts or screws.

C. Carbon Steel Bolts and Nuts: ASTM A307.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect/Landscape Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions have been corrected.

E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment of anchors.

## 3.02 PREPARATION

A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions and directions for installation of anchorages and fasteners.

B. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

**3.03 INSTALLATION**

A. Comply with manufacturer's drawings and written instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.

C. Anchor securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Weld connections that cannot be shop welded due to size limitations.
   1. Weld in accordance with AWS D1.1/D1.1M.
   2. Match shop welding and bolting.
   3. Clean welds, bolted connections and abraded areas.
   4. Touch up shop primer and factory applied finishes.
   5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

F. Isolate dissimilar materials with bituminous coating, bushings, grommets or washers to prevent electrolytic corrosion.

**3.04 TOLERANCES**

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

C. Maximum Out-of-Position: 1/4 inch (6 mm).

**3.05 FIELD QUALITY CONTROL**

A. Field Services: Provide the services of the manufacturer for field observation of installation of railings.

**3.06 CLEANING**

A. Remove protective film from exposed metal surfaces.

B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.

**3.07 PROTECTION**

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
   1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

**END OF SECTION**

# SECTION 061000 - ROUGH CARPENTRY

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Exposed timber structural framing.

C. Preservative treated wood materials.

D. Communications and electrical room mounting boards.

E. Concealed wood blocking, nailers, and supports.

F. Exterior wood decks

### 1.02 REFERENCE STANDARDS

A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

D. PS 1 - Structural Plywood; 2009.

E. PS 20 - American Softwood Lumber Standard; 2010.

### 1.03 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

### 1.04 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

### 2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 mm through 100 by 400 mm) ):

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

## 2.03 CONSTRUCTION PANELS

A. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
   1. Grade: Structural 1 Sheathing.
   2. Bond Classification: Exposure 1.
   3. Performance Category: 5/8 PERF CAT.

B. Equipment Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.04 ACCESSORIES

A. Subfloor Adhesives: Waterproof, air cure type, cartridge dispensed.

## 2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with masonry or concrete.

# PART 3 EXECUTION

## 3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

## 3.02 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.

E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

### 3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

### 3.04 INSTALLATION OF CONSTRUCTION PANELS

A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.

B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

### 3.05 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

### 3.06 TOLERANCES

A. Framing Members: 1/4 inch (6 mm) from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

### 3.07 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

### 3.08 CLEANING

A. Waste Disposal: Comply with the requirements of Section 017419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

# SECTION 062000 - EXTERIOR FINISHED CARPENTRY

## PART 1 GENERAL

### 1.01 RELATED REQUIREMENTS

### 1.02 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

### 1.03 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

B. Samples: Submit two samples of wood 6 inch (152.6 mm) long.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

## PART 2 PRODUCTS

### 2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Exterior Finished Carpemtry Items:
   1. Vertical Brise Soleil.
   2. Horizontal Brise Soleil.
   3. Exterior post and top rail of Guardrailing Systems on site stairs, decks, ramps, and walkways..
   4. Exterior decks and ramps, unless otherwise noted.
   5. Exterior decking, unless otherwise noted.
   6. Boardwalk structure.

### 2.02 LUMBER MATERIALS

A. Softwood Lumber: pressure treated southern yellow pine species, four sides sawn, maximum moisture content of 6 percent, No. 2 grade or better, KDAT.

B. Hardwood Lumber: Cumaru Wood or approved equal species, four sides sawn, maximum moisture content of 6 percent, No. 1 grade, KDAT.

C. Hardwood Lumber alternate: cumaru species, four sides sawn, maximum moisture content of 6 percent, No. 1 grade, KDAT.

### 2.03 FASTENINGS

A. All fasteners and hardware to be Type 316 Stainless Steel, unless specifically noted to be aluminium alloy compatiable with materials being fastened.

### 2.04 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

### 2.05 SHOP FINISHING

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
    a. System - 10, UV Curable, Water-based.
    b. Sheen: Satin.
    c. Comply with Section 099300 FL- staining and transparent finishing.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify adequacy of backing and support framing.

**3.02 INSTALLATION**

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

**3.03 SITE APPLIED WOOD TREATMENT**

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

**3.04 TOLERANCES**

A. Maximum Variation from True Position: 1/16 inch (1.6 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

**END OF SECTION**

## SECTION 072100 - THERMAL INSULATION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Board insulation and integral vapor retarder at over roof deck.

### 1.02 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

D. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

E. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

### 1.04 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

### 1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

## PART 2 PRODUCTS

### 2.01 APPLICATIONS

A. Insulation Over Roof Deck: Extruded polystyrene (XPS) board.

### 2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88) per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
   4. R-value (RSI-value); 1 inch (25 mm) of material at 72 degrees F (22 C): 5 (0.88), minimum.
   5. Board Edges: Square.
   6. Water Absorption, Maximum: 0.3 percent, by volume.

**2.03 ACCESSORIES**

A. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

B. Adhesive: Type recommended by insulation manufacturer for application.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

**3.02 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK**

A. Board Installation Over Roof Deck, General:
   1. See applicable roofing specification section for specific board installation requirements.
   2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
   3. Do not apply more insulation than can be covered with roofing in same day.

**3.03 FIELD QUALITY CONTROL**

A. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
   1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
   2. Notify in ABAA writing of schedule for air barrier work, and allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

**3.04 PROTECTION**

A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

## SECTION 072119 - FOAMED-IN-PLACE INSULATION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Foamed-in-place insulation.
   1. In masonry cavity walls.
B. Protective intumescent coating.
C. Protective cementitious coating.

### 1.02 REFERENCE STANDARDS

A. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
D. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide product description, insulation properties, and preparation requirements.
C. Certificates: Certify that products of this section meet or exceed specified requirements.
D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

### 1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. With a total thickeness R-value (RSI-value) of 5.7 (32.366082), when tested in accordance with ASTM C518.
   2. Water Vapor Permeance: Vapor retarder; 2 perms (115 ng/(Pa s sqm)), maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
   3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
   4. Air Permeance: 0.04 cfm/sq ft (0.2 L/second sq meter), maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.57 psf (75 Pa).
   5. Closed Cell Content: At least 90 percent.
   6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

**2.02 ACCESSORIES**

A. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.

**PART 3 EXECUTION**

**3.01 PREPARATION**

A. Mask and protect adjacent surfaces from over spray or dusting.

**3.02 APPLICATION**

A. Apply insulation in accordance with manufacturer's instructions.

**3.03 FIELD QUALITY CONTROL**

A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 014000 - Quality Requirements.

**3.04 PROTECTION**

A. Do not permit subsequent construction work to disturb applied insulation.

**END OF SECTION**

# SECTION 074113 - METAL ROOF PANELS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Architectural roofing system of preformed aluminum panels.

B. Attachment system.

C. Finishes.

D. Accessories.

### 1.02 RELATED REQUIREMENTS

### 1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
   1. Not less than 5 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

### 1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Finish Warranty: Provide manufacturer’s special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 20 year no dollar limit guarantee period from date of Substantial Completion.

C. Waterproofing Warranty: Provide manufacturer’s warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within

specified warranty period of 20 years no dollar limit guarantee from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 ARCHITECTURAL METAL ROOF PANELS

A. Architectural Metal Roofing: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Roofing system must meet fortified standards. Documents shall be submitted to the Architect and Engineer or Record proving fortification standard has been meet with the roof design.

C. Metal Panels: Factory-formed panels with factory-applied finish.
   1. Aluminum Panels:
      a. Alloy and Temper: Aluminum complying with ASTM B209 (ASTM B209M); temper as required for forming.
      b. Thickness: Minimum 20 gage (0.032 inch) (0.81 mm).
   2. Profile: Standing seam, with minimum 2.0 inch (51 mm) seam height; concealed fastener system for snap-on application of matching standing seam batten.
   3. Texture: Smooth.
   4. Width: Maximum panel coverage of 18 inches (457 mm).

### 2.02 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

### 2.03 FINISHES

A. Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss roof color on Phase 1A.

### 2.04 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
   3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

### 2.05 FABRICATION

A. Panels: Fabricate panels and accessory items at factory, using manufacturer92s standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect/Landscape Architect of unsatisfactory preparation before proceeding.

### 3.02 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.

1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

1. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

### 3.03 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

### 3.04 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

**END OF SECTION**

## SECTION 076200 - SHEET METAL FLASHING AND TRIM

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Sealants for joints within sheet metal fabrications.

### 1.02 RELATED REQUIREMENTS

### 1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

G. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).

H. CDA A4050 - Copper in Architecture - Handbook; current edition.

I. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

### 1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

## PART 2 PRODUCTS

### 2.01 SHEET MATERIALS

A. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) (0.81 mm) thick; anodized finish of color as selected.

1. Clear Anodized Finish: AAMA 611 AA-M12C22A41 Class I clear anodic coating not less than 0.7 mils (0.018 mm) thick.

B. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) (0.81 mm) thick; plain finish shop pre-coated with modified silicone coating.
   1. Modified Silicone Polyester Coating: Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.
   2. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
   3. Color: As selected by Architect/Landscape Architect from manufacturer's standard colors.

**2.02 ACCESSORIES**

A. Fasteners: Aluminum, with soft neoprene washers.

B. Primer: Zinc chromate type.

C. Protective Backing Paint: Zinc molybdate alkyd.

D. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

E. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

F. Plastic Cement: ASTM D4586, Type I.

**2.03 FABRICATION**

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.

F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

**3.02 PREPARATION**

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

**3.03 INSTALLATION**

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

### 3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

**END OF SECTION**

# SECTION 079200 - JOINT SEALANTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

### 1.02 RELATED REQUIREMENTS

### 1.03 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.

B. ASTM C834 - Standard Specification for Latex Sealants; 2014.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).

E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.

C. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

D. Installation Plan: Submit at least four weeks prior to start of installation.

E. Installation Log: Submit filled out log for each length or instance of sealant installed.

### 1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver to manufacturer sufficient samples for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
   6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

E. Installation Plan: Include schedule of sealed joints, including the following.
   1. Installation Log Form: Include the following data fields, with known information filled out.

a. Date of installation.
b. Name of installer.
c. Actual joint width; provide space to indicate maximum and minimum width.
d. Actual joint depth to face of backing material at centerline of joint.
e. Air temperature.

**1.06 WARRANTY**

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

**PART 2 PRODUCTS**

**2.01 JOINT SEALANT APPLICATIONS**

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
a. Wall expansion and control joints.
b. Pavement expansion joints.
c. Joints between door, window, and other frames and adjacent construction.
d. Joints between different exposed materials.
e. Openings below ledge angles in masonry.
f. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
a. Joints between door, window, and other frames and adjacent construction.
b. Other joints indicated below.
3. Do not seal the following types of joints.
a. Intentional weepholes in masonry.
b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.

**2.02 NONSAG JOINT SEALANTS**

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored manufacturered stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Color: To be selected by Architect/Landscape Architect from manufacturer's standard range.
5. Manufacturers:

a. Dow Chemical Company; DOWSIL 756 SMS Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
b. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
c. Pecora Corporation: www.pecora.com/#sle.
d. Pecora Corporation; 890FTS Field Tintable Ultra Low Modulus Architectural Silicone Sealant - Class 100: www.pecora.com.
e. Pecora Corporation; 864NST Low Modulus Architectural Silicone Sealant - Class 50: www.pecora.com.
f. Sika Corporation; Sikasil WS-290: www.usa-sika.com/#sle.
g. Sika Corporation; Sikasil WS-295: www.usa-sika.com/#sle.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White.
2. Manufacturers:
a. Pecora Corporation: www.pecora.com/#sle.
b. Sika Corporation; Sikasil GP: www.usa-sika.com/#sle.
c. Substitutions: See Section 016000 - Product Requirements.

C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Color: To be selected by Architect/Landscape Architect from manufacturer's standard range.
3. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
4. Manufacturers:
a. Pecora Corporation: www.pecora.com/#sle.
b. The QUIKRETE Companies; QUIKRETE® Polyurethane Non-Sag Sealant: www.quikrete.com/#sle.
c. Sherwin-Williams Company; Stampede 2NS Polyurethane Sealant: www.sherwin-williams.com/#sle.
d. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
e. Substitutions: See Section 016000 - Product Requirements.

D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: To be selected by Architect/Landscape Architect from manufacturer's standard range.
2. Grade: ASTM C834; Grade - Minus 18 Degrees C.
3. Manufacturers:
a. Pecora Corporation: www.pecora.com/#sle.
b. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
c. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
d. Substitutions: See Section 016000 - Product Requirements.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

## 3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

## 3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
   1. Width/depth ratio of 2:1.
   2. Neck dimension no greater than 1/3 of the joint width.
   3. Surface bond area on each side not less than 75 percent of joint width.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

## 3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

**END OF SECTION**

# SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

## .01 SELECT TYPE OF SPECIFICATION TO BE PREPARED: A LONG FORM SPEC, WITHOUT MANUFACTURER NAMES LISTED.

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

C. Bullet-resistant hollow metal doors and frames.

### 1.02 RELATED REQUIREMENTS

A. Section 087100 - Door Hardware.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

J. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

K. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

L. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

M. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

E. Manufacturer's Qualification Statement.

## 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
   1. Provide hollow metal frames from SDI Certified manufacturer.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of products specified.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

# PART 2 PRODUCTS

## 2.01 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Typical Door Face Sheets: Flush.
   5. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   6. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
      a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

## 2.02 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch (0.8 mm), minimum.
   2. Door Thickness: 1-3/4 inch (44.5 mm), nominal.

**2.03 HOLLOW METAL FRAMES**

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Interior Door Frames, Non-Fire Rated: Knock-down type.
   1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.
   2. Frame Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
   3. Frame Finish: Factory primed and field finished.

C. Bullet-Resistant Door Frames: Comply with UL 752, with same level of bullet resistance as door; face welded construction, ground smooth, fully prepared and reinforced for hardware installation.

D. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch (102 mm) high to fill opening without cutting masonry units.

**2.04 FINISHES**

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

**2.05 ACCESSORIES**

A. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

**2.06 FINISHES**

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

**3.02 INSTALLATION**

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Install door hardware as specified in Section 087100.

**3.03 TOLERANCES**

A. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

**3.04 ADJUSTING**

A. Adjust for smooth and balanced door movement.

**END OF SECTION**

# SECTION 087100 - DOOR HARDWARE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Hardware for hollow metal doors.

B. Electrically operated and controlled hardware.

C. Thresholds.

D. Weatherstripping and gasketing.

E. Gate locks.

### 1.02 RELATED REQUIREMENTS

A. Section 081113 - Hollow Metal Doors and Frames.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. BHMA (CPD) - Certified Products Directory; 2016.

C. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.

D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

E. BHMA A156.6 - American National Standard for Architectural Door Trim; 2010.

F. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.

G. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.

H. BHMA A156.21 - American National Standard for Thresholds; 2014.

I. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.

J. BHMA A156.23 - American National Standard for Electromagnetic Locks; 2010.

K. BHMA A156.25 - American National Standard for Electrified Locking Devices; 2013.

L. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.

M. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators; 2013.

N. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

O. DHI (H&S) - Sequence and Format for the Hardware Schedule; 1996.

P. DHI (KSN) - Keying Systems and Nomenclature; 1989.

Q. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

R. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

S. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

C. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

D. Keying Requirements Meeting:
   1. Attendance Required:
   2. Agenda:
   3. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
   4. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Landscape Architect, Owner, participants, and those affected by decisions made.
   5. Deliver established keying requirements to manufacturers.

**1.05 SUBMITTALS**

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
   2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
   3. List groups and suffixes in proper sequence.
   4. Provide complete description for each door listed.
   5. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
   6. Include account of abbreviations and symbols used in schedule.

D. Keying Schedule:
   1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

E. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Lock Cylinders: Ten for each master keyed group.
   3. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

**1.06 QUALITY ASSURANCE**

A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect/Landscape Architect and Contractor.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

## 1.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
   1. Locksets and Cylinders: Three years, minimum.
   2. Other Hardware: Two years, minimum.

# PART 2 PRODUCTS

## 2.01 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. Listed and certified compliant with specified standards by BHMA (CPD).
   4. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
   5. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
   1. Refer to Section 281000 for additional access control system requirements.

E. Fasteners:
   1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
      a. Aluminum fasteners are not permitted.
      b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
   2. Fire-Rated Applications: Comply with NFPA 80.
      a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
      b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

## 2.02 HINGES

A. Hinges: Complying with BHMA A156.1, Grade 3.
   1. Provide hinges on every swinging door.
   2. Provide non-removable pins on exterior outswinging doors.
   3. Provide power transfer hinges where electrified hardware is mounted in door leaf.
   4. Provide following quantity of butt hinges for each door:
      a. Doors From 60 inches (1.5 m) High up to 90 inches (2.3 m) High: Three hinges.

b. Doors 90 inches (2.3 m) High up to 120 inches (3 m) High: Four hinges.

**2.03 PIVOTS**

A. Center-Hung and Offset Pivots: Comply with BHMA A156.4.

B. Door Weight: Medium; standard openings with up to 650 lbs door weight.

**2.04 ELECTRIC STRIKES**

A. Electric Strikes: Comply with BHMA A156.31, Grade 1.
1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.

**2.05 ELECTROMAGNETIC LOCKS**

A. Electromagnetic Locks: Comply with BHMA A156.23, Grade 1.
1. Holding Force: 600 lbs (272 kgs), minimum.
2. Voltage: 12 VDC, and provide power supplies by same manufacturer as locks.
3. Mounting: Surface mounted to door and frame on secure side, with fasteners, brackets, and spacer bars as required for application.

**2.06 LOCK CYLINDERS**

A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
1. Provide cylinders from same manufacturer as locking device.
2. Provide cams and/or tailpieces as required for locking devices.

**2.07 ELECTROMECHANICAL LOCKS**

A. Electromechanical Locks: Comply with BHMA A156.25, Grade 1.
1. Provide motor-driven or solenoid-driven locks, with strike that is applicable to frame.
2. Type: Mortise deadbolt.

**2.08 CLOSERS**

A. Closers: Comply with BHMA A156.4, Grade 1.
1. Type: Concealed, overhead mounted.
2. Provide door closer on each exterior door.

**2.09 PROTECTION PLATES**

A. Protection Plates: Comply with BHMA A156.6.

B. Metal Properties: Aluminum.
1. Metal, Heavy Duty: Thickness 0.062 inch (1.57 mm), minimum.

C. Edges: Square, on four sides unless otherwise indicated.

D. Fasteners: Countersunk screw fasteners.

E. Provide clear anti-microbial coating that is silver ion-based.

F. Drip Guard: Provide at head of exterior doors unless covered by roof or canopy.

**2.10 ARMOR PLATES**

A. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
1. Size: 16 inch (406 mm) high by 1-1/2 inch (38 mm) less door width (LDW) on pull side and 2 inch (51 mm) LDW on push side of door.

**2.11 KICK PLATES**

A. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.

1. Size: 8 inch (203 mm) high by 2 inch (51 mm) less door width (LDW) on push side of door.

## 2.12 MOP PLATES

A. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
   1. Size: 6 inch (152 mm) high by 1-1/2 inch (38 mm) less door width (LDW) on pull side and 2 inch (51 mm) LDW on push side of door.

## 2.13 FLOOR STOPS

A. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
   1. Type: Manual hold-open, with pencil floor stop.
   2. Material: Aluminum housing with rubber insert.

## 2.14 WALL STOPS

A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
   1. Type: Bumper, concave, wall stop.
   2. Material: Aluminum housing with rubber insert.

## 2.15 THRESHOLDS

A. Thresholds: Comply with BHMA A156.21.
   1. Provide threshold at each exterior door, unless otherwise indicated.
   2. Type: Flat surface.
   3. Material: Aluminum.
   4. Threshold Surface: Fluted horizontal grooves across full width.
   5. Field cut threshold to profile of frame and width of door sill for tight fit.
   6. Provide non-corroding fasteners at exterior locations.

## 2.16 WEATHERSTRIPPING AND GASKETING

A. Weatherstripping and Gasketing: Comply with BHMA A156.22.
   1. Head and Jamb Type: Adjustable.
   2. Door Sweep Type: Encased in retainer.
   3. Material: Aluminum, with brush weatherstripping.

## 2.17 GATE LATCH

A. Gate Latch: Provide to secure a gate used for traffic control to prevent pedestrian traffic into an area, located on inside of gate with turn piece.
   1. Material: Steel.

## 2.18 SIGNAGE

A. Signage (Room Name Plates and Numbers): Provide on doors for individuals to easily identify room names and/or numbers.
   1. Text Required: "RESTROOM" with symbols and braille text.
   2. Material: In plastic or metal with paint used to create necessary text, adhered to door.
   3. Wall plaques only for restrooms, three (3) total. (1 for police substation, 1 for mens restroom, and 1 for womens restroom.)
   4. Coordinate signage requirements with the City of Gulf Shores.

## 2.19 SILENCERS

A. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
   1. Single Door: Provide three on strike jamb of frame.

2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
3. Material: Rubber, gray color.

**2.20 VIEWER**

A. Viewer: Provide at inside of door at eye level to see who is on outside of door, with integral door knocker.
   1. Material: Brass.

**2.21 KEY CONTROL SYSTEMS**

A. Key Control Systems: Comply with guidelines of BHMA A156.28.
   1. Coordinate keying requirements with the City of Gulf Shores
   2. Provide keying information in compliance with DHI (KSN) standards.
   3. Keying: Grand master keyed.
   4. Supply keys in following quantities:
      a. 2 each Grand Master keys.
   5. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.
   6. Security Key Tags: For each keyed lock on project, provide one set of matching key tags for permanent attachment to one key of each set.
   7. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
   8. Provide three (3) keys for Police Substation, Coordinate key requirements with the City of Gulf Shores.

**2.22 POWER SUPPLY**

A. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
   1. Power: 24 VAC, 10 Amp; with 120 VAC power supply.
   2. Operating Temperature: 32 to 110 degrees F (0 to 43 degrees C).
   3. Provide with emergency release terminals that release devices upon activation of fire alarm system.

**2.23 FINISHES**

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
   1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of correct characteristics.

**3.02 INSTALLATION**

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.

D. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

### 3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014000 - Quality Requirements.

B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

### 3.04 ADJUSTING

A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

### 3.05 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

### 3.06 PROTECTION

A. Protect finished Work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

**END OF SECTION**

# SECTION 088000 - GLAZING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. One way vision security films.

D. Glazing compounds and accessories.

### 1.02 RELATED REQUIREMENTS

### 1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

G. ASTM C1349 - Standard Specification for Architectural Flat Glass Clad Polycarbonate; 2010.

H. ASTM F1233 - Standard Test Method for Security Glazing Materials And Systems; 2008 (Reapproved 2013).

I. GANA (SM) - GANA Sealant Manual; 2008.

J. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data on Insulating Glass Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Insulating Glass Units: One of each glass size and each glass type.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

## 1.06 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

## 1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

# PART 2 PRODUCTS

## 2.01 GLASS MATERIALS

A. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

## 2.02 GLAZING UNITS

A. Monolithic Safety Glazing: Non-fire-rated.
   1. Applications:
      a. Glazed lites in doors, except fire doors.
      b. Glazed sidelights to doors, except in fire-rated walls and partitions.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on drawings.
   2. Glass Type: Fully tempered safety glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/4 inch (6.4 mm), nominal.

B. Security Glazing: Laminated glass, 3-Ply.
   1. Applications: Locations as indicated on drawings.
   2. Tint: Clear.
   3. Thickness: 1/2 inch (12.7 mm).
   4. Outer Lite: Annealed glass.
   5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
   6. Middle Lite: Annealed glass.
   7. Interlayer, Inboard Side : Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
   8. Inside Lite: Annealed glass.
   9. Performance Criteria:
      a. Bullet Resistance: Pass ASTM F1233 tests in compliance with ballistic criteria class and weapon description indicated; Class R5 - Rifle-Jacketed.

C. Glass-Clad Polycarbonate Security Glazing: Laminated glass and polycarbonate, 2-Ply; ASTM C1349.
   1. Applications: Locations as indicated on drawings.
   2. Tint: Clear.
   3. Thickness: As required to meet performance criteria.
   4. Outer Lite: Tempered glass.
   5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
   6. Air Layer- Spacer

7. Inside Lite: Tempered glass.
8. Performance Criteria:
   a. Bullet Resistance: Pass UL 752 tests in compliance with ballistic criteria level and weapon description indicated; Level 4 - .30 caliber rifle lead core.

**2.03 PLASTIC FILMS**

A. One way view film: SX-SG09 Silver / Gray One Way by Decorative Films LLC or approved equal. To be installed at the exterior windows of the police substation.

**2.04 GLAZING COMPOUNDS**

A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.

C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

**2.05 ACCESSORIES**

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.

B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

**PART 3 EXECUTION**

**3.01 VERIFICATION OF CONDITIONS**

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

**3.02 PREPARATION**

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

**3.03 INSTALLATION, GENERAL**

A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

**3.04 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)**

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch (5 mm) below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch (6.4 mm) below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

G. Fill gap between glazing and stop with window type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch (9 mm) below sight line.

H. Apply cap bead of window type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

**3.05 FIELD QUALITY CONTROL**

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

**3.06 CLEANING**

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

**3.07 PROTECTION**

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**

# SECTION 099113 - EXTERIOR PAINTING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for mechanical equipment before installing equipment.
   2. Exposed surfaces of steel lintels and ledge angles.
   3. Mechanical and Electrical:
      a. On the roof and outdoors, paint equipment that is exposed to weather or to view, including factory-finished materials.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other types of tiles.
   9. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
   10. Glass.
   11. Concealed pipes, ducts, and conduits.

### 1.02 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

### 1.03 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

D. SSPC-SP 1 - Solvent Cleaning; 2015.

E. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

F. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.

## 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

## 1.06 MOCK-UP

A. See Section 014000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 4 feet (1.21 m) long by 8 feet (2.4384 m) wide, illustrating paint color, texture, and finish.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

## 1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Primer Sealers: Same manufacturer as top coats.

C. Substitutions: See Section 016000 - Product Requirements.

## 2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Supply each paint material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

**2.03 PAINT SYSTEMS - EXTERIOR**

A. Exterior Surfaces to be Painted are limited to new pump room walls, gates, doors, some roofing trim. Brise soleil and fences shall require staining. See construction documents for designations..
1. Two top coats and one coat primer.
2. Top Coat(s): Exterior Pigmented Elastomeric, Water Based; MPI #113.
3. Primer: As recommended by top coat manufacturer for specific substrate.

B. Stain on Wood:
1. 2 coats stain.
2. Stain: Exterior Semi-Transparent Stain for Wood, Water Based; MPI #156.

C. Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
2. Gloss: Two coats of latex enamel.

D. Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer.
2. Gloss: Two coats of latex enamel.

**2.04 ACCESSORY MATERIALS**

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

**3.02 PREPARATION**

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.
3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi (4,140 to 10,350 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.

G. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

H. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

I. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

J. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.

K. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

## 3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

## 3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection.

## 3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.06 PROTECTION**

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

# SECTION 099123 - INTERIOR PAINTING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for mechanical equipment before installing equipment.
   2. Bathroom floors
   3. Bathroom walls
   4. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In all areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, to match face panels.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other tiles.
   9. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
   10. Glass.
   11. Acoustical materials, unless specifically indicated.
   12. Concealed pipes, ducts, and conduits.

### 1.02 RELATED REQUIREMENTS

A. Section 099113 - Exterior Painting.

### 1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

### 1.04 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

D. SSPC-SP 1 - Solvent Cleaning; 2015.

E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

**1.05 SUBMITTALS**

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

**1.06 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

**1.07 DELIVERY, STORAGE, AND HANDLING**

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

**1.08 FIELD CONDITIONS**

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

### 2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect/Landscape Architect after award of contract.
   2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

### 2.03 PAINT SYSTEMS - INTERIOR

A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete masonry units, uncoated steel, shop primed steel, and galvanized steel.
   1. Two top coats and one coat primer.
   2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
   3. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen at all locations.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
   1. Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
   2. Two top coats and one coat primer.
   3. Top Coat(s): High Performance Architectural Interior Latex; MPI #139, 140, or 141.
   4. Top Coat Sheen:
      a. Satin: MPI gloss level 4; use this sheen at all locations.

C. Dry Fall: Metals; exposed structure and overhead-mounted services, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
   1. Shop primer by others.
   2. One top coat.
   3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
   4. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen at all locations.

### 2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

### 3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Masonry:

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Galvanized Surfaces:

H. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

I. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

J. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

### 3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

**3.04 FIELD QUALITY CONTROL**

A. See Section 014000 - Quality Requirements, for general requirements for field inspection.

**3.05 CLEANING**

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.06 PROTECTION**

**END OF SECTION**

## SECTION 101400 - BUILDING SIGNAGE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Room and door signs.

B. Emergency evacuation maps.

C. Building identification signs.

### 1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
2. When content of signs is indicated to be determined later, request such information from Owner through Architect/Landscape Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
3. Submit for approval by Owner through Architect/Landscape Architect prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Curved Sign Media Suction Cups: One for each 100 signs; for removing media.

### 1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

### 1.06 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Flat Signs:
   1. Best Sign Systems, Inc; Lucent Series: www.bestsigns.com.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Dimensional Letter Signs:
   1. Cosco Industries; Cast Aluminum: www.coscoarchitecturalsigns.com/#sle.

### 2.02 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with translucent acrylic panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
   3. Character Height: 1 inch (25 mm).
   4. Sign Height: 2 inches (50 mm), unless otherwise indicated.
   5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
   6. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
   7. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

C. Emergency Evacuation Maps:
   1. Allow for one map per elevator lobby.
   2. Map content to be provided by Owner.
   3. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-mounted.

D. Building Identification Signs:
   1. Use individual aluminium letters and numbers.

### 2.03 SIGN TYPES

A. Flat Signs: Signage media without frame.
   1. Edges: Bevelled.
   2. Shape: Oval or Retangular; owner's option.
   3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: Clear.
   4. Character Color: Contrasting color.

### 2.04 TACTILE SIGNAGE MEDIA

A. Injection Molded Panels: One-piece acrylic plastic, with raised letters and braille.
   1. Product: Lucent Series by Best Signs.
   2. Total Thickness: 1/8 inch (3 mm).

**2.05 DIMENSIONAL LETTERS & NUMBERS**

A. Metal Letters:
   1. TEXT- "POLICE", "RESTROOM", and 6 individual buidling address numbers
   2. Height: 8" tall max.
   3. Metal: Aluminum casting.
   4. Finish: Brushed, satin.
   5. Mounting: Concealed screws.

**2.06 ACCESSORIES**

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

B. Tape Adhesive: Double sided tape, permanent adhesive.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that substrate surfaces are ready to receive work.

**3.02 INSTALLATION**

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs where indicated:
   1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches above finished floor.
   2. If no location is indicated, obtain Owner's instructions.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

**END OF SECTION**

# SECTION 101426 - POST AND PANEL SIGNAGE

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Gulf Shores Branding Initiative Wayfinding Signage Program: Phase 1,2 and 3 CLOSEOUT PACKAGE available from the City of Gulf shores.

### 1.02 SUMMARY

A. Section Includes:
   1. Nonilluminated post and panel signs.

B. Related Requirements:
   1. Section 01000 Article 51 “Project Signs” for temporary project signs.
   2. Section 033000 "Cast-in-Place Concrete" for concrete foundations, concrete fill in postholes, and setting anchor bolts in concrete foundations for signs.
   3. Section 099113 “Exterior Painting” for sign finishes.

### 1.03 ALLOWANCES

### 1.04 COORDINATION

A. Furnish templates and tolerance information for placement of sign-anchorage devices embedded in permanent construction by other installers.

### 1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For post and panel/pylon signage.
   1. Include fabrication and installation details and attachments to other work.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
   1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of sign assembly, showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
   1. Post and Panel Signs: Full-size Sample
   2. Exposed Accessories: Full-size Sample of each accessory type.

E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

F. Delegated-Design Submittal: For all signs mounted in footings.
   1. Include structural analysis calculations for signs and footings. Analysis to be signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Sample Warranty: For special warranty.

### 1.07 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

### 1.08 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer of products.

## 1.09 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices and electrical service (if required) embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

## 1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of finishes beyond normal weathering. b. Deterioration of embedded graphic image.
      b. Separation or delamination of sheet materials and components.
   2. Warranty Period: Five years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of post and panel sign type(s) to withstand design loads to comply a design wind speed as required by local code.

B. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.

C. Accessibility Standard: Comply with applicable provisions in ICC A117.1 for signs.

## 2.02 POST AND PANEL

A. Post and Panel Sign: Shall have smooth, uniform surfaces and support assembly; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

## 2.03 MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, Type 316, stretcher-leveled standard of flatness.

D. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

E. Fiberglass Sheet: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.

F. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), with coating on both sides.

G. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.

H. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

## 2.04 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
   2. For exterior exposure, furnish nonferrous-metal, or stainless-steel devices unless otherwise indicated.
   3. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
      b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant, one-way-head slots unless otherwise indicated.
   4. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.

B. Anchoring Materials:
   1. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
   2. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
      a. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

## 2.05 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in locations concealed from view after final assembly.
   2. Mill joints to tight, hairline fit. Form joints exposed to weather to resist water penetration and retention.
   3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
   4. Conceal fasteners and anchors unless indicated to be exposed; locate exposed fasteners where they will be inconspicuous.
   5. Internally brace signs for stability and for securing fasteners.

B. Sign Message Panels: Construct sign-panel surfaces to be smooth and to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner.
   1. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
   2. Increase panel thickness or reinforce with concealed stiffeners or backing materials as needed to produce surfaces without distortion, buckles, warp, or other surface deformations.
   3. Continuously weld joints and seams unless other methods are indicated; grind, fill, and dress welds to produce smooth, flush, exposed surfaces with welds invisible after final finishing.

C. Post Fabrication: Fabricate posts designed to withstand wind pressure indicated for Project location and of lengths required for installation method indicated for each sign.
   1. Aluminum Posts: Manufacturer's standard 0.125-inch- (3.18-mm-) thick, extruded-aluminum tubing unless otherwise indicated, with brackets or slots to engage sign panels.

Include post caps, fillers, spacers, junction boxes, access panels, reinforcement where required for loading conditions, and related accessories required for complete installation.

2. Steel Posts: Fabricate from minimum [0.120-inch- (3.05-mm-)] <Insert dimension> thick steel tubing unless otherwise indicated. Include post caps, fillers, spacers, junction boxes, access panels, reinforcement where required for loading conditions, and related accessories required for complete installation.
   a. Hot-dip galvanize post assemblies after fabrication according to ASTM A 123/A 123M.
3. Direct Burial: Fabricate posts 36 inches (910 mm) longer than height of sign to permit direct burial or embedment in concrete foundations or concrete-filled postholes.
4. Baseplates: Fabricate posts with baseplates welded to bottom of posts. Drill holes in baseplate for anchor-bolt connection.
   a. Provide preset anchor bolts of size required for connecting posts to concrete foundations.
5. Sleeves: Fabricate posts 12 inches (300 mm) longer than height of sign to permit embedment in sleeves cast in concrete foundations or concrete-filled postholes. Provide sleeves by manufacturer, sized to receive outside diameter of posts. Size sleeves for direct embedment in concrete foundations or concrete-filled postholes and to prevent sign movement, but not less than 24 inches (610 mm) for embedment.

## 2.06 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## 2.07 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

B. Color Anodic Finish: AAMA 611, Class I, 0.018 mmor thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

## 2.08 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
   1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
   2. Directional Satin Finish: No. 4.
   3. Dull Satin Finish: No. 6.
   4. Reflective, Directional Polish: No. 7.
   5. Mirrorlike Reflective, Nondirectional Polish: No. 8.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs.

C. Verify that anchor inserts are correctly sized and located to accommodate signs.

D. Verify that electrical service is correctly sized and located to accommodate signs.

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

### 3.02 INSTALLATION

A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to accessibility standard.
   3. Before installation, verify that sign components are clean and free of materials or debris that would impair installation.
   4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

### 3.03 INSTALLING POSTS

A. Vertical Tolerance: Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m)

B. Direct-Burial Method:
   1. Excavation: Excavate posthole to dimensions indicated. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating an additional 12 inches (300 mm) backfilling with satisfactory soil or well-graded aggregate, and compacting to original subgrade elevation.
   2. Setting in Cast-in-Place Concrete: Set post in position, support to prevent movement, and place concrete in posthole or for concrete foundation as indicated.
   3. Setting in Preformed Hole in Concrete Foundation: Form or core drill holes in concrete foundation not less than 3/4 inch (20 mm) larger than outside dimension of post for installing posts in concrete. Set post in position, shim to prevent movement, and fill annular space between post and hole with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with manufacturer's written instructions.
      a. Cover anchorage joint in concrete foundations with flange of same metal and finish as post, attached to post with set screws.

C. Baseplate Method:
   1. Preset Anchor Bolts: Set post baseplate in position over anchor bolts projecting from concrete foundation, shim and support post to prevent movement, place washers and nuts, and tighten. Fill shim space with nonshrink, nonmetallic grout, mixed and placed to comply with manufacturer's written instructions.
   2. Drilled-in-Place Anchor Bolts: Set post baseplate in position over concrete foundation, locate and drill anchor holes, shim and support post to prevent movement, place washers and anchor bolts, and tighten. Fill shim space with nonshrink, nonmetallic grout, mixed and placed to comply with manufacturer's written instructions.

D. Sleeve Method: Set post in position in sleeve and support post to prevent movement, fill annular space between post and sleeve with [nonshrink, nonmetallic grout] [or] [anchoring cement], mixed and placed to comply with manufacturer's written instructions.
   1. Cover anchorage joint with flange of same metal and finish as post, attached to post with set screws.

**3.04 ADJUSTING AND CLEANING**

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

**END OF SECTION**

## SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

B. Urinal screens.

### 1.02 REFERENCE STANDARDS

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

D. Samples: Submit two samples of partition panels, 6 by 6 inch (152.4 by152.4 mm) in size illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. Basis of Design: Bradley Corporation BradMar partitions www.bradleycorp.com.
   2. Substitutions: Section 016000 - Product Requirements.

B. Urinal Screen
   1. Basis of Design: Bradley, Mills Partitions, Model No. 4, www.bradleycorp.com.
   2. Substitutions: Section 016000 - Product Requirements

### 2.02 ACCESSORIES

A. Pilaster Brackets: Polished stainless steel.

B. Wall Brackets: Continuous type, natural anodized aluminum.

C. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

D. Hardware: Natural anodized aluminum:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
   2. Door Latch: Slide type with exterior emergency access feature.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

**3.02 INSTALLATION**

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch (9 mm to 13 mm) space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

**3.03 TOLERANCES**

A. Maximum Variation From True Position: 1/4 inch (6 mm).

B. Maximum Variation From Plumb: 1/8 inch (3 mm).

**3.04 ADJUSTING**

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

**END OF SECTION**

# SECTION 102800 - TOILET ACCESSORIES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Electric hand/hair dryers.

C. Grab bars.

### 1.02 RELATED REQUIREMENTS

A. Section 102113.19 - Plastic Toilet Compartments.

### 1.03 REFERENCE STANDARDS

A. ASTM C1036 - Standard Specification for Flat Glass; 2011.

B. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

C. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

### 1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Manufacturers.

B. Commercial Toilet, Shower, and Bath Accessories:
   1. American Specialties, Inc: www.americanspecialties.com/#sle.
   2. Georgia-Pacific Professional: www.blue-connect.com/#sle.
   3. Substitutions: Section 016000 - Product Requirements.

C. Under-Lavatory Pipe Supply Covers:
   1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.
   2. Substitutions: Section 016000 - Product Requirements.

D. Electric Hand/Hair Dryers:
   1. Basis of Design is Excel Thin Air.

E. Diaper Changing Stations:
   1. Bradley Corporation: www.bradleycorp.com/#sle.
   2. Diaper Deck & Company: www.diaperdeck.com/#sle.
   3. Koala Kare Products: www.koalabear.com/#sle.

### 2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

C. Adhesive: Two component epoxy type, waterproof.

D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

**2.03 COMMERCIAL TOILET ACCESSORIES**

A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, stainless steel, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
   1. Products:
      a. ASI 0039.

B. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
   1. Products:
      a. Basis of Design: ASI 0347.

C. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
   1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
   2. Size: 18 x 36.
   3.

D. Grab Bars: Stainless steel, smooth surface.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
      b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.

E. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Style: Horizontal.
   2. Mounting: Surface.
   3. Minimum Rated Load: 250 lbs (113.4 kg).
   4. Finish & Color: to match Phase 2.

**2.04 ELECTRIC HAND/HAIR DRYERS**

A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
   1. Operation: Automatic, sensor-operated on and off.
   2. Mounting: Surface mounted.
   3. Color, Type, and Finish: stainless steel.
   4. Electric Hand Dryer Products:
      a. Basis of Design: Excel Dryer Inc; ThinAir Hand Dryer: www.exceldryer.com/#sle.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

**3.02 PREPARATION**

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

**3.03 INSTALLATION**

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

1. Grab Bars: As indicated on drawings.

**3.04 PROTECTION**

A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**

## SECTION 104400 - FIRE PROTECTION SPECIALTIES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Accessories.

### 1.02 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; current edition.

B. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

C. Product Data: Provide extinguisher operational features.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

### 1.04 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

## PART 2 PRODUCTS

### 2.01 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.

### 2.02 ACCESSORIES

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

C. Provide one (1) in Police Substation and two (2) in Police Substation garage/ storage.

**END OF SECTION**

# SECTION 129300 - SITE FURNISHINGS

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.02 SUMMARY

A. Section Includes:
   1. Benches.
   2. Tables.
   3. Bicycle racks.
   4. Bollards.

B. Related Requirements:
   1. Section 033000 "Cast-in-Place Concrete" for installing pipe sleeves, installing anchor bolts, and formed voids in concrete footings.
   2. Section 312200 "GRADING" for excavation for installing concrete footings.

### 1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.

E. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

### 1.04 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings.
   1. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

### 1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

### 1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Bench Replacement Slats and Planks: No fewer than two full-size units for each size indicated.
   2. Trash Receptacle Inner Containers: Five full-size units for each size indicated, but no fewer than units.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURED SITE FURNITURE

A. Refer to “Furniture Schedule” on the drawings for a list of products and manufacturers that are the basis of design for the site furniture.

### 2.02 BOLLARDS - HIGH IMPACT BOLLARD

A. Bollard Construction:
   1. Bollard design as indicated on the plans.

2. Accessories: Bollard cover by “Ideal Shield” ¼” Dome top bollard cover, color black or approved equal.
3. Installation Method: Cast in concrete

B. Steel Finish: Galvanized and painted.
1. Color: matte black

## 2.03 MATERIALS

A. Stainless Steel: Free of surface blemishes and complying with the following:
1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
3. Tubing: ASTM A 554.

B. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
1. Wood Species: Manufacturer's standard.
2. Bench Swing Support Wood Species
a. Pine: Southern pine; No. 1 preservative treated, kiln dried after treatment.
3. Finish: Manufacturer's standard or as specified on the plans

C. Anchors, Fasteners, Fittings, and Hardware: Stainless steel commercial quality, tamperproof, vandal and theft resistant, concealed, recessed, and capped or plugged.
1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on grade substrate; one per leg.
2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; two per unit.

D. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

E. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

## 2.04 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment: Pressure-treat wood according to AWPA U1 and the following:
1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

## 2.05 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

## 2.06 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.07 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

## 2.08 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
   1. Run directional finishes with long dimension of each piece.
   2. Directional Satin Finish: No 4.
   3. Dull Satin Finish: No. 6.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.02 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, securely anchored, and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

**END OF SECTION**

# AQUATIC PLAY EQUIPMENT (IWF)

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Supply and installation of fountain mechanical and electrical equipment in accordance with the Contract Documents. Furnish all labor, materials, equipment, and services as required for a complete working fountain installation, as detailed in the project drawings and specifications.

### 1.02 SUBSTITUTIONS

A. The use of manufacturer's names and catalog numbers followed by the "or equal" is generally used to establish a standard of quality or utility for the specified items and to provide a dimensional reference for construction documents that are drawn to scale.

B. Submittals for "equal" items shall, where applicable, include the following data which are not necessarily required for specified items.

1. Performance characteristics.
2. Materials.
3. Finish.
4. Certification of conformance with specified codes and standards.

C. Submittals of "equal" components or systems may be rejected if:

1. The material or equipment would necessitate the alteration of any portion of the mechanical, architectural, or structural design.
2. Dimensions vary from the specified material or equipment in such a manner that accessibility or clearances are impaired

D. Proposed substitutions of materials or equipment must be submitted ten (10) days prior to final bid date with complete drawing documents for consideration as approved equals. Otherwise, such substitutions will not be permitted. Proposals for substitutions shall be made only by prime bidders. Manufacturers, distributors, and sub-contractors shall not make proposals to the Architect for substitutions

E. No substitution shall be made unless authorized in writing by the Architect. Should a substitution be accepted, and should the substitute material prove defective or otherwise unsatisfactory for the service intended, and within the guarantee period, the Contractor shall replace this material or equipment with material or equipment specified, at his own expense, and to the satisfaction of the Architect.

F. Contractors submitting bids on the substitute materials and equipment must also submit a bid on the "as specified" materials and equipment.

G. Contractors submitting bids on substitute materials and equipment must also provide a written performance guarantee certifying that the substitute materials and equipment will produce the specified water effects.

**1.03 SUBMITTALS**

A. The contractor shall submit complete shop drawings to the Architect for approval, in quantities required for proper distribution and in accordance with the requirements of the General Conditions.

B. Shop drawings shall include or incorporate those final drawings furnished by the equipment supplier, as specified herein, together with all additional information and drawings by the contractor required in showing the proper installation of all equipment. Preliminary or schematic drawings provided by the equipment supplier shall not be used for installation.

C. The contractor shall deliver drawings for approval, after the signing of the contract, so as not to delay the construction required under other sections.

D. Submittals may be rejected if they are difficult to read due to insufficient scale, poor image quality, poor drafting quality, or if the required information is not included.

E. Work shall not proceed until the Architect has approved submittals.

F. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instruction for specified equipment.

**1.04 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five (10) years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum of three (3) years' experience. Company must provide at least 5 project references specific to a spray pad installation.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters' laboratories (UL) as suitable for the purpose specified and indicated.

**1.05 REFERENCES**

A. This installation shall comply with all applicable provisions of the latest edition of the following codes:

| | |
|---|---|
| NEC | National Electrical Code |
| NFPA | National Fire Protection Association |
| UBC | Uniform Building Code |
| UPC | Uniform Plumbing Code |

B. Materials furnished hereunder shall comply with the latest edition of applicable standard specifications published by the following organizations:

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| ANSI | American National Standards Institute |
| ASME | American Society of Mechanical Engineers |
| ASSE | American Society of Sanitary Engineering |
| AWWA | American Water Works Association |
| CS | Commercial Standards |
| NEMA | National Electrical Manufacturers Association |
| NSF | National Sanitation Foundation |

**1.05 SYSTEM DESCRIPTION**

A. Furnish and install aquatic playground materials, apparatus, tools, equipment, transportation, temporary construction, and special or occasional services as required to effect a complete working installation, as shown on the Drawings and described in the Specifications.

B. Work included:
1. Aquatic playground equipment, valves, and piping.
2. Plumbing and electrical services including water, waste, and power supply to designated points of connection with site utilities.

**1.06 PRODUCT HANDLING**

A. Protection:
1. Equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. Equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times prior to installation. Pumps motors, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather-tight warehouses that are maintained at a temperature of at least 60 degrees F.
2. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Architect/Landscape Architect
3. Electrical equipment controls, and insulation shall be protected against moisture or water damage. Space heaters and sump pumps provided in the equipment shall be kept connected and operating at all times until the equipment is placed in service.
4. Store materials under cover and elevated above grade.

B. Replacements:
1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Landscape Architect at no additional cost.

**PART 2 PRODUCTS**

**2.01 GENERAL**

A. Equipment not listed within these Specifications or on Drawings as furnished by the equipment supplier, but required for the complete installation of the water feature mechanical or electrical systems, shall be furnished by the Contractor.

B. Products shown on the Drawings, but not listed in this Section, shall be provided in accordance with information shown on the Drawings and the General Provisions of this part of the Specification.

**2.02 AQUATIC PLAY EQUIPMENT MANUFACTURER**

A. Aquatic play equipment manufacturer shall be: Water Odyssey™ P.O. Box 807, 4600 Highway 123, San Marcos, TX 78666, Telephone (512) 392-1155, Facsimile (512) 392-1154. Local Water Odyssey™ Representative: Great Southern Recreation, Chris Berrong, chris@greatsouthernrec.com (615-631-1809).

**2.03 AQUATIC PLAY EQUIPMENT MANUFACTURER'S RESPONSIBILITY**

A. Aquatic playground materials and component parts shall be guaranteed to be free from defects of materials and workmanship, for a period (two years) from date of shipment. Additional warranties shall include;
   1. Coating system shall be warranted for a period of (two years) against peeling or fading under normal environmental conditions.
   2. Stainless steel pipe and anchor bases shall be guaranteed against structural failure for a period of (twenty-five) years under normal usage.
   3. Controller shall be guaranteed against failure for a period of (three years) under normal usage.

**2.04 AQUATIC PLAY EQUIPMENT**

A. Spray components shall be designed to operate at the specified flow rates.

B. Anchoring, mounting and assembly hardware shall be constructed of 304/304L Stainless Steel, cast Bronze or Red Brass. All anchoring systems shall include an integrated leveling system facilitating a flat surface installation free of non-compliant protrusions. Exposed and accessible hardware shall be tamper resistant, vandal deterring, theft resistant and shall require a special tool for removal

C. Top Plates, Component Heads and Spray Nozzles shall be constructed of materials resistant to vandalism, deterrent to theft, require special tools for removal and free from degradation in transmitting pressurized, chemically treated, potable water. Top Plates, Component Heads and Nozzles must be constructed of Stainless Steel, Bronze or Red Brass.

D. Where color coated finishes are appropriate or specified, the color coating shall be Aqua Armor™; an elastomeric polymer that is vandal resistant, UV resistant and resistant to degradation in the presence of chemicals at measureable levels typically used to maintain proper water quality levels in swimming pools.

E. Accessible edges shall be rounded, beveled or otherwise designed to prevent safety hazards. All components and component parts shall be designed to ensure a safe play environment with no pinch points, head entrapments or protrusion hazards. All products

shall be designed in accordance and compliant with ASTM F1487, ASTM F2461 and CSA Z614-98 standards for public playgrounds and aquatic playgrounds.

F. All play equipment shall be bonded/grounded per the requirements of NEC article 680 and the codes of the local jurisdiction of authority concerning non-residential, permanently installed swimming pools or fountains.

G. Concrete footings shall be as shown on the Drawings and specified. The Contractor shall provide all labor, material and equipment to construct the concrete footings as shown and shall conform with concrete design specifications.

**2.05 PLAY FEATURES**

A. Play Feature Equipment List: (or approved equal)

| | | |
|---|---|---|
| 2 Each | C019C | Water Odyssey™ Snoot Shooter™ |
| 1 Each | W130-W20703 | Water Odyssey™ Spin N Spill Fighter Jet™ |
| 2 Each | W326-1 | Water Odyssey™ Mission Hill Mister™ |
| 2 Each | W071 | Water Odyssey™ Water Flower™ |
| 8 Each | W085 | Water Odyssey™ Splash-o-Lator™ |
| 4 Each | W058C-3 | Water Odyssey™ Water Fence™ |
| 4 Each | W058C-5 | Water Odyssey™ Water Fence™ |
| 5 Each | W043 | Water Odyssey™ Dandelion Dome™ |
| 5 Each | W014 | Water Odyssey™ Triple Mist™ |

B. C019C Snoot Shooter or approved equal.
1. Anchor Base: The (1) below grade anchor base shall be constructed of type 304 stainless steel to mate with a component's shaft base plate. The anchor base shall each have a bonding/grounding connection and 2" FPT inlet. The anchor base shall be supplied with 3/8" threaded, 18/8 stainless steel anchor/leveling bolts with nuts, washers and a wooden pour template.
2. Construction Cover: The temporary cover shall be an adhesive polyethylene tape.
3. Shaft: The above grade frame shall be constructed of 3" type 304 stainless steel pipe with machined type 304 flanged base plate.
4. Joint: Precision machined Delrin® flow control joint factory adjustable for 45º - 360º directional flow.
5. Gasket: The leak preventing seal shall be an O-Ring of 70 durometer EPDM
6. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
7. Dimensions: Approximate dimensions shall be 4'9" H x 2'6" L x 1'0" W.
8. Nozzles: Precision machined brass, aerated nozzle.
9. Interactive water effect: The spray pattern shall be aerated arching stream soft to the touch and gentle on impact.
10. Hydraulic Requirements: The designed operational water supply shall be 18GPM @ 20PSI. C019C – Water Conserving version shall be 12GPM @ 13PSI.
11. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.
12. ColorCast™ Accent: A color impregnated, rigid urethane polymer with resistance to chlorine and UV.

13. Safety and Compliance: the spray feature meets ASTM safety standards, is ADA compliant, and inspected by a Certified Playground Safety Inspector prior to shipment of product.
14. Age Group Design Standards: The spray feature shall be designed for all ages.
15. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com

C. W130 W20703 Spin-N-Spill Fighter Jet™ or approved equal.
2. Anchor Base: The below grade anchor base shall be constructed of type 304 stainless steel to mate with a component's shaft base plate. The anchor base shall have a bonding/grounding connection and 2" FPT inlet. It shall be supplied with 3/8" threaded anchor/leveling bolts with nuts, washers and a wooden pour template. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
3. Construction Cover: The temporary cover shall be an adhesive polyethylene tape.
4. Construction Material: The above grade frame shall be constructed of 6" type 304 stainless steel pipe with 6" machined type 304 flanged base plates.
5. Gaskets: The leak preventing seal shall be an O-Ring of 70 durometer EPDM
6. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
7. Dimensions: Approximate dimensions shall be 13'-5" H.
8. Nozzle: The nozzles shall be 304 stainless steel precision jets that fill dumping buckets to produce a 2.3 gallon dump per bucket. Nozzles shall be free of finger entrapment hazards.
9. Hydraulic Requirements: The designed operational water supply shall be 15-30GPM @ 8PSI.
10. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.
11. Safety and Compliance: the spray feature meets ASTM safety standards, is ADA compliant, and inspected by a Certified Playground Safety Inspector prior to shipment of product.
12. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com

D. W326-1 Mission Hill Mister or approved equal.
1. Anchor Base: The (1) below grade anchor base shall be constructed of type 304 stainless steel to mate with a component's shaft base plate. The anchor base shall each have a bonding/grounding connection and 2" FPT inlet. The anchor base shall be supplied with 3/8" threaded, 18/8 stainless steel anchor/leveling bolts with nuts, washers and a wooden pour template.
2. Construction Cover: The temporary cover shall be an adhesive polyethylene tape.
3. Shaft: The above grade frame shall be constructed of 4" type 304 stainless steel pipe with 4" machined type 304 flanged base plate.

4. Gasket: The leak preventing seal shall be an O-Ring of 70 durometer EPDM
5. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
6. Nozzles: The Nozzles shall be machined cast bronze and brass construction.
7. Interactive water effect: The spray pattern shall be curvilinear group of cooling misters.
8. Hydraulic Requirements: The designed operational water supply shall be 13GPM @ 20PSI.
9. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.
10. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com.

E. W071 Water Flower™ or approved equal.
1. Housing: The below grade canister shall be constructed of 20 gauge deep-drawn type 304 stainless steel with bonding/grounding connection and 1" FPT inlet. It shall be supplied with 3/8" threaded anchor/leveling bolts with nuts, washers and a wooden pour template. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
2. Top Plate Anchors: The housing stabilizers and plate anchors shall be ½" x 5" machined brass with 30° hook bend
3. Construction Cover: The temporary cover shall be a reusable flat 7" diameter HDPE (high density polyethylene) plate.
4. Top Plate: The operational cover shall be a 7" diameter, slightly domed, cast bronze plate with interchangeable nozzle assembly.
5. Gaskets: The leak preventing seal shall be an O-Ring of 70 durometer EPDM
6. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
7. Nozzle: The interchangeable nozzle for 7" diameter operational plates shall be constructed of precision machined brass.
8. Interactive water effect: The spray pattern shall be a sheet effect in the shape of a morning glory flower.
9. Hydraulic Requirements: The designed operational water supply shall be 10GPM @ 1PSI and produce a 1' x 2' spray pattern.
10. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.

F. W085 Splash-O-Lator™ or approved equal.
1. Housing: The below grade canister shall be constructed of 20 gauge deep-drawn type 304 stainless steel with bonding/grounding connection and 1" FPT inlet. It shall be supplied with 3/8" threaded anchor/leveling bolts with nuts, washers and a wooden pour template. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
2. Top Plate Anchors: The housing stabilizers and plate anchors shall be ½" x 5" machined brass with 30° hook bend
3. Construction Cover: The temporary cover shall be a reusable flat 7" diameter HDPE (high density polyethylene) plate.

4. Top Plate: The operational cover shall be a 7" diameter, slightly domed, cast bronze plate with interchangeable nozzle assembly.
5. Gaskets: The leak preventing seal shall be an O-Ring of 70 durometer EPDM
6. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
7. Nozzle: The interchangeable nozzle for 7" diameter operational plates shall be constructed of precision machined brass.
8. Interactive water effect: The spray pattern shall be a surging splash effect
9. Hydraulic Requirements: The designed operational water supply shall be maximum 10GPM @ 4PSI and produce an 8' High spray pattern.
10. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.

G. W058C-3 Water Fence™ water conserving version or approved equal.
1. Housing: The below grade linear manifold shall be constructed of schedule 40 red brass pipe with bonding/grounding connection and (1) 1 1/2" MPT inlet. It shall be supplied with 3/8" threaded, 18/8 stainless steel anchor/leveling bolts with nuts and washers. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
2. Construction Covers: Each orifice temporary cover shall be a reusable 1/2" diameter HDPE (high density polyethylene) plug.
3. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
4. Nozzles: The Water Fence™ nozzle shall be constructed of stainless steel. There shall be approximately two nozzles per foot of manifold length
5. Interactive water effect: The spray pattern shall be a row of (7) water streams. Each stream shall spray vertically.
6. Hydraulic Requirements: The designed operational water supply shall be 5GPM @ 3PSI and produce a 4' High spray pattern.
7. Finish: Each nozzle shall have a natural stainless steel finish.

H. W058C-5 Water Fence™ water conserving version or approved equal.
1. Housing: The below grade linear manifold shall be constructed of schedule 40 red brass pipe with bonding/grounding connection and (1) 1 1/2" MPT inlet. It shall be supplied with 3/8" threaded, 18/8 stainless steel anchor/leveling bolts with nuts and washers. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
2. Construction Covers: Each orifice temporary cover shall be a reusable 1/2" diameter HDPE (high density polyethylene) plug.
3. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
4. Nozzles: The Water Fence™ nozzle shall be constructed of stainless steel. There shall be approximately two nozzles per foot of manifold length
5. Interactive water effect: The spray pattern shall be a row of (11) water streams. Each stream shall spray vertically.
6. Hydraulic Requirements: The designed operational water supply shall be 9GPM @ 3PSI and produce a 4' High spray pattern.
7. Finish: Each nozzle shall have a natural stainless steel finish.

I. W043 Dandelion Dome™ or approved equal.

1. Housing: The below grade canister shall be constructed of 20 gauge deep-drawn type 304 stainless steel with bonding/grounding connection and 1" FPT inlet. It shall be supplied with 3/8" threaded anchor/leveling bolts with nuts, washers and a wooden pour template. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
2. Top Plate Anchors: The housing stabilizers and plate anchors shall be ½" x 5" machined brass with 30° hook bend
3. Construction Cover: The temporary cover shall be a reusable flat 7" diameter HDPE (high density polyethylene) plate.
4. Top Plate: The operational cover shall be a 7" diameter, slightly domed, cast bronze plate with interchangeable nozzle assembly.
5. Gaskets: The leak preventing seal shall be an O-Ring of 70 durometer EPDM
6. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
7. Nozzle: The interchangeable nozzle for 7" diameter operational plates shall be constructed of precision machined brass.
8. Interactive water effect: The spray pattern shall be fine spray effect that fills a 6 foot diameter circle.
9. Hydraulic Requirements: The designed operational water supply shall be 5GPM @ 3PSI and produce a 2' x 6' circle spray pattern.
10. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.

J. W014 Triple Mist™ or approved equal.
1. Housing: The below grade canister shall be constructed of 20 gauge deep-drawn type 304 stainless steel with bonding/grounding connection and 1" FPT inlet. It shall be supplied with 3/8" threaded anchor/leveling bolts with nuts, washers and a wooden pour template. The housing stabilizers and plate anchors shall be ½" x 5" machined brass with 30° hook bend. The temporary construction cover shall be a reusable flat 7" diameter HDPE (high density polyethylene) plate. Bonding/grounding shall be compliant with codes of the jurisdiction having authority.
2. Top Plate: The operational cover shall be a 7" diameter, slightly domed, cast bronze plate with interchangeable nozzle assembly.
3. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.
4. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
5. Gaskets: The leak preventing seal shall be an O-Ring of 70 Durometer EPDM.
6. Nozzle: The interchangeable nozzle for 7" diameter operational plates shall be constructed of precision machined brass.
7. Hydraulic Requirements: The designed operational water supply shall be 3 GPM @20 PSI and produce a spray height of 4'-12', reference drawings.
8. Interactive Water Effect: Shall be an upward moving cloud of mist.
9. Safety and Compliance: Product meets ASTM safety standards, is ADA compliant, and inspected by a Certified Playground Safety Inspector prior to shipment of product.
10. Dimensions: The top plate diameter shall be 7".

11. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com

**2.06 AQUATIC PLAY DEVICE**

A. Equipment List:

| | | |
|---|---|---|
| 3 Each | W009 | Water Odyssey™ Touch & Go Wired™ |
| 1 Each | WMFS-16 | Water Odyssey™ WMFS-16™ |
| 1 Each | DSC 8-16 | Water Odyssey™ DSC 8-16™ |

B. W009 Touch N' Go™ Wired or approved equal.

11. Shaft: The above grade shaft, and base plate shall be constructed of 4" type 304 stainless steel with bonding/grounding connection.
12. Base Plate: Shall be type 304 stainless steel.
13. Anchors: Anchors shall be (4) stainless steel concrete anchors supplied by the manufacturer.
14. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
15. Activator Housing: Activator housing shall be machined PVC with tactile button for stimulated sensory response.
16. Activator Cord: Shall be supplied with 150' of 18/3 type SJTOW submersible cable pre-wired to activator button, supplied.
17. Finish: When specified for solid, patterned or theme painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer with a UV and chlorine resistant sealer coat.
18. Safety and Compliance: Spray feature meets ASTM safety standards, is ADA compliant, and inspected by a Certified Playground Safety Inspector prior to shipment of product.
19. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com

C. DSC-8-16 Water Odyssey Dynamic Sequencing Controller™ or approved equal.

1. Housing: The enclosure shall carry a NEMA 4X rating with a lockable hasp.

2. Input Power Supply: The input power supply shall be 120VAC/60 Hertz, 20 Amps capacity.
3. Power Cord: The power cord shall be 6 foot, 16-3 type SJT with grounded plug
4. Output Power Supply: The output power supply shall be 24VAC/60 Hertz, 0.75 Amps capacity continuous per output.
5. Cord Seals: The cord seals shall be PVC compression seal fittings with neoprene gland for 16-2 solenoid valve cables.
6. Time Clock: The time clock shall be integral, electronic, 7 day, 24 hour.
7. Interface: The user interface shall be an integral keypad with 20 keys and a 4 x 20 backlit LCD display.
8. Antenna/Receiver: The antenna/receiver shall be enclosed in a weather resistant PVC housing with 150 feet of CAT 5 crossover cable supplied..
9. Programmable Events: The programmable events shall be timed duration, cycled, defined, random and/or cued sequencing. The events shall be field adjustable.
10. Programming: The programming shall be through the keyboard interface, set at the factory and shall be field adjustable.
11. Safety: The Dynamic Sequencing Controller shall be ETL and Underwriters' Laboratories Listed.
12. Wireless Inputs: The Controller shall have the capacity to receive 32 wireless inputs maximum.
13. Outputs: The Controller shall have the capacity to receive 8 outputs of the specified output power supply.
14. As manufactured by Water Odyssey™/ Fountain People P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com.

D. WMFS -16 Wall Mount Distribution Manifold with Stainless Steel Header or approved equal.
1. Distribution Header: The distribution manifold header shall be 4" type 304 stainless steel pipe with flanged connections on both ends.
2. Water Hammer Arrestor: The water hammer arrestor shall be 2" copper and brass construction with pre-set operating pressure of 10-35 PSI.
3. Drain Valve: The distribution manifold header shall have a ¾" hose bib style drain valve constructed of cast bronze.
4. Pressure Gauge: The distribution manifold header shall have a 0-60 PSI discharge side pressure gauge
5. Solenoid Valves: The distribution manifold header shall have 10 solenoid valves constructed die cast bronze with stainless steel hardware, DIN connector with 15' cord and 24 VAC UL Recognized.
6. Balancing Valves: The distribution manifold header shall include 10 true union ball valves constructed of schedule 80 PVC for balancing and throttling the discharges.
7. Mounting Brackets: Shall be supplied with type 304 stainless steel with ½" stainless steel u-bolt.
8. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154, website: www.waterodyssey.com

**2.07 DRAINS**

A. Equipment List:

5 Each W200 Water Odyssey™ Plain Drain or approved equal.

B. W200 Plain Drain™ or approved equal.
1. Sump Housing: The below grade canister shall be formed polyethylene with a 4" Slip outlet.
2. Top Grate: The operational grate shall be a 12" square, constructed of heavy-duty FRP. The grate shall have a skid resistant surface urethane coating. The grate shall be ADA compliant
3. Strainer Basket: The sump shall include a mesh molded polyurethane strainer basket.
4. Fasteners: All accessible fasteners shall be tamper-resistant 18/8 stainless steel.
5. Hydraulic Criteria: The designed operational gravity drain capacity shall be
6. 50 GPM with less than a ½" weir water depth.
7. Safety and Compliance: the unit meets ASTM safety standards, is ADA compliant, and inspected by a Certified Playground Safety Inspector prior to shipment of product.
8. Finish: When specified for painted coloring the component shall be coated with Aqua Armor™; a UV stabilized, textured structural elastomeric polymer.
9. As manufactured by Water Odyssey™/ Fountain People, Inc., P.O. Box 807, San Marcos TX, 78667, 4600 Hwy. 123, San Marcos TX, 78666, telephone: 512-392-1155, facsimile: 512-392-1154

## PART 3 EXECUTION

### 3.01 SITE AND DRAWING EXAMINATION

A. Contractors submitting a proposal for this work shall first examine the site of the proposed work that they may fully understand facilities, difficulties, and restrictions attending the execution of the contract. No subsequent allowances shall be made because of omission, error, or negligence in connection with this provision.

B. Contractors submitting a proposal for this work shall carefully examine the architectural and structural Drawings and Specifications.

C. Questions pertaining to work that do not appear to be sufficiently detailed or explained, or pertaining to the true meaning of any part of the Drawings or Specifications, or discrepancies found existing in or between the Specifications and Drawings, shall be referred to the Architect for clarification or correction.

### 3.02 COORDINATION

A. The Contractor shall cooperate with subcontractors of other trades, whose work is in anyway affected by, or affects the work under this Section.
1. The Contractor shall coordinate the work under this Section with that of other trades to effect a complete installation consistent with the requirements and intent of the Drawings and Specifications.

B. The Contractor shall furnish materials so as to avoid delay in the progress of the work and shall store them as to prevent interference with other work.

**3.03 GENERAL INSTALLATION**

A. Install and connect all equipment in accordance with manufacturer's instructions and recommendations unless otherwise noted. If specified installation is contrary to manufacturer's instructions, cease installation of affected components or systems. Notify Project Manager and the Architect and do not resume installation without clear instructions.

B. Protect pipes, conduits, and equipment from damage from inclement weather.

C. Parts to be cast in concrete shall be located as detailed on the Plans shall be rigidly supported to resist loads imposed during concrete pour.

D. Water pipe lines shall be flushed free of debris as follows:
1. Completely drain water feature piping and equipment.
2. Remove construction debris and thoroughly sweep all reservoirs and play area clean. Do not flush debris from play area into system drainage system.

**3.06 PIPE INSTALLATION**

A. General:

1. Install piping straight and true without loops or traps in accordance with the best modern practice.
2. Make pipe runs as direct as possible using a minimum number of fittings.
3. Slope piping to the pump for drainage. If piping cannot be sloped to pump, make provision for the complete draining of each pipe line by connecting minimum a 1-1/2" drain line and valve to lowest point in pipe run.
4. Pump suction piping shall be a straight run into the pump free of pipe bends or tees for a minimum of ten pipe diameters preceding the pump's suction connection unless otherwise indicated on drawings.
5. Pump suction piping reduction 4" or larger shall be made with eccentric type fittings to eliminate the entrapment of air in the suction piping.
6. Cut pipe and tubing ends square. Remove rough edges and burrs so that a smooth and unobstructed flow will be obtained.
7. Cut pipe to measurements established at the site. Work into place without springing or forcing.
8. Protect all openings in piping during construction to prevent entrance of foreign matter.
9. Provide flanges or unions as indicated and as necessary to allow removal and re-installation of any item of equipment or accessory without cutting, welding or soldering.
10. All connections between dissimilar metals shall be made with dielectric fittings.
11. Arrange exposed piping straight, parallel and perpendicular to the walls of the structure unless otherwise shown on the drawings.

12. All city water lines connected to system shall be protected by a backflow preventer approved for application and a pressure regulator which limits supply pressure to a maximum 50 psi.
13. Excavate trenching for underground piping to required depths providing sufficient slope for proper pipe fall and adequate space at both sides and bottom of trench to facilitate pipe installation.
14. Tamp trenches.
15. Install piping on 6" deep bed of pea gravel in the bottom of trench.
16. Backfill trench with pea gravel to a height of 12" above top of pipe.
17. Backfill to surface in 6" layers with a minimum of 95% compaction. At paved areas, material may be gravel, or native soil. At planted areas, soil shall be as specified by the Architect.

**3.04 DEFECTIVE WORK AND MATERIALS**

A. Materials or work found to be defective or not in strict conformity with the drawings, or different from the requirements of the Drawings and Specifications, or defaced or injured, shall be removed and satisfactory material and work substituted.

**3.05 CLEAN-UP**

A. Upon completion of the work of this Section, the Contractor shall remove unused equipment and implements of service, and leave the entire areainvolved in a neat, clean, and acceptable condition as approved by the Owner.
   1. Soiled, abraded, or discolored surfaces of the aquatic play area shall be cleaned and left free from blemishes or defects.

**3.06 TESTS AND ADJUSTMENTS**

A. General: The Contractor shall test equipment installed by him to show that it complies with specified requirements. Testing shall be done in a manner approved by the Architect.

B. Electrical tests:
   1. Electrical circuits, feeders, and equipment shall be tested and proven free of faulty grounds, open circuits, or shorts, as required by local codes.
   2. Contractor shall, at his expense, make the aquatic playground operational and make tests, adjustments, and corrections, until it is shown to be in proper operating condition.

**END OF SECTION**

# SECTION 224000 - PLUMBING FIXTURES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Under-lavatory pipe supply covers.

### 1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011.

C. ASME A112.18.1 - Plumbing Supply Fittings; 2018.

D. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013.

E. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

F. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

G. NSF 372 - Drinking Water System Components - Lead Content; 2011.

## PART 2 PRODUCTS

### 2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

### 2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.

B. Perform work in accordance with local health department regulations.

### 2.03 FLUSH VALVE WATER CLOSETS

A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
   1. Flush Valve: Exposed (top spud).
   2. Flush Operation: Sensor operated.
   3. Handle Height: 44 inches (1117 mm) or less.
   4. Basis of Design: American Standard Madera

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Sensor-Operated Type: Solenoid or motor-driven operator, low voltage hard-wired, infrared sensor with mechanical over-ride or over-ride push button.
   2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
   3. Manufacturers:
      a. American Standard, Inc; Madera: www.americanstandard-us.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

C. Seats:
   1. Manufacturers:

a. American Standard, Inc: www.americanstandard-us.com/#sle.

**2.04 WALL HUNG URINALS**

A. Urinal: Stainless steel, wall hung
   1. Flush Volume: 0.5 gallons (1.9 liters), maximum.
   2. Flush Style: Washout.
   3. Flush Valve: Exposed (top spud).
   4. Flush Operation: Manual, oscillating handle.
   5. Removable stainless steel strainer.
   6. Basis of Design: Acorn Dura-ware 2158-T-1

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.

**2.05 LAVATORIES**

A. Lavatory Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com/#sle.
   2. Basis of Design: American Standard Lucerne

B. Metered Faucet: ASME A112.18.1; chrome plated metered mixing faucet with low voltage operated solenoid operator and infrared sensor, aerator and cover plate, open grid strainer.
   1. Basis of Design: American Standard Metering

**2.06 UNDER-LAVATORY PIPE SUPPLY COVERS**

A. Manufacturers:
   1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.

B. General:
   1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
   2. Construction: 1/8 inch (3.2 mm) PVC with antimicrobial, antifungal and UV resistant properties.
      a. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
      b. Comply with ICC A117.1.

**END OF SECTION**

# SECTION 311000 - SITE CLEARING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

### 1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

## PART 2 PRODUCTS -- NOT USED

## PART 3 EXECUTION

### 3.01 SITE CLEARING

A. Comply with other requirements specified in Section 017000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

### 3.02 VEGETATION

A. Do not remove or damage vegetation beyond the limits indicated on drawings.

B. Install substantial, highly visible fences at least 3 feet (1 m) high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.

C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
   3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
   4. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

### 3.03 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

# SECTION 312200 - GRADING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Rough grading the site for site structures.

B. Finish grading.

### 1.02 RELATED REQUIREMENTS

A. Section 312323 - Fill: Filling and compaction.

B. Section 329300 - Plants: Topsoil in beds and pits.

### 1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

### 1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Florida, Highway Department standards.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Topsoil: See Section 329223.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

### 3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

### 3.03 ROUGH GRADING

A. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

C. When excavating through roots, perform work by hand and cut roots with sharp axe.

D. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

E. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

**3.04 SOIL REMOVAL**

A. Stockpile excavated topsoil on site.

B. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet (2.5 m); protect from erosion.

**3.05 FINISH GRADING**

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches (75 mm).

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches (75 mm).

E. Place topsoil in areas where seeding are indicated.

F. Place topsoil where required to level finish grade.

G. Place topsoil to the following compacted thicknesses:
   1. Areas to be Seeded with Grass: 6 inches (150 mm).
   2. Areas to be Sodded: 4 inches (100 mm).
   3. Shrub Beds: 18 inches (450 mm).
   4. Flower Beds: 12 inches (300 mm).

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and foreign material while spreading.

J. Near plants spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

L. Lightly compact placed topsoil.

M. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

**3.06 TOLERANCES**

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) (30 mm) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch) (13 mm).

**3.07 REPAIR AND RESTORATION**

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect/Landscape Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

**3.08 FIELD QUALITY CONTROL**

A. See Section 312323 for compaction density testing.

**3.09 CLEANING**

A. Remove unused stockpiled topsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

**END OF SECTION**

## SECTION 321216 - ASPHALT PAVING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Cold milling of existing hot-mix asphalt pavement.

B. Hot-mix asphalt patching.

C. Hot-mix asphalt paving.

D. Hot-mix asphalt paving overlay.

E. Asphalt surface treatments.

F. Pavement-marking paint.

G. Single course bituminous concrete paving.

### 1.02 RELATED REQUIREMENTS

A. Section 31 2000 - Earth Moving (for aggregate subbase and base courses and for aggregate pavement shoulders.)

B. Section 312200 - Grading: Preparation of site for paving and base.

C. Section 321313 - Concrete Paving: Concrete substrate.

D. Section 321313 - Concrete Paving: Concrete curbs.

### 1.03 REFERENCE STANDARDS

A. City of Milton Public Work Manual

B. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 2015.

### 1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Formulas and Designs: For each job mix proposed for the work.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Material Certificates: For each paving material, from manufacturer.

D. Material Test Reports: For each paving material.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the Georgia DOT.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of DOT for asphalt paving work

C. Perform Work in accordance with State of Florida Highways standard.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

### 1.07 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
   1. Prime Coat: Minimum surface temperature of 60 deg F.
   2. Tack Coat: Minimum surface temperature of 60 deg F.
   3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
   4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
   5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 55 deg F for water-based materials, and not exceeding 95 deg F.

C. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

## PART 2 PRODUCTS

### 2.01 REGULATORY REQUIREMENTS

A. Conform to City of Milton Public Works Manual

B. Conform to applicable code for paving work on public property.

## PART 3 EXECUTION

### 3.01 CONFORM TO CITY OF MILTON PUBLIC WORKS MANUAL

### 3.02 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with Municipality of Milton Public Work's standards.

B. Place asphalt within 24 hours of applying primer or tack coat.

C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

D. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

### 3.03 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils
   1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb./gal.

E. Hot Applied Preformed Plastic Pavement Markings - This includes furnishing and placing hot applied preformed plastic pavement markings for turn arrows, stop bars and crosswalks where shown on the contract drawings. Materials and installation are to be in full accordance with Department of Transportation State of Georgia Supplemental Specification Section 659-Hot Applied Preformed Plastic Pavement Markings, Dated January 13, 2014.

### 3.04 WHEEL STOPS

A. Install wheel stops in bed of adhesive as recommended by manufacturer.

B. Securely attach wheel stops to pavement with not less than two galvanized-steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

**3.05 FIELD QUALITY CONTROL**

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. Traffic-Calming Devices: Finished height of asphalt speed bumps above pavement will be measured for compliance with tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
   1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
   2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
      a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
      b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Replace and compact hot-mix asphalt where core tests were taken.

G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

**3.06 DISPOSAL**

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow milled materials to accumulate on-site.

**END OF SECTION**

# SECTION 321313 - CONCRETE PAVING

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. City of Milton Public Works Manual

### 1.02 SECTION INCLUDES

A. Driveways.

B. Concrete sidewalks, stair steps, integral curbs, gutters, parking areas, and roads.

### 1.03 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.

C. Section 312323 - Fill: Compacted subbase for paving.

D. Section 321216 - Asphalt Paving: Asphalt wearing course.

E. Section 32 1373 - Concrete Paving Joint Sealants (for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.)

### 1.04 REFERENCE STANDARDS

### 1.05 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

### 1.06 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to concrete paving, including but not limited to, the following:
      a. Concrete mixture design.
      b. Quality control of concrete materials and concrete paving construction practices.

B. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
   1. Contractor's superintendent.
   2. Independent testing agency responsible for concrete design mixtures.
   3. Ready-mix concrete manufacturer.
   4. Concrete paving Subcontractor.
   5. Manufacturer's representative of stamped concrete paving system used for stamped detectable warnings.

### 1.07 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product.

C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.

D. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:
   1. Exposed Aggregate: 10-lb (4.5-kg) Sample of each mix.

E. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

F. Qualification Data: For qualified Installer of stamped detectable warnings, ready-mix concrete manufacturer, and testing agency.

G. Material Certificates: For the following, from manufacturer:
   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.
   6. Applied finish materials.
   7. Bonding agent or epoxy adhesive.
   8. Joint fillers.

H. Material Test Reports: For each of the following:
   1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

I. Field quality-control reports.

## 1.08 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
   2. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Architect and not less than 96 inches (2400 mm) by 96 inches (2400 mm). Include full-size detectable warning.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.09 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

## 1.10 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
   1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

# PART 2 PRODUCTS

## 2.01 CONCRETE, GENERAL

A. See City of Milton Public Work Manual

## 2.02 CONCRETE MIX DESIGN

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
   1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
   2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash or Pozzolan: 25 percent.
   2. Slag Cement: 50 percent.
   3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
   1. Air Content: 5-1/2 percent plus or minus 1-1/2 percent for 1-1/2-inch (38-mm) nominal maximum aggregate size.

2. Air Content: 6 percent plus or minus 1-1/2 percent for 1-inch (25-mm) nominal maximum aggregate size.
3. Air Content: 6 percent plus or minus 1-1/2 percent for 3/4-inch (19-mm) nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing admixture in concrete as required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

H. Concrete Mixtures: Normal-weight concrete.
1. Compressive Strength (28 Days) unless otherwise noted on the plans:
a. Curb: 3000 psi minimum
b. Sidewalk: 3500 psi minimum
2. Maximum W/C Ratio at Point of Placement: 0.45
3. Slump Limit: 4 inches (100 mm) plus or minus 1 inch (25 mm).

**PART 3 EXECUTION**

**3.01 SEE CITY OF MILTON PUBLIC WORK MANUAL**

**3.02 REPAIR**

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

**END OF SECTION**

## SECTION 321726 - TACTILE WARNING SURFACING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

#### 1.02 RELATED REQUIREMENTS

A. Section 321313 - Concrete Paving: for concrete walkways serving as substrates for tactile warning surfacing.

#### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.

C. Samples for Initial Selection: For each type of exposed finish requiring color selection.

D. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

E. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

#### 1.04 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.05 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Adhesive Application:
   1. Apply adhesive only when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (2 deg C) for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

C. Weather Limitations for Mortar and Grout:
   1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.
      a. When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set unit pavers within 1 minute of spreading setting-bed mortar.

#### 1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of finishes beyond normal weathering and wear.

b. Separation or delamination of materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Plastic Tactile and Detectable Warning Surface Tiles:
1. Match Gulf Shores City Standard.

### 2.02 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for tactile warning surfaces.
1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

### 2.03 DETECTABLE WARNING TILES

A. Surface-Applied Detectable Warning Tiles: Accessible truncated-dome detectable warning concrete tiles configured for surface application on existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of tile, and beveled outside edges.
1. Tuf Tile TM ( TufTile.com; 888.960.8897) ADA truncated dome tiles or approved equal
a. Material: vitrified polymer composite
b. Color: BRICK RED, FED 22144 COLOR I.D. BRD
c. Size 24”x24”
d. Embed

### 2.04 TACTILE AND DETECTABLE WARNING DEVICES

### 2.05 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
1. If existing conditions are not as required to properly complete the work of this section, notify Architect/Landscape Architect.
2. Do not proceed with installation until deficiencies in existing conditions have been corrected.

B. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

### 3.02 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

## 3.03 INSTALLATION OF DETECTABLE WARNING TILES

A. Surface-Applied Detectable Warning Tiles:
   1. Lay out detectable warning tiles as indicated and mark concrete pavement.
   2. Prepare existing paving surface by grinding and cleaning as recommended by manufacturer.
   3. Apply adhesive to back of tiles in amounts and pattern recommended by manufacturer, and set tiles in place. Firmly seat tiles in adhesive bed, eliminating air pockets and establishing full adhesion to pavement. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
   4. Install anchor devices through face of tiles and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with top surface of mat.
   5. Mask perimeter of tiles and adjacent concrete, and apply sealant in continuous bead around perimeter of tile installation.
   6. Remove masking, adhesive, excess sealant, and soil from exposed surfaces of detectable warning tiles and surrounding concrete pavement using cleaning agents recommended in writing by manufacturer.
   7. Protect installed tiles from traffic until adhesive has set.

## 3.04 CLEANING AND PROTECTION

A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.

B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

**END OF SECTION**

# SECTION 323300 - SITE FURNISHINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Benches.

B. Drinking Fountain

C. Unbrellas

D. Tables.

E. Waste receptacles.

### 1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Bollard infill and underground encasement.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

### 1.04 SUBMITTALS

A. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, and maintenance information.

B. Shop Drawings: Indicate plans for each unit or groups of units, elevations with model number, overall dimensions; construction, and anchorage details.

C. Samples: Submit two sets of manufacturer's available colors for metal furnishings.

### 1.05 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Refer to landscape plans for product adn manufactuirer information.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that mounting surfaces, preinstalled anchor bolts, or other mounting devices are properly installed; and ready to receive site furnishing items.

B. Do not begin installation until unacceptable conditions are corrected.

### 3.02 INSTALLATION

A. Install site furnishings in accordance with approved shop drawings, and manufacturer's installation instructions.

B. Surface mount.

**END OF SECTION**

# SECTION 329223 - SODDING

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.02 SECTION INCLUDES

A. Preparation of subsoil.

B. Fertilizing.

C. Sod installation.

D. Maintenance.

### 1.03 RELATED REQUIREMENTS

A. Section 312200 - Grading: Topsoil material.

B. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

C. Section 312323 - Fill: Topsoil material.

D. Section 32 9300 - Plants: for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

### 1.04 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

D. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

E. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

### 1.05 REFERENCE STANDARDS

A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

### 1.06 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

### 1.07 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Qualification Data: For landscape Installer.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

**1.08 QUALITY ASSURANCE**

A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Florida.

B. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
   2. Experience: Three years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
   3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
      a. Landscape Industry Certified Technician - Exterior.
      b. Landscape Industry Certified Lawncare Manager.
      c. Landscape Industry Certified Lawncare Technician.
   5. Pesticide Applicator: State licensed, commercial.

**1.09 REGULATORY REQUIREMENTS**

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of fertilizer and herbicide mixture.

**1.10 DELIVERY, STORAGE, AND HANDLING**

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Accompany each delivery of bulk materials with appropriate certificates.

**1.11 FIELD CONDITIONS**

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

**1.12 MAINTENANCE**

A. Provide maintenance of sod for 90 days or through final acceptqance, whichever is greater.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

A. Comply with regulatory agencies for fertilizer and herbicide composition.

**2.02 MATERIALS**

A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots;

containing no more than 5 weeds per 1000 sq ft (100 sq m). Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

**2.03 TURFGRASS SOD**

A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turfgrass Species: Celebration Bermudagrass; CYNODON dactylon 'Celebration'

**2.04 FERTILIZERS**

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

**2.05 PESTICIDES**

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that prepared soil base is ready to receive the work of this section.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Identify area within existing turf to be repaired and prepare soil base to recieve sod.

**3.02 PREPARATION**

A. Prepare subgrade in accordance with Section 312200.

B. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
   1. Protect grade stakes set by others until directed to remove them.

**3.03 FERTILIZING**

A. DO NOT apply fertilizer in environmental areas. Refer to local jurisdictional authority for proper use of fertilizers in this area.

B. Apply fertilizer in accordance with manufacturer's instructions.

C. Apply after smooth raking of topsoil and prior to installation of sod.

D. Apply fertilizer no more than 48 hours before laying sod.

E. Mix thoroughly into upper 2 inches (50 mm) of topsoil.

F. Lightly water to aid the dissipation of fertilizer.

**3.04 TURF AREA PREPARATION**

A. General: Prepare planting area for soil placement and mix planting soil according to Landscape Plans.

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
   1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

**3.05 LAYING SOD**

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod within 24 hours after harvesting unless a suitable preservation method is accepted by Landscape Architect prior to delivery time. Do not lay sod if ground is frozen or muddy. The planting and/or installation of dormant sod is prohibited, unless stated otherwise herein the contract documents and/or amended through a Change Order.

C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches (300 mm) minimum. Do not stretch or overlap sod pieces.A void damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
   1. Lay sod across slopes exceeding 1:3.
   2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

D. Where new sod adjoins existing grass areas, align top surfaces.

E. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch (13 mm) below top of hard surface.

F. On slopes 6 inches per foot (500 mm per m) and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet (600 mm) on center. Drive pegs flush with soil portion of sod.

G. Prior to placing sod, on slopes exceeding 8 inches per foot (666 mm per m) or where indicated, place wire mesh over topsoil. Securely anchor in place with wood pegs sunk firmly into the ground.

H. Saturate sodded areas with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 4 inches (100 mm) of soil.

**3.06 TURF MAINTENANCE**

A. Provide maintenance at no extra cost to Owner; Owner will not pay for water.

B. General: All planting shall be protected and maintained by the Contractor until time of final acceptance as defined herein these contract documents and/or amended by a Change Order. Contractor's maintenance shall include but is not limited to watering, weeding, cultivation, removal of dead material, lawn mowing, fertilizing, staking, and other necessary operations. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
   1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
   2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

C. Watering: Water necessary for planting and maintenance shall be of satisfactory amounts and quality to sustain the growth of plants and shall not contain harmful, natural or man-made, elements detrimental to plants. Water meeting the above standard shall be furnished by the Contractor and all arrangements for securing water, dispersing, and associated expenses are the responsibility of the Contractor. Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).
   1. Schedule watering to prevent wilting, puddling, and erosion. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

D. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
   1. Mow bermudagrass to a height of 1/2 to 1 inch (13 to 25 mm).

E. Turf Post-fertilization: Apply commercial fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

F. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

G. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches (65 mm). Do not cut more than 1/3 of grass blade at any one mowing.

H. Neatly trim edges and hand clip where necessary.

I. Immediately remove clippings after mowing and trimming.

J. Water to prevent grass and soil from drying out.

K. Roll surface to remove irregularities.

L. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

M. Immediately replace sod to areas that show deterioration or bare spots.

N. Protect sodded areas with warning signs during maintenance period.

**3.07 SATISFACTORY TURF**

A. Turf installations shall meet the following criteria as determined by Landscape Architect:
   1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities over 95% of the turf area.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

**3.08 PESTICIDE APPLICATION**

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

**3.09 CLEANUP AND PROTECTION**

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

**3.10 MAINTENANCE SERVICE**

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
   1. Sodded Turf: Until substantial completion and Owner acceptance.

**3.11 LANDSCAPE WARRANTY**

A. The Owner’s Representative shall have the final approval for acceptance of all work. All plants, grass, shrubs, and trees shall be warrantied to be alive and healthy one (1) year after the date of final acceptance.
   1. The Owner will not water non-irrigated plant material upon acceptance.
   2. The Owner is not responsible for adverse weather or environmental conditions.
   3. The Owner’s Representative is responsible for notifying the Contractor of any plant material, including grass, shrubs, or tree that is dead, dying, diseased, or not showing satisfactory growth. Following written notification, said plant material shall be replaced, or conditions contributing to unsatisfactory growth shall be corrected by the Contractor in a mutually agreeable and or appropriate season timeframe with the Owner’s Representative.
   4. All replacement plant material shall be of the same contract specified quality and or shall be of a size equal to that attained by adjacent plant material or trees of the same species. If necessary, any replacement plant material substitutions shall be proposed to and accepted by

the Owner's Representative, prior to installation. The Contractor is responsible for protection and maintenance of replacement plant material including, but not limited to, watering, weeding, cultivating, removal of dead material, lawn mowing, fertilizing, staking, and other necessary operations.

5. The Contractor shall water replacement plant material for a period of ninety (90) days following installation, a minimum of 3" per plant every ten (10) days, if no measurable rain is received during that period. Replacement plant material shall be guaranteed to be alive and healthy at the beginning of the following growing season. The Contractor shall submit written warranty notice detailing replacement plant material, locations, quantity, species, substitutions accepted, date of installation, and scheduled maintenance. The Owner's Representative shall review, approve, and note the date beginning of the following growing season and end of re-instated warranty period.

**END OF SECTION**

# SECTION 329300 - PLANTS

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.02 SECTION INCLUDES

A. Preparation of subsoil and topsoil.

B. Topsoil bedding.

C. New trees, plants, and ground cover.

D. Mulch and Fertilizer.

E. Tree stabilization.

F. Tree-watering devices.

G. Tree Pruning.

### 1.03 RELATED REQUIREMENTS

A. Section 32 9223 - Sodding: for turf (lawn) planting.

B. Section 312200 - Grading: Topsoil material.

### 1.04 DEFINITIONS

A. Weeds: Any plant life not specified or scheduled.

B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

C. Owner's Representative: Owner will be represented by its on-site Superintendent for the duration of the work and, from time to time, by the Landscape Architect as authorized by the Owner.

D. Final Acceptance: The end of landscape installation operations and the beginning of the landscape maintenance and guarantee period.

E. Final Completion: The end of the landscape guarantee and maintenance period.

F. Backfill: The earth used to replace or the act of replacing earth in an excavation.

G. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

H. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.

I. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

J. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

K. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

L. Finish Grade: Elevation of finished surface of planting soil.

M. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

N. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

O. Planting Area: Areas to be planted.

P. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

Q. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

R. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

S. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

T. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

## 1.05 REFERENCE STANDARDS

A. General: "Hortus Third," 1976.

B. ASTM Standard Specifications

C. ANSI/AHIA Z60.1 - American National Standard for Nursery Stock; 2014.

## 1.06 SUBMITTALS

A. Product Data: Submit three (3) copies of manufacturer's product data and application instructions for all products used in the work, as applicable; such as soil amendments, fertilizers, pesticides, herbicides, fungicides, cleaning solutions, and other materials.
   1. Provide certification that chemicals are approved by the governing authority, if so requested by Owner.

B. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

C. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of 3 photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

D. Submit three (3) samples of mulch, organic matter, pre-emergent, boulders, stone mulch, and washed gravel backfill for approval by Owner’s representative.

E. Samples for Verification: For each of the following:
   1. Trees and Shrubs: Three samples of each variety and size delivered to site for review. Maintain approved Samples on-site as a standard for comparison.
   2. Organic Mulch: 1-pint (0.5-L) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each

Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

F. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

G. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
   1. Manufacturer's certified analysis of standard products.
   2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

H. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

I. All proposed field adjustments shall be documented on a revised plan by the contractor and submitted to the Landscape Architect for approval.

J. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

K. Substitutions: Substitutions of plant materials will not be permitted unless authorized in writing by Owner's Representative. If proof is submitted that any plant specified is not obtainable from five Georgia nurseries 30 days prior to anticipated date of planting, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

**1.07 COORDINATION**

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

B. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

**1.08 PRE-INSTALLATION MEETINGS**

A. Pre-installation Conference: Conduct conference at Project site.

**1.09 QUALITY ASSURANCE**

A. Perform work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work and provide for all inspections, licenses and permits required local authorities in furnishing, transporting and installing materials.

B. All work shall be performed in accordance with these specifications. Should conflicting information between similar specifications sections occur, the stricter version shall take precedence.

C. Certify that all plant material is free of harmful insects and disease.

D. Provide commercially grown mycorrhiza inoculated plant material.

E. Plant material shall be shade or sun grown, and/or acclimatized depending on planting location.

F. Provide matching plant materials with like sized species of same height and width.

G. All plant material furnished shall meet the sizing and grading standards of the current edition of "American Standard for Nursery Stock," as approved by the American Standards Association, Inc., unless otherwise specified. Oversized and exceptionally heavy plants are acceptable at no increase in price if the size of the ball is proportionally increased to the satisfaction of the

Landscape Architect or Owner's Representative. Plant materials that are weak or have been cut back from larger grades to meet certain specified requirements will be rejected.

H. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

I. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
   1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
   2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

J. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
   1. Notify Landscape Architect of sources of planting materials 7 days in advance of delivery to site.

K. Certificates of inspection, if required by law for transportation, shall accompany invoice for each shipment of plants. File copies of certificates with Owner's Representative after acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of plants at project site.

L. Contractor shall have a minimum of five years professional experience installing landscaping of similar materials, design and extent with an established record of success in doing so. The contractor shall provide an experienced full time supervisor on site at all times during which landscaping is in progress.

M. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
   2. Experience: Three years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
   3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
      a. Landscape Industry Certified Technician - Exterior.
      b. Landscape Industry Certified Interior.
      c. Landscape Industry Certified Horticultural Technician.
   5. Pesticide Applicator: State licensed, commercial.

N. Closely following these instructions should promote healthy tree growth & should prevent the following challenges from occurring:
   1. Defoliation / holding brown leaves
   2. Formation of trunk-girdling roots
   3. Secondary pests (insects / disease)
   4. Trunk & canopy damage
   5. Leaning trees / loose root balls

6. Poor health, lack of vigor, decline or death

## 1.10 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

## 1.11 SELECTION, TAGGING AND ORDERING OF PLANT MATERIAL:

A. Owner Purchased Plant Material: The owner may elected to purchase select materials as indicated on the plans. Additionally, the owner reserves the right to purchase all plant materials for the job. Contractor to coordinate with Owner's Representative for pick up and handling of owner purchased plant materials from the grower. Contractor to inspect and certify in writing that all plant materials are free from damage and heathy at the time of pickup. Once accepted from the grower, the contractor assumes full responsibility for owner purchased plant materials including but not limited to damage from transport, damage during storage at the site, maintenance, and warranty. If replacement is required the Contractor shall be responsible for all costs related to replacing the plant materials with matching stock from the same source grower.

B. Plants are subject to tagging, inspection and approval by Owner's Representative at place of growth and upon delivery for conformity to specifications. The owner/Owner's representative reserves the right to tag all trees over two inches in caliper. Selection of plant materials prior to commencement of work shall not impair the right of inspection and rejection during progress of the work. Submit written request for inspection of plant material at place of growth to Owner's Representative. Written request shall state the place of growth and quantity of plants to be inspected. Owner's Representative reserves right to refuse inspection at this time if, in his judgment, a sufficient quantity of plants is not available for inspection.

C. Substitutions of plant materials will not be permitted unless authorized in writing by Owner's Representative. If proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

D. Contractor shall be responsible for all transportation-related expenses for rejected or unapproved plant material

## 1.12 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Transport plant materials covered or in closed vehicles to protect them from exposure to heat, cold, and wind. Take precautions to protect plant materials from desiccation and from damage to bark, branches and roots. Do not allow root balls to crack. Do not allow damage to containerized root systems.

B. Storage and Protection: If planting is delayed after delivery, store plants in an upright position, keep plants in a shaded area, cover B&B or bare root materials' roots with mulch or topsoil, and keep plants sufficiently watered until planted so as to ensure no drought stress or desiccation.

C. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

D. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3. Accompany each delivery of bulk materials with appropriate certificates.

E. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

F. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

G. Caution: Use extreme caution when handling trees. Use a strap or chain cradle (adequate for weight and size of tree and rootball) attached to the root ball to unload & move trees. Strapping & wire baskets can break or loosen. Never move, lift, or handle by attaching to or by putting pressure on the trunk. Be very careful not to damage or scar trunks & branches. Handle planting stock by root ball.

H. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

I. Apply anti-desiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   1. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.

J. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

K. Prep for staging: Staging systems should be prepared in advance to adequately hold trees above ground for optimum tree health prior to planting. Many times, even with the best planning & coordination, trees cannot be planted when they are delivered. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
   1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
   2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
   3. Do not remove container-grown stock from containers before time of planting.
   4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

L. Unloading: Prior to unloading, proper moisture should be maintained in root balls. Trucks should be staged in the shade prior to unloading. Unloading time should be no more than two hours per truck.

M. Stand-up: Immediately after unloading (no more than one hour after unloading), stand the trees up. This will reduce the risk of sun scald. Properly staged trees are standing, untied, & spaced. Trees should not be staged on pavement.

N. Trunk protectors: Remove the cardboard trunk protector within 48 hours of trees being stood upright to reduce the risk of later damage to bark and trunk.

O. Moisture: Monitor moisture in the root ball by probing with a soil probe & manage supplemental irrigation accordingly. Be careful not to over or under irrigate.

P. Cold: During cold weather periods, root balls must be protected from freezing temperatures.

## 1.13 EXISTING UTILITIES AND IMPROVEMENTS:

A. Contractor is responsible for contacting all utility companies to mark locations of utilities on site, including within public rights-of-way prior to any land disturbance. Contractor shall be responsible for repair of all utilities or other existing site features damaged as a result of Contractor operations, to their original condition to Owner's satisfaction.

## 1.14 FIELD CONDITIONS

A. Contractor is responsible for evaluating site and soil conditions prior to and during construction, sufficient to identify any existing conditions that may prevent the plant species proposed from attaining normal establishment and vigorous growth. Examples include but are not limited to soil compaction and poor drainage. If unsatisfactory growing conditions are encountered the contractor shall be correct them prior to planting at no additional cost to the owner.

B. The Contractor should anticipate field adjustment to the locations of materials. All field adjustments to be approved prior to installation. Such field adjustments shall be accommodated at no additional cost to Owner.

C. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

D. Planting Restrictions: General planting, in areas receiving irrigation, shall be installed under favorable weather conditions preferably November 1st to April 15th. General planting, in non-irrigated areas shall take place November 1st through March 1st, under favorable weather conditions. Planting small reforestation trees in non-irrigated areas shall take place between November 15th and January 15th. The contract may be adjusted, if necessary, to meet the proper planting time frame, at no additional cost to the Owner.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

F. Do not install plant life when ambient temperatures may drop below 35 degrees F (2 degrees C) or rise above 90 degrees F (32 degrees C).

G. Do not install plant life when wind velocity exceeds 30 mph (48 k/hr).

## 1.15 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Warranty: Include coverage for one continuous growing season after final completion; replace dead or unhealthy plants.

1. Truck water and/or hand water plants as necessary to establish plants, until Final Acceptance or as directed until establishment.

C. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
   b. Structural failures including plantings falling or blowing over.
   c. Faulty performance of tree stabilization, edgings, and tree grates.
   d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Periods: From date of planting completion.
   a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

c. Annuals: Three months.

3. Include the following remedial actions as a minimum:
   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
   c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
   d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

**1.16 MAINTENANCE**

A. Maintenance procedures: Maintain the work of this Section until Final Completion is certified by Owners Representative. Perform the following operations at least once a week:
   1. Remove and replace dead plant material. Prune woody plants to remove dead wood and to maintain health of plants.
   2. Maintain mulch areas at a 4" min. depth. Remove weeds and grass from shrub and ground cover areas and from tree watering saucers.
   3. Provide insect and disease control to maintain health of plants.
   4. Irrigation:
      a. Monitor the site to provide adequate water for plants on a regular basis.

**PART 2 PRODUCTS**

**2.01 TREES**

A. Tree Health: As typical for the species/cultivar, trees shall be healthy and vigorous, as indicated by an inspection for the following:
   1. Trees shall be relatively free of pests (insects, pathogens, nematodes or other injurious organisms)
   2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
   3. Sizes: Measured after any pruning and in accordance with the American Standard for Nursery Stock. All plant material shall exceed average or typical sizes generally found in the trade for the species and container size indicated, or the typical spread and density of foliage in relation to the plant height specified. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
   4. Crown Form: The form or shape of the crow is typical for a young specimen of the species/cultivar. The crown is not significantly deformed by wind, pruning practices, pests or other factors.
   5. Leaves: The size, color, and appearance of leaves are typical for the time of year and stage of growth of the species/cultivar. Leaves are not stunted, misshapen, tattered, discolored (chlorotic or necrotic) or otherwise atypical.
   6. Branches: Shoot growth (length and diameter) throughout the crown is typical for the age/size of the species/cultivar. Trees do not have dead, diseased, broken, distorted or other serious branch injuries.
   7. Trunk: The tree trunk should be fairly straight, vertical and free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers/lesions and girdling ties.
   8. Root: The root system is free of injury from biotic (insects, pathogens, etc.) and abiotic agents (herbicide toxicity, salt injury, excess irrigation, etc.). Root distribution is uniform throughout the soil mix or growth media and growth is typical for the species/cultivar.

B. Crown: Central Leader: Trees shall have a single, relatively straight central leader and tapered trunk, free of codominant stems and vigorous, upright branches that compete with the central leader. If the original leader has been headed, a new leader at least ½ (one-half) the diameter of the original leader shall be present.
   1. Main Branches (scaffolds): Branches should be distributed radially around and vertically along the trunk, forming a generally symmetrical crown typical for the species. Main branches, for the most part, shall be well spaced. Branch diameter shall be no greater than 2/3 (two thirds) the diameter of the trunk, measure 1" (one inch) above the branch. The attachment of scaffold branches shall be free of included bark.
   2. Temporary Branches: Temporary branches should be present along the lower trunk, particularly for trees less than 1–1/2" (one and one–half inches) in trunk diameter. They should be no greater than 3/8" (three–eighths inch) in diameter. Heading of temporary branches is often necessary to limit their growth.

C. Trunk: Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.
   1. The trunk shall be free of wounds (except properly–made pruning cuts), sunburned areas, conks (fungal fruiting–bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.

D. Roots: The trunk, root collar (root crown) and large roots shall be free of circling and/or kinked roots. Soil removal near the root collar may be necessary to inspect for circling and/or kinked roots.
   1. The tree shall be well rooted in the soil mix. When the container is removed, the rootball shall remain intact. When the trunk is carefully lifted both the trunk and root system shall move as one.
   2. The upper–most roots or root collar shall be within 1" (one inch) above or below the soil surface.
   3. The rootball periphery should be free of large circling and bottom–matted roots. The acceptable diameter of circling peripheral roots depends on species and size of rootball. The maximum acceptable size should be indicated for the species (if necessary).

E. Root-Ball Depth: Furnish trees with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

**2.02 PLANTS**

A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

B. Provide plant materials that are healthy and free from disease, harmful insects, and larvae and without damage or injury to bark, branches, or roots.
   1. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

C. Sizes: Measured after any pruning and in accordance with the American Standard for Nursery Stock. All plant material shall exceed average or typical sizes generally found in the trade for the species and container size indicated, or the typical spread and density of foliage in relation to the plant height specified. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

D. Plants shall be well formed, vigorously growing specimens well rooted in the container without being root bound.

E. Plants with tightly bound or cracked root balls will be rejected.

F. Plants shall be grown from their own root system, grafted plants are not acceptable.

G. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

H. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

I. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

J. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

## 2.03 SOIL MATERIALS

A. Topsoil
   1. Definition: Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments, fertilizers, and water storing crystals to produce a soil mixture best for plant growth. Imported soils and planting media shall meet local and state requirements for use on the beach.
   2. Planting Soil shall be obtained from naturally well drained sites where topsoil occurs at least 4inches deep. Topsoil shall not be obtained from bogs or marshes.
   3. Materials larger than 1.75” shall be disposed of off the site. Existing leaf litter and plant material shall be excluded from topsoil and soil mix.
   4. Maximum Soluble Salts: 300 ppm.
   5. In the event planting soil on site does not meet the above requirements, topsoil meeting the requirements shall be imported from off-site sources.

## 2.04 SOIL AMENDMENT MATERIALS

A. Fertilizer: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
   1. Size: 5-gram tablets.
   2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

## 2.05 ORGANIC MATTER:

A. Organic material shall be partially decomposed fibrous or cellular stems and leaves of Sphagnum moss and rotted manure with mycorrhiza inoculants. Organic material may require chopping to shredding to insure thorough mixing with the topsoil.

## 2.06 MULCH MATERIALS

A. General: All mulch shall be free from deleterious material and toxic levels of acidity and alkalinity, derived from disease-free deciduous trees, with particle size of less than 1” diameter and less than 3” in length. Hardwood mulch shall complete two composting cycles of 140 F (60 C) so that all viable weed seeds are destroyed and no further decomposition due to nitrification will occur.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch (25-mm) sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

## 2.07 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## 2.08 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:
1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end. Three stakes per tree.
2. Wood Deadmen: Timbers measuring 8 inches (200 mm) in diameter and 48 inches (1200 mm) long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
4. Anchors: 2” by 4” pine, preservative treated, long enough to anchor trees through the warranty period
5. Guys: 12 gauge steel wire and ½” hose chafing guards, black in color.
6. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
8. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.

B. Root-Ball Stabilization Materials:
1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.
3. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball and that do not encircle the trunk; sized according to manufacturer's written recommendations unless otherwise indicated.

## 2.09 ACCESSORIES

A. Filter Fabric: Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

## 2.10 PLANT SOIL MIX

A. Definition: An equal-mix mineral topsoil, aged fines, and composted cow manure roto-tilled to a depth of 6-8”. Soil mixes approved as equals may be utilized at the discretion of landscape architect or owner's representative.

## 2.11 WASHED GRAVEL BACKFILL: FOR SUB BASE APPLICATIONS.

A. ASTM # 57 gravel. Gravel shall be native stone obtained from a local source.

**2.12 BIORETENTION SOILS:**

A. Bio Retention / Rain Garden Soil Mix by Earth Products, LLC.; www.erthproducts.com; phone: 770.487.6677 or approved equal

**2.13 CHEMICAL ADDITIVES:**

A. Pre-plant Fertilizer: Timed release fertilizer, 50% of the nitrogen to be derived from natural organic sources of urea-form. Available phosphoric acid shall be from superphosphate, bone or tankage. Potash shall be derived from muriate of potash containing 60% potash. Fertilizer shall consist of the following percent by weight and shall be mixed by a commercial fertilizer supplier.
   10% Nitrogen
   6% Phosphorus
   4% Potash
   1. Trees: 2 lbs per 1"of Caliper
   2. Shrub & Groundcover Beds: 2 lbs per 10 square yards area.

B. Pre-Emergent Weed Control: 6 month time release pre-emergent weed control; apply per manufactures directions.

**2.14 BACKFILL MIXTURES:**

A. General: Soil in planting areas additives as specified herein, as directed in the field, or as required by the specific conditions in the field to provide a suitable growing medium.

B. All planting soil mixes shall be thoroughly blended to form a generally uniform planting medium, suitable for vigorous growth of the plant species specified.

C. Planting pits for container material (2 gal liter and larger) shall be backfilled with planting mix.

D. Planting beds shall receive a minimum of 12 inches of planting mix, all other areas to receive minimum of 3 inches topsoil.

E. All non-seeded planting areas to receive pre-emergent weed control.

F. On structure planting areas shall be constructed using lightweight planting mix.

**PART 3 EXECUTION**

**3.01 EXAMINATION AND PREPARATION**

A. Existing Utilities and Improvements: Contractor is responsible for contacting all utility companies to mark locations of utilities on site, including within public rights-of-way prior to any land disturbance. Contractor shall be responsible for repair of all utilities or other existing site features damaged as a result of Contractor operations, to their original condition to Owner's satisfaction.

B. Existing Site and Soil Conditions: Contractor is responsible for evaluating site and soil conditions prior to and during construction, sufficient to identify any existing conditions that may prevent the plant species proposed from attaining normal establishment and vigorous growth. Examples include but are not limited to soil compaction and poor drainage. If unsatisfactory growing conditions are encountered the contractor shall correct them prior to planting at no additional cost to the owner.
   1. The Contractor should anticipate field adjustment to the locations of materials. All field adjustments to be approved, by Owner or Owners Representative, prior to installation. Such field adjustments shall be accommodated at no additional cost to Owner.

C. Verification of Conditions: Examine the site and conditions under which landscape work is to be performed. Notify the Landscape Architect in writing, with a copy to the Owner, if site conditions prevent proceeding in accordance with the contract requirements. Beginning of work indicates acceptance of the site as satisfactory by the installer. All workmanship is subject to the approval of the Owner's Representative; rejected workmanship shall be corrected at no additional cost to Owner.

1. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

D. The Contractor shall be responsible to thoroughly remove all objectionable material and debris from the site as necessary to install the specified improvements and deliver a complete project, finished in appearance, and in full accordance with these specifications and plans.
1. Any road base material encountered in areas designated for planting shall be completely removed and clean parent soil exposed.
2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
3. The Contractor shall fine grade and, as necessary, backfill with native topsoil, all areas to be planted, unless existing cover is to be retained. Finished grade shall meet adjacent existing grade smoothly, with no abrupt transitions
4. Reviews: The Contractor shall field stake and mark all tree and bed locations prior to excavation or planting, for review by the Owner's Representative. A minimum of 14 days' notice shall be provided prior to the time of review required. Reviews shall be scheduled for the following milestones:

Pre-construction conference
Fine grading and plant staking
Final Acceptance
Final Completion

**3.02 PREPARATION OF SUBSOIL**

A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

C. Scarify subsoil to a depth of 3 inches (75 mm) where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

D. Dig pits and beds 6 inches (150 mm) larger than plant root system.

**3.03 PLACING TOPSOIL**

A. Spread topsoil to a minimum depth of 4 inches (100 mm) over area to be planted. Rake smooth.

B. Place topsoil during dry weather and on dry unfrozen subgrade.

C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches (150 mm).

**3.04 FERTILIZING**

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after initial raking of topsoil.

C. Mix thoroughly into upper 2 inches (50 mm) of topsoil.

D. Lightly water to aid the dissipation of fertilizer.

## 3.05 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to plans.

B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Before retaining "Application of Mycorrhizal Fungi" Paragraph below, obtain guidance from a scientist as to the optimum application rate of mycorrhizal fungi for Project.

E. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

## 3.06 EXCAVATION FOR TREES AND SHRUBS

A. Percolation test: Prior to planting, check soil drainage with a percolation test. The rate at which water drains through the soil affects plants' survival and growth. Poorly drained soil results in too much water in the root zone and a lack of needed oxygen for healthy roots. To determine percolation rate, dig a hole 1 foot deep, fill with water and see how long it takes to empty. If the water level drops more slowly than 1 inch per hour, do not plant until drainage is corrected and satisfactory percolation test is completed.

B. Planting Pits and Trenches: Excavate circular planting pits.
   1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
   2. Excavate approximately three times as wide as ball diameter for balled and burlapped stock. Rootball must be set on compacted foundation that cannot settle when saturated.
   3. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
   4. Hole depth: Excavate hole no deeper than 2" shallower than the rootball depth. If a hole is over-excavated, use size 57 stone gravel placed in the bottom of the hole, beginning at undisturbed soil, and fill up to the level where bottom of rootball should rest. Do not place soil back in an over-excavated hole.
   5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
   6. Maintain supervision of excavations during working hours.
   7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
   8. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

C. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

D. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
   1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

E. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

F. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

### 3.07 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
   1. Backfill: Planting soil.
   2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
      a. Quantity: Two per plant.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Balled and Potted and Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
   1. Backfill: Planting soil.
   2. Carefully remove root ball from container without damaging root ball or plant.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
      a. Quantity: Two per plant.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Fabric Bag-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
   1. Backfill: Planting soil.
   2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
      a. Quantity: Two per plant.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grade.

1. Backfill: Planting soil.
2. Spread roots without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
3. Carefully work backfill in layers around roots by hand. Bring roots into close contact with the soil.
4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside soil-covered roots about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole or touching the roots.
   a. Quantity: Two per plant.
6. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. Watering Pipe: During backfilling, install watering pipe 4 feet (1.25 m) deep into the planting pit outside the root ball with top of pipe 1 inch (25 mm) above the mulched surface.

H. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

I. Equipment: Use machinery such as a telehandler with side-tilt carriage forks (brands such as lull or jlg) rated to handle weights of rootballs and trees to set root balls in planting pits. Forks should always be carefully positioned above rootball to lift rootball by strapping on top of the root ball with four pick-up points for even weight distribution. Prior to setting rootball in planting pit, forks should be adjusted so that tree is plumb. Place rootball at a level where the trunk flare will be 2'' above surrounding finished grade after settling.

J. Straight and plumb: Maintain the tree with forks in a straight & plumb position while backfilling and watering.

K. Backfill/water: Backfill and tamp in 6" lifts until ½ complete. Saturate the planting hole with water.

L. Backfill/water: After 1/2 backfill, watering, & the tree is plumb, then add backfill to just below the top horizontal ring of the wire basket, completely saturate planting hole. Adjust root ball (if necessary) by adjusting forks to make tree straight & plumb and at proper depth. Do not remove forks until tree is straight and plumb, backfill is settled, and rootball is stable.

M. Remove forks: After above items have been completed and tree is straight and plumb with rootball stable and at proper depth, gently remove forks and also remove:
   1. The synthetic strap,
   2. Any cardboard packaging,
   3. The top portion of the wire basket down to & including the first horizontal ring,
   4. The burlap from the top portion of the root ball.

N. Complete the backfill & thoroughly saturate with water. Repeat this step if necessary to make absolutely certain that air pockets do not exist in the backfill.

O. When soil on top of rootball is distorted or not perpendicular to tree trunk: even rootballs with excellent root systems grown and harvested at proper depth can sometimes become distorted during shipping and handling. Actions to take if soil on top of rootball has become distorted:

P. If soil is bulging or distorted on the top surface of the rootball:
   1. Very gently tamp the area of bulging or distorted soil as much as possible so that soil is perpendicular to trunk.
   2. If soil is still bulging or distorted, very gently (with a sharp shovel or spade) cut and remove remaining bulge.

Q. Rootball distortion can be minimized by:
   1. Coordinating scheduling so that trees will not be shipped or moved during significant rain.
   2. Following the previous handling planting and care instructions. When a tree is handled, moved, adjusted, straightened, etc. More than the minimum steps covered in these instructions, the possibility of rootball distortion and other damage increases. Rootballs that are moved when extremely wet are the most likely to become distorted or damaged.

R. Place plants for best appearance.

S. Remove non-biodegradable root containers.

T. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

**3.08 MECHANIZED TREE-SPADE PLANTING**

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.

C. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

D. Cut exposed roots cleanly during transplanting operations.

E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in the same direction as in its original location.

**3.09 MULCHING**

A. Mulch all planting areas unless otherwise indicated on the plans.

**3.10 EDGING INSTALLATION**

**3.11 INSECT AND DISEASE CONTROL**

A. Apply treatment as frequently as required to prevent damage to plant material. Use only chemicals that comply with local laws and regulations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

**3.12 PLANT RELOCATION AND RE-PLANTING**

A. Relocate plants as indicated by Architect/Landscape Architect.

B. Replant plants in pits or beds, partly filled with prepared planting soil mixture, at a minimum depth of 6 inches (150 mm) under each plant. Remove burlap, ropes, and wires, from the root ball.

C. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

**3.13 TREE STABILIZATION**

A. Immediately after backfill has settled & the tree is straight & plumb, stabilize tree until root system is thoroughly established in the backfill.

B. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
   1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend at least 72 inches (1830 mm) above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
   2. Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
   3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
   4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

C. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet (4.2 m) in height and more than 3 inches (75 mm) in caliper unless otherwise indicated.
   1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.
      a. Securely attach guys to stakes 30 inches (760 mm) long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle for each guy wire and tighten securely.
      b. For trees more than 6 inches (150 mm) in caliper anchor guys to wood deadmen buried at least 36 inches (900 mm) below grade. Provide turnbuckle for each guy wire and tighten securely.
      c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
      d. Support trees with guy cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
      e. Attach flags to each guy wire, 30 inches (760 mm) above finish grade.
      f. Paint turnbuckles with luminescent white paint.
   2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

D. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.
   1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.
      a. Install stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation. Saw stakes off at horizontal stake.
      b. Install screws through horizontal hold-down and penetrating at least 1 inch (25 mm) into stakes. Predrill holes if necessary to prevent splitting wood.
      c. Install second set of stakes on other side of root trunk for larger trees.
   2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

### 3.14 STRAIGHTENING

A. If for any reason trees need straightening, trees can be straightened by carefully digging out all backfill around the root ball, attaching seat belt strap to the wire basket and lifting. Never pull, push, or put pressure on the trunk. If tree roots are significantly established in the backfill, it is best for the health of the trees to wait until dormancy to straighten trees, since roots outside the original rootball will be cut.

### 3.15 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.
   1. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
   2. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
   3. Do not apply pruning paint to wounds.

### 3.16 GROUND COVER AND SHRUB PLANTING

A. Shrubs (2 gal. and larger): Excavate planting pit to depth of container or ball and width at least two times the diameter of the ball or container unless otherwise indicated on Drawings.
   1. After removing containers sever the sides of the root mass in several places to encourage rapid root extension into the soil. Set root ball on undisturbed firm soil in planting pit.
   2. Adjust backfill fill if necessary to ensure top of root mass will be flush with finished grade of bed. All trees shall have trunk flare exposed. Plants placed too deep will be required to be re-installed to proper grade at Contractor's expense.
   3. Remove top 1/3 of burlap and ties from balled and burlapped plants.
   4. Fill planting gradually with backfill mixture as specified above, soaking with water and allowing to settle ensuring that all air pockets are eliminated. Finish backfilling pit and tamp firm but do not compact soil or damage roots.
   5. Construct a watering saucer for individual trees / large shrubs, and install 3" of mulch throughout planting area as indicated on the plans. Water-in to completely saturate the root ball and planting backfill.

B. Groundcover / small shrub beds (mostly 1 gal or smaller): Cross slope planting bed one-half inch per foot away from structures, with perimeter of bed flush with adjacent finish grade; provide mulch trench at outer edge of beds
   1. Broadcast 3" layer of organic amendment over the entire area to be planted, and mix thoroughly with underlying 6" layer of native topsoil and 4" layer of planting mix.
   2. Place plants in staggered and varying rows as indicated on plans or as directed by Owner's Representative.
   3. Loosen and / or scarify root masses of container grown plants as indicated for trees and shrubs (above).
   4. Tamp and water when planting to eliminate air pockets and finish installation with plants firmly set.
   5. Install a layer of mulch throughout the planting area as indicated on the plans. Water-in completely as appropriate for the species.

### 3.17 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
   1. Submit details of proposed pruning and repairs.
   2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.

3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

B. Remove and replace trees that are more than 66 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
   1. Provide new trees of same size as those being replaced for each tree of 6 inches (150 mm) or smaller in caliper size.
      a. Provide two new tree(s) of 4-inch (100-mm) caliper size for each tree being replaced that measures more than 6 inches (150 mm) in caliper size.
      b. Species of Replacement Trees: Same species being replaced.

**3.18 CLEANING AND PROTECTION:**

A. Contractor's work area shall be cleaned at the end of each working day. Landscape debris and trash shall be daily collected and removed from the site. Any materials or equipment staged on site shall be kept in an organized manner in locations approved by the Owner.

B. Remove debris from landscaped areas and sweep clean adjacent pavements, if soiled by landscape activities. Protect landscaping from damage until Final Completion. Treat, repair, or replace damaged plantings.

C. After installation remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

**3.19 ACCEPTANCE:**

A. Final Acceptance
   1. Upon Final Acceptance, the Landscape Architect shall inspect all work for acceptance upon written request by the Contractor. The request shall be received at least fourteen (14) calendar days before the anticipated date of inspection.
   2. Acceptance of plant material by the Landscape Architect shall be for conformance to specified size, character and quality and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents including correct species.
   3. The Landscape Architect will certify final acceptance in writing to the Contractor.
   4. The 1 year guarantee period will begin at certification of final acceptance.

B. Acceptance in Part
   1. Portions of the work of planting may be accepted in part upon Landscape Architect's approval.
   2. Plantings may be accepted exclusive of each other if it is in the best interest of the Owner.

**3.20 MAINTENANCE**

A. Maintenance Period: Twelve months from date of final completion.

B. All planting shall be protected and maintained by the Contractor until time of final acceptance as defined herein these contract documents and/or amended by a Change Order. Contractor's maintenance shall include but is not limited to watering, weeding, cultivation, removal of dead material, lawn mowing, fertilizing, staking, and other necessary operations as required to establish healthy, viable plantings.

C. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

D. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

E. Irrigation: Monitor the site to provide adequate water for plants on a regular basis.

## 3.21 LANDSCAPE WARRANTY

A. The Owner's Representative shall have the final approval for acceptance of all work. All plants, grass, shrubs, and trees shall be warrantied to be alive and healthy one (1) year after the date of final completion.
   1. The Owner will not water non-irrigated plant material upon acceptance.
   2. The Owner is not responsible for adverse weather or environmental conditions.
   3. The Owner's Representative is responsible for notifying the Contractor of any plant material, including grass, shrubs, or tree that is dead, dying, diseased, or not showing satisfactory growth. Following written notification, said plant material shall be replaced, or conditions contributing to unsatisfactory growth shall be corrected by the Contractor in a mutually agreeable and or appropriate season timeframe with the Owner's Representative.
   4. All replacement plant material shall be of the same contract specified quality and or shall be of a size equal to that attained by adjacent plant material or trees of the same species. If necessary, any replacement plant material substitutions shall be proposed to and accepted by the Owner's Representative, prior to installation. The Contractor is responsible for protection and maintenance of replacement plant material including, but not limited to, watering, weeding, cultivating, removal of dead material, lawn mowing, fertilizing, staking, and other necessary operations.
   5. The Contractor shall water replacement plant material for a period of ninety (90) days following installation, a minimum of 3" per plant every ten (10) days, if no measurable rain is received during that period. Replacement plant material shall be guaranteed to be alive and healthy at the beginning of the following growing season. The Contractor shall submit written warranty notice detailing replacement plant material, locations, quantity, species, substitutions accepted, date of installation, and scheduled maintenance. The Owner's Representative shall review, approve, and note the date beginning of the following growing season and end of re-instated warranty period.

**END OF SECTION**

# PUBLIC WORKS MANUAL

Revised 5/2014

# Table of Contents

# SECTION 1: AUTHORITY AND JURISDICTION

## A. AUTHORITY

The City Council of the City of Milton (City) has authorized the use of the Public Works Manual as its standard for construction. These standards shall govern all related construction within the corporate limits of the City as now and hereafter established and any construction or connections to City owned utility systems in unincorporated areas.

Any owner of land within the limits stated above wishing to develop or improve his property in such a way as to require any construction improvements regulated herein, shall submit plans and specifications to the Planning and Development Department for review and approval as required in Article II of the City of Milton Land Development Regulations. No such improvements shall be accepted for public maintenance unless constructed to these standards and accepted and approved by the City Manager or his designee.

These regulations are to be considered as the standards required by the City for construction. It should be understood that this manual is only a guide and not intended to dictate good engineering practices. In addition, the City retains the right to place more stringent requirements upon construction where actual field conditions mat warrant.

## B. PENALTIES

As provided for in Article II, Section II-1.2 of the Land Development Regulations, no building permits (as therein defined) may be authorized by the City of Milton Planning and Development Department, unless such plans and specifications for the development activity conform to the technical and construction standards contained in this manual and other Land Development Regulations, Life Safety Codes, etc,. Failure to comply with these standards will result in the denial of acceptance for maintenance by the City until such improvements comply with the requirements contained herein. Further, no utilities shall be connected until such time as the improvements have been approved by the City Manager and accepted by the City.

## C. INTENT

It is the intent of this manual to be used as a guide for design as well as establish minimum standards for construction. It should be noted that the standards contained in the manual may be increased by the City Manager or his designee, dependent upon circumstances related to a specific site. Additionally, the City may place more stringent requirements on a particular project based upon actual or anticipated field conditions.

While this manual does provide for the use of specific materials and design criteria, it is also understood that materials and methods of construction constantly change. It is the intent of the City to be able to keep current with new technology as it relates to new materials and methods. Therefore, the City will review alternative materials and construction methods presented by developers and contractors from time to time. The review will be made by the Technical Review Committee (TRC) and minor modifications may be approved by the City Manager or his designee. Major deviations will be reviewed by the TRC who will forward their recommendations to various committees and then to the City Council for final approval. Unless specifically stated, any deviations allowed will be on a case by case basis until such time as this manual may be revised.

# SECTION 2: STREETS AND HIGHWAYS

## A. GENERAL

New roadways proposed for construction within the City shall be classified as *arterial, collector, local roads and streets or alleys*. The functional classification of each proposed roadway within a new development shall be confirmed during the Application for Development approval process. A schematic illustration of the functional classification concept is provided in Figure II-1.

For the purpose of design for all new roadways and developments, the following publications shall act as guides. While these publications are intended for large highways systems, the design criteria contained within them can be applied to most projects within the City of Milton. Throughout the remainder of this section, more specific data will be presented that may supersede the publications:

1. ***FDOT - Plans Preparation Manual, latest edition.***
2. ***FDOT – Manual of Uniform Minimum Standards for Design, Construction & Maintenance for Streets and Highways, latest edition. (also commonly known as the "Florida Green-book")***
3. ***FDOT – Design Standards for Design, Construction, Maintenance & Utility Operations on the State Highway System, latest edition.***

## B. ARRANGEMENT

The arrangement, character, extent and location of all streets shall conform to the current Comprehensive Plan. The relation of proposed streets to existing and planned streets, to topographical conditions and to the proposed land uses to be served by such streets, shall be considered in the development of the proposed street arrangements. The arrangement of all proposed streets shall promote public safety, public convenience and should allow the most advantageous development of the surrounding neighborhood.

1. Where such is not shown in the Comprehensive Plan, the arrangement of the streets in a subdivision shall either:
   a. Provide the continuation or appropriate projection of existing principal streets in the surrounding areas, or,
   b. Conform to a plan for the neighborhood adopted by the Planning Board.
2. Where a subdivision abuts or contains an existing or proposed arterial street, the development approval authority, as provide for in Article II, Administration, of the Milton Land Development Regulations, may require marginal access streets, reverse frontage with screen planting contained in a non-access reservation along the rear property line, deep lots with rear service alleys or such other treatment as may be necessary for adequate protection of residential properties and to afford separation of through and local traffic.
3. Reserve strips controlling access to streets shall be prohibited except where their control is definitely placed in the City under conditions approved by the development approval authority.
4. Half streets shall be prohibited, except where essential to the reasonable development of a subdivision in conformity with the other requirements of the regulations and where the development approval authority finds it will be practicable to require the dedication of the other half when the adjoining property is subdivided. Whenever a half street is adjacent to a tract to be subdivided, the other half street shall be platted within such tract.
5. Permanent dead-end streets (cul-de-sacs) which are not to be extended by either the sub divider or the adjoining property owner shall be provided at the closed end with a turnaround having a minimum paved outside diameter of one hundred feet (100') and a minimum right-of-way diameter of one hundred twenty feet (120'). The maximum length of a dead-end street shall be 1000' as depicted in Figure II-2.
6. Street jogs with center line offset of less than one hundred twenty five feet (125') shall be avoided.

## C. STREET NAMES, STREET MARKERS AND OTHER MARKING REQUIREMENTS

1. STREET NAMES – A proposed new street, which is in alignment with a continuation of an existing street, shall have the same name as the existing street. In no case (including numbered or lettered streets) shall a new street have the names or numbers which duplicate or are phonetically similar to existing street names regardless of the prefix or suffix used such as Avenue, Boulevard, Court, Crescent, Drive, Place, Street and Terrace. All street names shall be subject to the approval of the Coty Council.

2. STREET NAME SIGNS - Street name signs shall be installed by the developer at street intersections, designating the names of the streets. Street name signs shall be erected in urban areas at all street intersections regardless of other route marking that may be present and should be erected in rural districts to identify important roads not otherwise marked.

Supplementary lettering to indicate the type of street ( Street, Road, etc.) or section of the City (N.W., S.E. etc.) may be in similar lettering, at least 2½" high. Conventional abbreviations are acceptable except for the street name itself.

Street sign blades on streets located at city, county or state road intersections shall be nine (9") inches in height aluminum with a green background. Lettering on these signs shall be white, six (6") inch high letters. The background shall be a high intensity grade green reflective material or illuminated. The downtown historic district shall be white letters on a brown background. Some districts may use a different color scheme. In these districts the City Council shall have final approval for variations to the color scheme.

Any circular street shall be required to notate the address ranges on each sign for emergency response purpose.

In business districts and on principle arterials, street name signs should be placed at least on diagonally opposite corners so that they will be on the far right-hand side of the intersection for traffic on the major street. Signs naming both streets should be erected at each location. All faces shall be parallel to the streets they name.

In residential districts, at least one street name sign should be mounted at each intersection. In locations where same name street loops or has 90 degree curves, additional street name sign will be required.

The sign supports shall be constructed as shown in Figure II-3.

All sign supports shall be galvanized and installed with vandal proof hardware consisting of stainless steel brackets and bolts.

The developer is responsible for purchasing and installing speed limit, STOP and other warning or information signs as deemed necessary by the City. All signage shall comply with the latest edition of the MUTCD or FDOT Standards. All STOP signs shall be thirty (30") inch.

3. OTHER STREET MARKING REQUIREMENTS - STOP bars shall be installed at all intersections. The STOP bar shall be 18" wide solid white in subdivisions developments and 24" wide at all other intersections of the city, county or state roads.

   A solid double yellow six inch (6") line shall be installed at each STOP intersection. The yellow lines shall extend from the STOP bar a minimum of seventy-five (75') feet in order to divide the traffic lanes.

   The word "STOP" shall be painted on the pavement twenty-five (25") prior to the STOP bar. The letters shall be ninety-six (96") inches high.

All pavement markings shall be thermoplastic.

At each fire hydrant location a blue raised pavement marker shall be installed on the centerline of the street. If the fire hydrant is located on a street corner, two (2) markers shall be installed, one on each street.

## D. GEOMETRIC DESIGN

***See Publications***

### 1. CROSS SECTION ELEMENTS

a. RIGHT-OF-WAY – The acquisition of sufficient right-of-way is necessary in order to provide space for a safe street or highway. The width of the right-of-way required depends upon the design of the roadway, the arrangement of bridges, underpasses, other structures, utility installations and the need for cuts or fills. The minimum right-of-way shall be as specified in Table II-1. For preexisting conditions when the right-of-way is less than 60 feet, efforts should be made to obtain the necessary right-of-way.

b. PAVEMENT – ***See Publications***
The paved surface of all travel lanes shall be designed and constructed in accordance with the requirements set forth in Section II-E; BASE AND PAVEMENT DESIGN AND CONSTRUCTION. All pavement widths shall be a minimum of 12 ft. from centerline of street to pavement edge at curb (24 ft. total, edge of pavement to edge of pavement).

c. ROADSIDE CLEAR ZONE – ***See Publications***
The width of the clear zone should be as wide as practicable. For design speeds of 25 mph or less, the minimum width is six (6') feet. For design speeds greater than 25 mph, the minimum width shall be six (6') feet for local roads, ten (10') feet for collector roads and fourteen (14') feet for arterials roads. These are minimum values only and should be increased wherever possible.

d. CLEARING, GRUBBING AND GRADING – ***See Publications***
Clearing and grubbing shall be for the full width of the right-of-way except as may be approved by the City Manager or his designee. Grading shall be in accordance with the approved plans. All cleared areas shall be seeded and mulched per FDOT standards or a City approved equal, to insure stabilization on a permanent basis. The developer/property owner/permit holder shall be responsible for maintaining and stabilizing the grassing the site through the warranty period or as may be approved by the City. This includes right-of-ways, easements, stormwater ponds and other areas as may be identified during the construction process.

e. PARKING – Parking on street right-of-ways shall be prohibited on all twenty-four (24') foot wide streets.

2. DESIGN SPEED

***See Publications***
Recommended minimum values for design speeds are given in Table II-4.

3. SIGHT DISTANCE

***See Publications***
The stopping sight distance shall be no less than the values shown in Table II-5.

4. HORIZONTAL ALIGNMENT

***See Publications***
Design speed maximum degrees of curve relationships are given in Table II-6. The use of sharper curvature for the design speeds shown in Table II-6 would call for super elevation beyond the limit considered practical or for operation with tire friction beyond the limit considered practical, safe or comfortable.

5. VERTICAL ALIGNMENT

***See Publications***
The grades selected should be as flat as possible and should not be greater than the value given in Table II-7.
Vertical curves are required when the algebraic difference of the intersecting grades exceeds the value given in Table II-8. The length of the vertical curve on a crest as governed by stopping sight distance is obtained from Figure II-5. The minimum length of a sag vertical curve as governed by vehicle headlight capabilities is obtained from Figure II-6.

6. ALIGNMENT COORDINATION

***See Publications***

7. ACCESS CONTROL

***See Publications***
Spacing and location of access points shall be established consistent with Section V-3 Access Management of the Land Development Regulations.
'T' intersections in branching networks are recommended, particularly for local and collector streets. Street jogs with centerline offsets of less than 125 feet shall be avoided.

8. INTERSECTION DESIGN

***See Publications***

The location and spacing of intersections should follow the requirements presented in Section II.D.7 – ACCESS CONTROL.

Approach to STOP signs, YIELD signs or traffic signs should be provided with a sight distance no less than the values given in Figure II-7.

Where the approach roadway is on grade or vertical curve, the sight distance should be no less than the values shown in Figure II-7.

The distance required for acceleration on level roadways for passenger cars are given in Table II-10. Where acceleration occurs on a grade, the required distance is obtained by using Tables II-10 and Table II-11.

The distance required for deceleration of passenger cars is given in Table II-10. Where deceleration occurs on a grade, the required distance is obtained by using Table II-10 and Table II-11 and should be increased whenever feasible.

## E. BASE AND PAVEMENT DESIGN AND CONSTRUCTION

1. SUB-GRADE/BASE COURSE – ***See Publications***

   The constructed base course shall be a minimum of six (6") inches thick and shall be placed on a stabilized, compacted subgrade having a minimum Limerock Bearing Ratio (LBR) of 40. The sub-grade shall be compacted to 95% of the maximum dry density as obtained by the standard proctor method (ASTM D-698). Compaction test of the sub-grade shall be completed at one (1) per every 300' of roadway, with no less than a total of 3 tests being made. All compaction testing shall be completed prior to the placement of the base material or concrete curbing.

   The types of base courses approved for use are shown below, along with the testing requirements.

   a. Sand – Clay
   b. Limerock
   c. Graded Stone Aggregate

   All materials specified and construction methods shall be in accordance with the FDOT – Standard Specification for Road and Bridge Construction, latest edition. Any alternate base course proposed shall have written approval by the City Manager or his designee.

   The City Planning and Development Department shall be notified at least 48 hours in advance of any testing so that a City representative may be present.

   The City shall be provided the results of all compaction tests as construction progresses or as requested. Compaction test of the base shall be completed at one (1) per every 300' of roadway, with no less than a total of 3 tests being made. The test shall not fall in the same locations of the sub-grade compaction tests. In

areas of questionable soils, more stringent requirements may apply. Location of the testing sites shall be coordinated with the City staff. Copies of all tests results shall also be submitted with the "as-built" drawings or prior to the acceptance by the City.

2. PRIMING AND PROTECTION OF THE BASE – ***See Publications***
   Priming of all base courses will be required and shall be in accordance with FDOT Standards. Until paving occurs, all primed bases shall be protected with an approved sand coating or other type of armor coating.

3. PAVED/SURFACE COURSE – ***See Publications***
   All roadways shall be paved. Minimum thicknesses are shown in Figure II-9. All surface courses shall be FDOT Type S-1 or equivalent based on the latest edition of the FDOT Standards.

## F. OTHER DESIGN AND CONSTRUCTION ITEMS.

1. CONCRETE WORK
   All cast or poured-in-place concrete work shall comply with the following requirements.
   a. Quality Assurance
      (1) Comply with the latest published edition of the American Concrete Institute (ACI) and American Society of Testing and Materials (ASTM) standards and codes:
         (a.) ACI 301-Specifications for Structural Concrete for Buildings
         (b.) ACI 305-Placing Concrete in Hot Weather
         (c.) ACI 306-Placing Concrete in Cold Weather
         (d.) ACI 318-Building Code Requirements for Reinforced Concrete
      (2) The City of Milton reserves the right to require submitted or proposed job mixes, slump test and compressive strength tests for all concrete used.
      (3) Unless otherwise indicated, all concrete shall be 3000 p.s.i. design strength.
   b. Products
      (1) Portland Cement: ASTM C150
      (2) Fly Ash: ASTM C618, Type C or F. Limit use of fly ash to not to exceed 25% of cement content by weight.
      (3) Aggregates: ASTM C33, except local aggregates of proven durability may be used when acceptable to the Engineer.
      (4) Water: Potable
   c. Admixtures
      (1) Air-Entraining Admixture: ASTM C260
      (2) Water Reducing Admixture: ASTM C494, type as required to suit project conditions. Only use admixtures which may have been tested and accepted in mix design.

d. Related Materials
    (1) Waterstops: Flat dumbbell or center bulb type, size to suit joints, of either rubber (CRD C513) or PVC ( CRD C572).
    (2) Moisture Barrier: Clear eight (8) mils thick polyethylene.
    (3) Membrane-Forming Curing Compound: ASTM C309, Type I.
    (4) Joint Fillers:
        (a.) Joint Sealer: Hot poured, non-extruding, elastic, ASTM D1190.
        (b.) Preformed Expansion Joint Filler: Non-extruding, bituminous fiber, ASTM D1751.
        (c.) Provide form materials with sufficient stability to withstand pressure of placed concrete without bowing or deflecting.
e. Reinforcing Materials
    (1) Deformed Reinforcing Bars: ASTM A615, Grade 60, unless otherwise indicated.
    (2) Welded Wire Fabric: ASTM A185.
f. Mixing, Forming and Placing Concrete
    (1) Job-Site Mixing: Use drum type batch machine mixer, mixing not less than 1½ minutes per one (1) cubic yard or smaller capacity. Increasing mixing time at least 15 seconds for each additional cubic yard or fraction thereof. Batch time shall not exceed 1½ hours.
    (2) Ready-Mix Concrete: ASTM C94
    (3) Formwork: Construct so that concrete members and structures are of correct size, shape, alignment, elevation and position. Provide openings in formwork to accommodate work of other trades. Accurately place and securely support items built into forms. Clean and adjust forms prior to concrete placement. Apply a form release agent or wet forms as required. Retighten forms during concrete placement if required to eliminate mortar leaks.
    (4) Placement of Reinforcement: Position, support and secure reinforcement against displacement. Locate and support with metal chairs, runners, bolsters, spacers and hangers as required. Set wire ties so ends are directed into concrete. Install welded wire fabric in as long lengths as practicable, lapping at least one mesh at both ends and sides. Tie or interlace at laps.
    (5) Joints: Provide construction, isolation and control joints as indicated or required. Locate construction joints so as to not impair strength and appearance of structure. Locate isolation and control joints in slabs-on-grade to accommodate differential settlement and prevent random cracking.
    (6) Embedded Items: Set or build into work, anchorage devices and other embedded items required for other work that is attached to or supported by the cast-in-place concrete. Use diagrams, templates or instructions provided by others for locating and setting.

(7) Placement: Comply with all ACI requirements when placing concrete. Do not begin placement until the work of other trades affecting the concrete is completed. Consolidate concrete using vibrating equipment, hand rodding and tamping so that the concrete is well placed around reinforcement, embedded items and into forms. Protect concrete from physical damage or reduced strength due to weather conditions.

g. Concrete Finishes

(1) Exposed Surfaces: Unless otherwise called for, provide a smooth surface for all exposed concrete surfaces. Remove all fins and unwanted projections and patch defective areas and rub smooth.

(2) Finishes:

(a) Trowel Finish: slab surfaces exposed to view and to be covered with flooring, painted or other coatings.

(b) Broom Finish: slab surfaces exposed to view and subject to vehicular or pedestrian traffic.

(3) Curing: Provide protection to prevent damage to exposed surfaces for a minimum of 48 hours for pedestrian use and 72 hours for vehicular use.

2. CURB AND GUTTERS – ***See Publications***

Concrete curb and gutters shall be installed on all streets utilizing either a layback or FDOT Type 'F' designs as shown in Figure II-4. Other curbs shown may only be used upon request and approval by the City Manager or his designee. The curb will be constructed using a ½" expansion joint at the beginning and end of each radius, at any abutments, at any grade change and at every fifty (50') feet thereafter. All stormwater shall be conveyed through curb inlets and into underground piping or as approved in the design.

3. SIDEWALKS – ***See Publications***

On projects where sidewalks are included, they shall be constructed of concrete and a minimum of five (5') feet wide and four (4") inches thick.
Sidewalks at all driveways shall be six (6") inches thick. The contractor may use forms or an approved automatic extrusion type paving machine. If a machine is used, it must demonstrate to produce a consolidated concrete section conforming to the required cross section and dimensions.

Sidewalks shall be placed to true line and grade upon a uniformly compacted sub-grade. Control joints providing a groove approximately one-half (½") inch in depth with rounded edges shall be provided every five (5') feet. One-half (½") inch expansion joints shall be placed where walks join other concrete units with additional interior expansion joints every sixty (60)' feet and at all radius changes.

All sidewalks shall have a broom finish or as indicated by the City and shall be sloped as to not cause ponding of water and to comply with ADA and handicapped access requirements.

4. DRIVEWAYS – ***See Publications***

All driveways shall be constructed using concrete, unless specifically approved to use another material by the City Planning and Development Department.
All concrete driveways shall be constructed using concrete and shall be a minimum of 6" thick. Driveways for non-residential use will require additional reinforcing based on the proposed use.

For all new developments where driveways locations are know, the curb and gutter section should conform to the standard details. At locations within existing developments, the curb and gutter section should be removed and replaced to match the standard details. In some locations and with approval of the City Planning and Development Department, the entire curb and gutter section may only be modified in lieu of total removing and replacement.

The first section of the driveway, at the 1st joint, shall be equal to or higher than the top of the curb nearest the driveway on either side. Should the finishes floor elevation of the structure being served, additional grading may be required to address any stormwater flow entering or damaging the structure.

Should the driveway be constructed without removing the entire curb and gutter section, the addition of #4 rebar dowels will be required for structural integrity. The dowels will be drilled into the existing curb 6" deep and secured with epoxy. The dowels shall extend into the new driveway 12" and shall be spaced no greater than 24" apart.

5. STREET LIGHTS

All new subdivision developments within the City, with underground electrical power, will be required to install street lights. As part of the development plan review, a" Street Lighting Plan" will be required. The Plan will show proposed locations and types of lighting and will have been approved by Gulf Power Company. Each pole and fixture shall be spaced no more than 250' apart and each fixture shall be LED producing a min. of 9200 lumens. The City will, after each light is installed, assume the monthly cost to operate each light. Both the pole and fixture will be the "standard" Gulf Power style, tapered concrete pole and LED cobra head residential streetlight fixture.
Any other type or design will require the approval of the City Manager or his designee.

Because most "build out" of the development is staged, not all of the light poles and fixtures will be required to be installed prior to the final acceptance of the development. Therefore, as each lot is developed, it will be the reasonability of each builder, nearest the locations shown on the approved Street Lighting Plan, to have each pole and light installed. In most cases the pole will split between 2 lots, in this case the first builder to seek City approval for development will be the responsible party to have the pole and fixture installed.

### 6. UTILITIES

Where it is necessary to locate utilities within the right-of-ways, the placement and location shall not be in contradiction to or fail to meet the intent of the design requirements of this manual. Poles or other above ground utility structures are not generally permitted in the medians or within the roadside clear zones. Underground utilities should not be buried under pavement when other space is available within the right-of-way. Unavoidable crossing of roadways should be designed to allow for repairs and modifications without unnecessary disruption or hazard to traffic, with the exception of local residential streets. The placement of access manholes within the pavement, shoulders or medians should be avoided.

# SECTION 3 – EARTHWORK

## A. ROADS AND STREETS

***See Publications***

For all developments within the City, a geotechnical engineer shall be retained in order to prepare a soils report on the various components of the project. The recommendations made in the report shall be no less than those listed below.

Excavation shall be performed in accordance with all applicable Federal, State, County and City Regulations. Blasting will not be permitted.

All streets and roadways shall be cleared of all trees, brush, stumps, roots and other objectionable materials so that the entire right-of-way can be constructed to the required cross section. Any trees or other items noted for preserving shall be protected. All obstructions shall be removed to a minimum of four (4') feet below existing grade and/or twelve (12") inches below the sub-grade. Stump holes or other holes shall be carefully backfilled and compacted. All soft, yielding or otherwise unsuitable materials must be removed and replaced with acceptable fill material.

Suitable materials from roadway cuts may be used in the construction of fills, approaches or at other places needed. The fill shall be spread in layers and compacted in no more than six (6") inch lifts. The top twelve (12") inches of soil in both cut and fill sections shall have a dry weight density of at least equal to ninety-five (95%) percent obtained by the modified proctor method (ASTM D-1557).

Grading must progress so as to insure good drainage and prevent formation of depressions where water may collect. When the natural soil cannot be made stable enough to support construction traffic, sub-grade modifications shall be accomplished. The sub-grade shall have provisions to intercept groundwater from springs and seepage plains to prevent saturation of the sub-grade or other items that would prevent a quality development. The finished sub-grade shall be true to the plan grade and uniformly firm. All disturbed areas outside the paved roadway shall be stabilized with seed and mulch per the standards. In some cases, sod may be required to obtain the stabilization. All slopes greater have 4:1 will require sod.

All underground utilities crossing paved streets shall be installed prior to final grading and compaction. Electrical, telephone, cable and irrigation systems crossings shall be placed in adequately sized conduits. The conduits shall be no closer to the edge of pavement or curbing than two (2') feet.

## B. UTILITIES

1. GENERAL – ***See Publications***
   All excavation shall be performed in accordance with all Federal, State, County and City regulations. All trench excavations shall conform to the requirements of the Occupational Safety and Health Administration – *Construction Standards for Excavations.*

2. EXISTING FACILITIES – ***See Publications***
   Adequate measures shall be taken to provide for the protection of all existing structures and utilities, both above and below ground. In **all cases** the City shall be held harmless against damage and claims from damage resulting from construction activity. The contractor performing the work shall be responsible for **all** utility locates and shall have on site, a current Locate Ticket as provided by Florida One Call service, telephone ***811*** or email *www.callsunshine.com*.

3. MAINTENANCE OF TRAFFIC –***See Publications***
   Effective barricades, danger signals and signs shall be erected and maintained in locations where necessary for the protection of the work and public safety. Barricades or obstructions, which encroach on or are adjacent to public right-of-way, shall be provided with lights. The lights shall always be on during non-day light hours. All work shall conform to all Federal, State, County and City work zone safety requirements and/or FDOT – Maintenance of Traffic Standards. Work shall be arranged to minimize disturbance to normal pedestrian and vehicular traffic.

4. CONSTRUCTION WITHIN STREETS, RIGHT-OF-WAYS AND EASEMENTS
   All obstructions along the construction area shall removed and the area cleared in order to provide adequate space for the layout and construction. Work shall be limited to the street, right-of-way or easement. Any survey reference points

or benchmarks encountered shall not be disturbed. If any points or benchmarks are disturbed, they will be replaced by a registered land surveyor at no cost to the City or the property owner.

5. EXISTING PAVEMENT REMOVAL AND REPLACEMENT
   Any removal of existing concrete or asphalt pavement shall be in a straight line and such width only as necessary for the work to be completed. Pavement to be removed shall be saw cut to a width shown in Figure II – 11, 12 or 13. Repair after the construction shall also follow that shown in the same details. Until the final repair can be completed, the surface of the trench shall be maintained in smooth riding condition without potholes and depressions. Final repaving will not occur until all heavy equipment is permanently removed and all work has been tested and accepted.

6. EXISTING SIDEWALK, DRIVEWAY AND CURB REPLACEMENT
   All existing sidewalks, driveways and curb removed, disturbed or destroyed during construction shall be repaired or replaced. The completed work shall be equal to or better than the original. All edges of the work to be repaired or replaced shall be saw cut in a straight line. All sidewalks and curbs shall be replaced joint to joint. All concrete work shall be in accordance with Section 2.F. All asphalt driveways shall be repaired as detailed in Figure II – 11, 12 or 13.

7. EXCAVATIONS FOR PIPE WORK
   All excavations for pipe lines shall be along the centerline of the pipe and shall be by open cut method. Bell holes for piping shall be hand excavated to ensure that the pipe rest upon the bottom of the trench. If the bottom of the excavation is found to have unsuitable materials, the material shall be removed at least six (6") inches below the trench bottom and for the length necessary. The bottom of the excavation shall be backfilled using compacted clean sand, gravel or crushed stone.

   Suitable excavated materials to be used for backfill or other purposes shall be neatly deposited at the sides of the trenches, where space is available, or at a stockpile location for use at a later time. The stockpile location shall provide for natural drainage and not present an unsightly appearance. The stockpile location shall be owned by the developer or the developer has obtained written permission. The stockpile shall also be protected from erosion by using hay bales or silt fencing or both.

   Upon completion, all disturbed areas shall be seeded and mulched per FDOT standards to prevent erosion and to establish a good stand of grass.

8. DEWATERING FOR PIPE WORK
   Dewatering, if required during construction, will be to keep the ground water below the work area so that the proposed work to be completed will not be

compromised. Well pointing or other acceptable means of dewatering will be required until such time ground water, either natural or caused by some other means, no longer exist. Well points will not be allowed to be placed in existing pavement unless approved by the City.

9. BACKFILLING OF TRENCHES
   Backfilling of trenches will follow the same procedure as detailed in SECTION 3.A for fill sections. Placement of the backfill shall be carefully placed on both sides of the pipe at the same time and compacted until reaching 12" above the pipe. Then the entire trench shall be backfilled and compacted following the guidelines. See Figure II – 14. The trench shall be restored to its original grade or to the proposed grade. Under no condition is construction debris to be included within the backfill. All disturbed areas, unless included within a development, shall be seeded and mulched per FDOT standards or as may be approved by the City.

# SECTION 4 – UTILITIES – SEWER/WATER/NATURAL GAS

## A. SANITARY SEWER – WASTEWATER COLLECTION AND TRANSMISSION

1. GENERAL
   All new wastewater collection and transmission systems shall be designed permitted and constructed in accordance with FAC Chapter 62-604; Ten States Standards or any other rules that may apply. City of Milton Code of Ordinances, Section 48-33, requires that anyone within two-hundred (200') feet of the City's wastewater collection system must connect. All persons outside the City Limits may connect, but only with permission of the City. No work shall commence until all permits and approvals are obtained and all fees have been paid.

2. DESIGN FLOW

   All new systems shall be designed on the basis of an average daily flow per capita of not less than 100 gallon per day and 3.5 persons per household. The flow shall be adjusted by a "peaking factor" as determined by the Ten States Standards.

   In addition to the basis of design provided above, consideration of unusually high commercial, industrial or other flows shall be incorporated into the design.

3. GRAVITY SYSTEM CONSIDERATIONS

a. GENERAL DESIGN

No gravity sewer main conveying raw sewage shall be less than eight (8") inched in diameter. The maximum distance between manholes shall be four hundred (400') feet.

All gravity service laterals shall be no less than four (4") inches in diameter. Each gravity service laterals shall be designed to service only one (1) customer and shall have a clean-out installed at the property line.

All gravity sewers shall be installed with uniform slope between manholes. The sewer shall also be designed and constructed to give minimum velocities of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013. (Ten States Standards, Section 33.41)

Sewers shall be laid with straight alignment between manholes. Construction shall be by the use of an internal to the pipe, laser beam system. Prior to final acceptance, ALL sewers shall be cleaned and televised and the videos turned over to the City for review.

When sewers of different size join one another, the invert of the larger sewer should be lowered sufficiently, but not less than 0.10 inches to maintain the same energy gradient.

b. MATERIALS

All materials shall be free from defects impairing strength and durability and be of the best commercial quality for the purpose specified. It shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

1) Polyvinyl Chloride Pipe (PVC)

PVC gravity sewer pipe and fittings shall meet or exceed ASTM-D3034. Pipe lengths shall not exceed twenty (20') feet and shall be push-on gasket joints. All pipe shall meet the following minimum wall thickness:

| Diameter: | 4" | 6" | 8" | 10" | 12" | 15" |
|---|---|---|---|---|---|---|
| Wall Thickness | .124" | .180" | .240" | .300" | .360" | .437" |

All pipes shall have a maximum SDR ratio of 35 and a minimum pipe stiffness (F/Y) of 46 at five (5%) percent deflection when tested in accordance with ASTAll pipe and fittings shall be joined by means of a bell and spigot joint using a rubber ring gasket. The pipe and fittings shall come to the job site with the gasket securely locked into each bell. The bell shall consist of an integral wall section of the pipe. All joints shall be capable of withstanding the testing requirements described further in this manual.

In every instance where pipe enters or leaves a manhole, a fitting shall be provided which will accommodate expansion and contraction; release strain that may be caused by differential settlement between the pipe and structure; and provide a water tight seal between the pipe and structure.

Each joint of pipe shall be clearly marked with the following information at intervals of no more than five (5') feet:

- Manufacturer's name and trademark
- Normal pipe size
- ASTM specification
- NSF approval stamp

2) Polyvinyl Chloride Pipe (PVC): PVC pressure piping (force mains). PVC pressure pipe shall have a bell-type joint designed for conveying liquid products under pressure. Ring-type neoprene gasket shall be provided in recesses in the bells to make the joints watertight for all slip joint piping. Only where noted on the plans shall solvent weld flanged connections be allowed. All fittings shall be of the same joint design as recommended by the manufacturer. PVC pipe shall meet or exceed the minimum requirements of AWWA C-900, SDR 25. PVC pipe 3" or less shall be Class 200, SDR 21. All sewer force main piping shall be GREEN in color and marked "SEWER".

All fittings for PVC pressure pipe shall be mechanical joint ductile iron as described below.

3) Ductile Iron Pipe (DIP): Ductile iron pipe shall meet the requirements of ANSI A21.51, including Addenda A21.51a. Pipe dimensions shall conform to Federal Specification WW-P-421, Class 150. Each pipe shall be marked on the outside of the barrel to readily identify it from Cast Iron. Metal thickness shall conform to ANSI A21.51, Table 51.1 for 2½-5 feet of cover.

Mechanical Joints: conform to ANSI A21.11, Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings.

Push-On Joints: conform to ANSI A21.11, Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings, single gasket push on type.

Flanged Joints: conform to ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings, 125 pounds. Screwed on flanges, faced and drilled to ANSI Class 125 pound template. The flanged joints shall be assembled by threading plain end pipe and screwing on long hub flanges. The connection shall then be power tightened and refaced across both face of both ends. Provide 1/16"ring gaskets meeting ASTM D1330-66, Sheet

Rubber Gaskets, Grade 1, Table 1. Connections shall be made with machine bolts and hexagonal nuts.

Fittings: Fittings shall meet ANSI A21.10, Cast Iron Fittings, 2" – 48" for Water and Other Liquids. Minimum pressure rating shall be equivalent to that of the pipe specified.

Coatings: All ductile iron pipe and fittings that will convey wastewater or other non-potable water fluids, shall be lined with *PROTECTO 401 CERAMIC EPOXY LININGS* or *$H^2$ SEWER SAFE* and the exterior, below grade, coated with bituminous material in accordance with ANSI A21.6. The exterior above grade shall receive a coating of rust inhibitor primer compatible with the finish paint schedule. All nuts, bolts, studs and other uncoated parts of joints for underground installation shall be coated with asphalt or coal-tar epoxy prior to backfilling.

4) Tracer Wire: A 12 ga. insulated, copper tracer wire shall be installed along the routes of ALL force mains. The wire shall be installed no less than 8" or no more than 12" above the pipe. All joints shall be water tight. Water tight splice kits shall be 3M ID No. 80-6105-9435-2 DBR or approved equal. The wire shall terminate at each end so it may be accessed with a device for future locates.

5) Gate Valves: All valves shall meet the requirements listed in Section B.5.d

6) Air Release and Vacuum Valves: The air release and vacuum valve shall be furnished where indicated on the plans. The valve shall be specifically design for use with sewer force mains and shall be ARI Model D-025P-2.The valve shall have a stainless steel shut off ball valve and a port for back flushing as may be necessary to keep the valve clear of debris and other foreign matter. All valves shall be installed in a fiberglass manhole or suitable and accessible structure appropriate for the location of installation.

7) Manholes: Unless otherwise shown on the drawings, all manholes receiving pipes 12" and less, shall have an inside diameter of four (4') feet. All manholes receiving pipes greater than 12", shall have an inside diameter of fie (5') feet. All manholes shall have an eccentric top cone section that narrows to two (2') feet at the cover. Manholes shall be installed at all change in alignment, grade, pipe diameter, the upstream end of sewers and at the junction of 2 or more sewers. Manholes spacing shall not exceed four hundred (400') feet. Sewer sloping in opposite directions shall not use a single manhole as a common terminus.

All manholes shall be precast concrete construction meeting ASTM C478, latest edition, except as modified herein. The concrete used shall be Type II or approved equal with a 28 day strength of 4000 psi. The walls shall have a minimum thickness of five (5") inches.

Flat tops may be used on shorter manholes (5' or less) where a standard cone section will not fit or as may be pre-approved. All flat tops shall be designed for H-20 loading and in no case be reinforced with less that No. 6 bars at six (6") inches, both ways.

The bottom section shall be of monolithic design and a minimum thickness of six (6") inches.

The joints between the sections shall be tongue and groove and shall be sealed with round or other flexible type natural rubber joint rings. In addition to the rubber ring gaskets, the interior and exterior voids at each joint shall be sealed with *RAM-NEK* flexible plastic gasket material as manufactured by K.T. Snyder Company. The material shall be installed in strict accordance with the manufacturer's recommendations.

All manholes greater than four (4') feet in depth will be furnished with steps. The step shall be plastic coated with a non-slip foot surface. Steps shall be placed no more than 18" apart.

All manhole frames and covers shall be *Vulcan Foundry No. VM-37; Neenah Foundry No. R-1600 series; or equivalent.* All covers shall be marked "SEWER".

All manholes shall have approved water tight seals at all pipe openings in order to prevent groundwater from entering.

All manhole invert channels shall be smooth and accurately shaped to a semi circular bottom conforming to the connecting sewer section. Invert channels and manhole bottoms shall be shaped and smoothed with one to two (1:2) cement/sand mortar mix. Side slopes shall be constructed as to not allow water to stand or pool. Changes in size and grade shall be made gradually and evenly.

All manholes interiors and exteriors (including air bubbles and form imperfections) in standard sewer construction conditions shall be coated with a minimum of 15 mils dry film thickness of *Pro Standard (Pro Tech Coatings)* or approved bituminous coating. In the case of precast manholes, the coatings shall be applied at the plant and shall be completely dried and cured prior to delivery.

All new manholes that will receive a force main connection shall be constructed using fiberglass. All existing manholes that will receive a force main connection shall be coated on the interior using *Strong Seal, Sewer Coat or an approved equal*. All new manholes that will receive a force main connection will be five (5') foot interior diameter. The force main drop pipe that is located on the interior of the manhole shall be of stainless steel construction and shall extend outside the manhole no less than three (3') feet. The pipe shall enter the manhole; turn 90° down the wall and 45° towards the flow line of the sewer pipe. The location of the 45° bend shall be positioned close to the flow line to prevent the least amount of splash as possible. The drop pipe shall be strapped or anchored to the wall of the manhole using stainless steel fittings and fasteners.

8) Vacuum Sewers: Vacuum sewer collection systems will be evaluated and approved on a case-by-case basis. All vacuum sewers will comply with FDEP and manufactures standards for such systems.

4. SANITARY SEWER LIFT STATIONS – GENERAL DESIGN

Due to the substantial operational and maintenance expense of sanitary sewer lift stations, the use of lift station in the design of sewage collection systems shall be minimized to the greatest extent possible. Lift stations may be used only when the upstream gravity collection system cannot be physically connected to the existing system in a code compliant and practicable manner. A pre-design meeting with the Public Works Director or his designee shall be completed prior to the start of design in order to determine if the project is a candidate for City operation and maintenance.

The installation shall comply with all local, state and federal laws and ordinance applicable to electrical installation and with the regulations of the latest edition of the published National Electrical Code where such regulations do not conflict with those laws and ordinances. The contractor shall obtain all permits, and after the work is completed, shall furnish the City a Certificate of Final Inspection and Approval from the applicable local inspection departments.

Construction drawings submitted to the City for review shall be accompanied by three (3) sets of design calculations. The design shall be in accordance with the Florida Department of Environmental Protection (FDEP), Chapter 62-604 and the Ten States Standards (TSS) and shall specifically incorporate the following features:

a. The lift Station shall be located in areas not subject to flooding. The lift station top elevation shall be above the 100 year flood elevation as designated by FEMA Flood Maps.
b. Design shall prevent the introduction of stormwater runoff in accordance with TSS 41.1.

c. Each lift station site shall have a minimum size of 25' x 25' or of a size to include the location of all equipment and structures, including but not limited to wet well, valve box(s), generator and control panel(s) plus required separation between all components.
d. Each site shall have a 12' wide, "all-weather" access drive located to allow easy access for future pump removal or maintenance. The drive shall be rated for supporting H-20 loadings. Parcels not fronting a public right-of-way shall include a dedicated access easement of no less than 20' wide with adequate provisions for turnaround equipment. Additionally, a suitable gate for access shall be provided.
e. The lift station size shall be no less than six (6') feet in diameter and the depth shall be as needed for the project. The minimum liquid level in the wet well shall be in accordance with the pump manufacturer's requirement or a minimum of 2 ft.. This will set the *pump-off* elevation. The minimum control volume shall be set to ensure that minimum cycle time exceeds the pump manufacturer's requirements or a 10 minute minimum. This will set the *lead pump on* elevation. The space between the *lead pump on* and the *lag pump on* shall be a minimum of 12". This will set the *lag pump on* elevation. The *high level alarm* shall be set not less than 12" above the *lag pump on* elevation. The lowest invert elevation shall be set suck that a minimum of 30 minute emergency storage volume is provided between the high level alarm and the lowest influent invert.
f. The wet well shall be fiberglass, manufactured in accordance with ASTM D3753. The discharge piping through the top shall incorporate link seal devices and shall be sized to allow the passage of the pipe flanges. The gate valves and check valves shall meet the requirements detailed in Section B.5.d. The top of the wet well shall be fitted with aluminum hatch cover sized to allow easy access for installation and removal of the pumps. A pump guide rail system shall be included. The rails shall be no less than 2", sch. 40, 316 stainless steel pipes. For wet wells deeper than 20 ft. provide for intermediate guide rail support.
g. The design shall incorporate a riser and quick coupling device and valves to allow a portable pump to be connected to the force main discharge as shown on the details.
h. The electrical equipment shall be protected from lightning and transient voltage surges. As a minimum, stations shall be equipped with lightning arresters, surge capacitors, T.V.S.S. or other similar protective devices.
i. Stations shall located to minimize adverse effects resulting from odors, noise and lighting. Any station that is thought to produce odors may be required to add such devices that will reduce or eliminate odors.
j. All stations and support equipment will be enclosed inside a 6' chain link fence as shown in the details.
k. Stations shall be designed to resist flotation in totally saturated soils.

**l.** Lift station and controls shall meet the requirements shown in the following **City's Standard Detail Drawings; Dwg. No. C-4 dated 9/24/2007; Dwg No. C-5 dated 9/24/2007 and Dwg. No. C-6 dated 9/24/2007**

m. All stations will be designed for two (2) submersible pumps operation. Minimum pumping capacity shall be 100 gpm and the minimum force main size shall be four (4") inch. For designs that will require more than two (2) pumps or complex controls, the City shall be consulted prior to start of design.

n. All stations shall have float switch level controls, stainless steel discharge piping and valves as shown on the standard details.

o. Lift stations that provide service to more than **20** homes or **20** ERU's shall be designed and constructed with a site mounted stand-by generator. All lift stations serving less than the above shall be fitted with a generator receptacle and manual transfer switch approved by the City.

p. Stand-by generators shall conform to the following:
   1) Generators shall be Generac or City approved equal.
   2) Where possible, all generators shall be natural gas fueled. Where natural gas is not available and with the City's approval, provide for diesel fuel operations.
   3) All diesel fuel tanks shall be sized for 72 hours of continuous, full load operation, unless approved by the City. Tanks shall be double wall, welded painted steel, with fuel gauge, overfill protection, Stage II vapor recovery and meet or exceed all FDEP and EPA requirements. The bottom shall have channel steel construction to prevent the entire bottom from coming in full contact with the foundation. Paint shall be marine grade for wet environments.
   4) All units shall be for automatic start-up operation and come with automatic transfer switches (ATS). The ATS shall be NEMA 3R, ASCO or City approved equal.
   5) All units shall operate at no more than 1800 rpm. No gear reduction will be allowed unless approved by the City.
   6) All units shall be equipped with an engine jacket heater and battery charger.
   7) All units shall meet ANSI/NEMA MG 1, three (3) phase, reconnectable brushless synchronous generator with brushless exciter. Insulation shall meet ANSI/NEMA MG 1, Class F standards.
   8) All enclosures shall be 14 gauge, painted steel construction and sound attenuated to a maximum level of 72 db. The enclosure shall not allow wind driven rain to enter and cause damage while operating. The enclosure shall be designed to 110 mph wind speed. All silencers shall be mounted inside the enclosure.
   9) All units shall be pre-wired to a terminal strip for remote alarm monitoring by SCADA.
   10) Provide a full five (5) year warranty for the engine and alternator against wear and defects from date of start-up and acceptance by the City.

11) Provide service and maintenance of units for a two (2) year period from date of start-up and acceptance by the City. Items included in this service will include oil, filters or other items that may fall under service.

q. At the completion of the work, provide to the design engineer or City, three (3) copies of written operation and maintenance manuals, software, copies of any PLC Logic incorporated into the station controls and certified pump curves. The design engineer shall then forward to the Public Works Director, all the data and his certification (including FDEP).

r. Submersible Pumps:
   1) Each pump shall be capable of handling raw unscreened sewage or other similar solids-laden fluids without clogging.
   2) The impeller shall be made of erosion-resistant cast iron and shall be of the non-clogging, dynamically balanced type capable of passing a minimum of a three (3") inch solid.
   3) Each impeller and volute shall have wear rings, minimum of 400bhn hardness, installed, except where vortex impeller deign is used.
   4) The pump discharge connection shall be a minimum of four (4") inch in diameter. The volute shall be made of Class 35B or higher, gray cast iron, with smooth internal surfaces and all passageways free of any obstructions. The volute shall also have a centerline discharge, unless otherwise approved by the City.
   5) Each motor shall be equipped with a tandem, double mechanical seal. Both the lower stationary seals face and rotating seal face shall be made of silicon carbide, while the upper stationary seal shall be sealed with an o-ring. The positively driven faces shall be held in place by individual independent springs. The seals shall require neither routine maintenance nor adjustment and shall not be damaged when the pump is allowed to run dry.
   6) Moisture sensing probes shall be used for detecting the presence of water in the lower motor chamber and provide a warning and shut down of the pump, by closing an electrical circuit and energizing a warning light on the face of the control panel. All relays used for this function shall be intrinsically safe.
   7) The pump shaft shall be made of AISI 430F stainless steel supported by a heavy duty lower row of ball bearing and upper sealed single row ball bearing and bearings suitable for L10 bearing life of 50,000 hours.
   8) Each motor shall be a NEMA design B, suitable for continuous duty with moisture resistant class F insulation rated for 155°F. Each motor shall contain a temperature monitor to provide overheating protection and shall shut the pump down should any of the monitors detect a high temperature. The monitors shall automatically reset once the starter temperature returns to normal.
   9) The motors shall be FM Approved for Class 1, Division 1, Group C and D Explosion Proof, Hazardous locations as defined by the National Electric Code.

10) Minimum length of power cables shall be sufficient to allow for connection of the pump to the control panel and have at least three (3') feet extra of slack inside the wet well.
11) All cable entry designs shall have a potted design to preclude of entry of moisture should the cable be damaged.
12) Lifting bail shall be supplied on each pump, sufficient to carry the load of the motor, pump, cable and pull-up attachment.
13) Pumps shall be manufactured by one of the following:
    - KSB
    - Fairbanks-Morse
    - Hydromatic
    - EMU
14) All pumps shall carry a minimum 5 year, 100% written warranty against defects and failure.

## B. POTABLE WATER DISTRIBUTION

### 1. GENERAL

All new potable water distribution systems shall be designed and constructed in strict accordance with FAC Chapter 62-555; Ten States Standards and any other State and Federal rules that may apply. No construction activity shall commence until all appropriate permits have been received from the Florida Department of Environmental Protection (FDEP).

### 2. DESIGN FLOW

In sizing the distribution system water mains, the required design flow shall be the sum of the required fire flow, plus two-thirds for the required domestic, industrial, commercial and institutional flow as described below.

a. Required Domestic Flow Residential
The required flow for domestic use in residential areas shall be based on not less than an average daily flow rate of 100 gallons per capita per day assuming 3.5 persons per household. The average daily per capita water flow shall be adjusted by a "peaking factor" of four (4).

b. Required Industrial/Commercial/Institutional Flow
The designer shall include appropriate site specific allowances for large quantity water users such as industries, Laundromats, food processing operations, schools, etc. These design allowances shall be subject to review and approval by the City.

c. Fire Flow
Required fire flow in single-family areas shall be a minimum of 1,000 gpm at 20 psi residual pressure. This may be reduced to 750 gpm if all residential structures are spaced a minimum of 30 ft. apart. Fire Flow requirements may be modified by the Fire Chief in certain single-family

dwelling areas based upon the building areas of structures, fire loading, degree of physical separation between buildings and other factors which contribute to rapid fire spread or excessive fire involvement or as permitted by the Florida Fire prevention Code. Required fire flow for industrial, commercial and institutional areas shall be determined in accordance with the current edition of the Florida Fire Prevention Code.

3. DISTRIBUTION SYSTEM CONNECTIONS TO SUBDIVISIONS

Any proposed subdivision to be supplied by the City water system and having a design flow requirement as determined herein of not more than 1500 gpm, may have a single connection to the distribution system, provided that the design flow requirements can be met with such connection. Any proposed subdivision having a design flow of 1,500 gpm, shall have a minimum of two (2) connections to the distribution system.

4. DISTRIBUTION MAIN LAYOUT AND SIZING

Distribution mains shall be of sufficient size to furnish the required flow at the pressures and velocities provided herein. All mains shall be installed only in dedicated streets, alleys, public rights-of ways or utility easements. All mains locations and sizes shall be as approved by the City of Milton. If the installation of a "dead end" main cannot be avoided, it's dead end length shall not exceed 1,000 ft. unless approved by the City. When a fire hydrant is installed on a dead end main exceeding 300 ft., the hydrant shall be supplied by main of not less than eight (8") inches in diameter. When a hydrant is installed on a dead end main exceeding 600 ft., the hydrant shall be supplied by a main of not less than ten (10") inches in diameter. All dead end mains less than six (6") inches shall be looped. Dead end mains six (6") inches or larger shall be provided with a fire hydrant at the end of the main. See Figure II-18 for general details.

a. <u>Required Pressure</u>

The minimum water pressure in the distribution system shall not be less than 30 psi with no fire hydrants in use. The minimum water pressure in the system with the hydrant in use shall not be less than 20 psi (as measured at ground level). When the water main pressure exceeds 90 psi, an approved individual pressure reducing regulator valve (PRV) shall be installed on the customer side of the meter. If, based on the number of meters to be effected, the City may require an in line PRV to service the development.

b. <u>Minimum Main Size</u>

Assuming that all flows and pressures are met, the minimum distribution water main size shall be three (3") inches and six (6") inches in single family residential areas and eight (8") inches in all other areas. No two (2") inch or four (4") inch mains are allowed. No more than six (6) homes will be allowed on a three (3") inch main. All water service tubing will be one (1") inch. All water service brass will be ¾" and each lot or connection will have no more than one (1) meter per service.

c. Standard Sizes
Standard water main sizes shall be 3", 6", 8", 10", 12", 18" and 24".

d. Velocity
Velocities of water for non-fire flow conditions within the distribution system, shall NOT exceed six (6) feet per second.

e. Cover
1) A minimum cover of thirty (30") inches must be provided unless special conditions exist. The special conditions may be approved by the City on a case-by-case basis.
2) At all road crossing, except FDOT, the minimum separation between the bottom of the base and the top of the casing shall be twenty-four (24") inches.
3) All stream crossings shall have the minimum cover listed in e.1 above or as may be required to prevent "fracking out" in the stream bed.

f. Crossings
Major road crossings shall be encased in a steel casing. All casings shall extend a minimum of four (4') feet beyond the pavement edge. Additional requirements of the responsible regulatory agency shall also be met.

5. POTABLE WATER PIPE AND FITTINGS
All materials shall be free from defects impairing strength and durability and be of the best commercial quality for the purpose specified. It shall have the structural properties sufficient to safety sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

a. Polyvinyl Chloride (PVC) Pressure Pipe
PVC pressure piping (water mains) shall be a bell-type joint designed for conveying water under pressure. Ring-type neoprene gasket shall be provided in recesses in the bells to make the joints watertight for all slip joint piping. All fittings shall be of the same joint design as recommended by the manufacturer. PVC pipe shall meet or exceed the minimum requirements of AWWA C-900, SDR 25, unless as may be noted on the plans. All pipe must be certified a suitable for potable water by the National Sanitation Foundation (NSF) and be clearly marked as: NSF-PW. Each length of pipe shall also be clearly marked with the following information at intervals of five (5') feet or less:
- Nominal pipe size and OD base
- Material code designation
- Dimension ratio number (SDR or DR)
- AWWA pressure class and standard designation number
- Manufactures name or trademark
- NSF approval seal

All fittings for PVC water mains shall be mechanical joint ductile iron, unless as may be noted on the plans. All mechanical joints shall be restrained using a "Mega-Lug" or similar approved type of device.

b. Ductile Iron Pipe (DIP)
Ductile iron pipe shall meet the requirements of ANSI A21.51, including Addenda A21.51a. Pipe dimensions shall conform to Federal Specification WW-P-421, Class 150. Each pipe shall be marked on the outside of the barrel to readily identify it from Cast Iron. Metal thickness shall conform to ANSI A21.51, Table 51.1 for 2½-5 feet of cover.

1) Mechanical Joints: conform to ANSI A21.11, Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings.

2) Push-On Joints: conform to ANSI A21.11, Rubber Gasket Joints for Iron Pressure Pipe and Fittings, single gasket push on type.

3) Flanged Joints: conform to ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings, 125 pounds. Screwed on flanges, faced and drilled to ANSI Class 125 pound template. The flanged joints shall be assembled by threading plain end pipe and screwing on long hub flanges. The connection shall then be power tightened and refaced across both face of both ends. Provide 1/16"ring gaskets meeting ASTM D1330-66, Sheet Rubber Gaskets, Grade 1, Table 1. Connections shall be made with machine bolts and hexagonal nuts.

4) Fittings: Fittings shall meet ANSI A21.11, Cast Iron Fittings, 2"– 48" for Water and Other Liquids. Minimum pressure rating shall be 350 psi.

c. Tracer Wire: A 12 ga. insulated, copper tracer wire shall be install along the routes of ALL water mains. The wire shall be installed no less than 8" or no more than 12" above the pipe. All joints shall be water tight. Water tight splice kits shall be 3M ID No. 80-6105-9435-2 DBR or approved equal. The wire shall terminate at each end so it may be accessed with a device for future locates.

d. Valves:

1) Gate Valves: (2" & larger) Valves shall be of the resilient seated wedge type, epoxy coated, meeting AWWA C550 cast-iron body design. They shall comply with the AWWA Gate Valve Standard C509 or latest revision. Valves shall be rated for zero leakage at 200 psi and have a 400 psi hydrostatic test structural soundness. All cast iron shall conform to ASTM A-126 Class B. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of

such defects will be allowed. Stems shall be manganese bronze having a minimum yield of 20,000 psi. Bolts shall be electro-zinc plated steel with hex heads and hex nuts in accordance with ASTM A-307.

2) Gate Valves: (under 2") Valves two (2") inches and under shall be bronze body, threaded ends, non-rising stem, solid wedge disc and shall be American Model 3FG or approved equal.

3) Check Valves: (over 3") Valves over three (3") inches shall be iron body, bronze mounted, horizontal swing check with mechanical joints or flanged ends (as may be called for). All working parts shall be spring-loaded to prevent slamming. The check valve shall be M&H Fig. 259-02; American Darling 50 Line or approved equal.

4) Check Valve: (under 3") Valves under three (3") inches shall screwed-end, bronze body, silent type as manufactured by Crane Co., No. 34 or approved equal.

5) Air Release & Vacuum Valves: The combination air release and vacuum valve shall be furnished with both a large and small orifice. The valve shall automatically function to release to atmosphere both large and small amounts of air that accumulate in the pipeline. Once air has been exhausted, both the large and small valve shall seat tightly to prevent water leakage. The valve shall also function to admit air into the line under emergency conditions, when the line is being drained. The valve body and cover shall be of semi-steel, floats of stainless steel, levers of bronze and resilient seats. The Valve shall be G-A Industries Inc., Type I-AV or approved equal.

6) Valve Boxes: All valves shall be provided with cast iron valve boxes. The top section shall be adjustable for finish grade. Each box shall be fitted with a precast concrete "donut" style ring for protection. All boxes shall have the type of utility serviced (ie; WATER; SEWER; GAS) provided in each cover.

e. <u>Fire Hydrants:</u>

1) All fire hydrants shall be standard 3-way, 5¼" barrel and two 2 - 2¼" hose connections. The hydrant shall be designed for 250 psi working pressure. Hydrants shall conform to the requirements of AWWA C-502. Hydrants shall have mechanical joint inlets and designed for three (3') foot bury. Additionally, all hydrants shall be traffic or breakaway style, dry barrel type. Hydrants shall be Mueller, Centurion 250; M&H Style 129; or approved equal. The hydrant shall be painted RED in color.

2) Maximum separation between fire hydrants shall be 1,000 feet. In no case shall the farthest point of corner of any new structure be permitted to be located more than 500 feet from the nearest fire hydrant capable of delivering the required fire flow. The distance shall be measured as the hose is laid.

3) All fire hydrants shall have a six (6") inch gate valve installed no more than two (2') feet in front of the hydrant. The hydrant shall also be set on one (1') foot of pea gravel under, around and up the side of each unit. The supply line and all fittings, including the main line tee, shall be fully restrained using "Mega-Lug" style mechanical joints. No rods or cables may be used.

4) All fire hydrants, unless otherwise agreed to, will be owned and maintained by the City of Milton. If no public right-of-way is available, a ten (10') foot wide utility easement will be required.

f. Steel Casing: All casing used for borings or similar crossings, shall be wrought steel, schedule 40, with minimum yield strength of 35,000 psi. The casing shall be installed by either jack/bore or directional drill method. Casing spacers and end seals shall be used in all installations. Additionally, as may be shown on the plans, casing vents may be required.

g. Pipeline/Valve Markers: Where indicated pipeline/valve markers may be required. All markers shall be Rhino Tri-View as manufactured by Rhino Marking & Protection System. Markers shall be one of the following colors. WATER – Blue; SEWER – Green; GAS – Yellow. Consult with the City for actual placement prior to installation. Prior to ordering, the contractor shall request from the City, the current data to print on each marker label.

h. Water Service Materials: When required, the following materials will be used for the item listed.
   1) Service Clamps: Ford Model FS202.
   2) Corporation Stop: Ford Model F-1000, w/compression connection.
   3) Service Tubing: Polybutylene meeting AWWA C-902, SDR 11, NSF approved. All service tubing under paved surfaces shall be encased in PVC of PE tubing.
   4) Curb Stop: Ford Model BH 41-233, w/ compression connection.
   5) Meter Boxes: Unless otherwise directed, will be supplied by the City
   6) Meter:
      - Up to two (2") inch: supplied by the City.
      - Above 2": supplied by the contractor. Meter shall be
        Commercial- Sensus OMNI Compound (C2)
        Industrial- Sensus OMNI Turbo (T2)

7) Backflow Preventer:
   - Up to two (2") inch: supplied by the City.
   - Above two (2") inch: supplied by the contractor. Backflow Preventer (BFP) shall meet all State and local requirements for either low or high hazard as defined by the Cross-Connection Control Program.
   - All BFP's will be the responsibility of the customer to maintain and test on an annual basis.

## C. NATURAL GAS PIPE LINES

1. GENERAL
   a. The work covered by this section shall consist of furnishing and installing natural gas pipe lines, including fittings, casings, testing and appurtenant items as called for on the plans and as specified herein.
   b. The contractor or sub-contractor must have a minimum of five (5) years experience installing gas pipe lines of similar size, length and complexity. Further, they must be OQ certified to perform each task in accordance with Federal and State laws, rules and regulations.
   c. All work shall be performed in accordance with Federal Title 49 CRF, Part 192.
   d. All gas lines installed will be considered to be in a Class 3 location, as defined by the Federal Safety Standards. Further, all work shall be in conformity with the applicable provisions of the Minimum Federal Safety Standards for this Class location.
   e. All gas lines installed shall have 36" minimum cover or that shown on the plans. All gas lines installed under ditches, streams or road crossings shall have 48" minimum cover or that shown on the plans.
   f. Where the gas line crosses other pipelines, drains, sewers, conduits, utilities or other underground structures, the trench at such points shall be excavated a sufficient depth to permit the proposed gas pipeline to be laid underneath such structures with a minimum clearance of twelve (12") inches or at a depth required by the City if greater than twelve (12") inches.
   g. PRIOR TO CONSTRUCTION, the Contractor or sub-contractor, must submit for the City's files two (2) copies of the following. 1) Their current drug and alcohol testing program which satisfies the appropriate Federal, State or other regulations for such procedures. 2) Their certificates for making heat fusion joints. Additionally, the Contractor will demonstrate to the City making heat fusion joints.

2. PRODUCT
   a. <u>Polyethylene Pipe and Fittings</u>

1) Polyethylene pipe (PE) and fittings shall conform to the applicable requirements of ASTM D2513, Thermoplastic Gas Pressure Pipe, Tubing and Fittings, latest edition. The polyethylene resin shall be in accordance with ASTM D1248, Standard Specification for Polyethylene Plastic Molding and Extrusion Materials, Class B, Grade P24, SDR 11. Cell Classification shall be in accordance with ASTM D3350, PE 234363E. Pipe shall be Poly Pipe 3810, PE 2406, MDPE as manufactured by CSR PolyPipe.
2) Storage, handling, installation and fusion shall be in accordance with the manufactures recommendations.
3) A 12 ga., insulated solid copper wire (locator wire) shall be installed along the entire length of the pipe line and service lines. The wire shall be installed at a depth of no less than 8" and no more than 12" above the pipe. The wire shall extend to the ground level at all valves, services or other locations designated by the City. Water tight splice kits shall be 3M ID No. 80-6105-9435-2 DBR or approve equal.
4) A 3' wide locator tape shall also be installed at a depth of no greater than 12" below the finished grade. The tape shall be YELLOW with the words "CAUTION – GAS LINE BURIED BELOW". The tape shall be Magnatec 31141 (3" X 1000' roll) or approved equal.

b. Valves
1) Valves shall be installed where shown on the plans. The location is only approximate and shall be confirmed by the City prior to installation.
2) All polyethylene vales shall be Polytec ball valves (PE 2406) as manufactured by Kerotest Corp. or approved equal. All in ground valves shall have cast iron valve boxes as shown in section B.5.d.e above.

3. EXECUTION
a. Stringing, Bending and Welding
Pipe shall be handled, welded and lowered in a workmanlike manner in accordance with best pipeline construction methods. Pipe shall be handled and strung to prevent damage to the pipe. Immediately prior to lining-up the pipe, each length of pipe shall be carefully examined for defects and swabbed clean with a steel brush pulled through the pipe. Bends shall be made of the same materials as the pipe. For steel pipe lines, the pipe shall be aligned and welded in strict conformance to the applicable provisions of Title 49 CRF, Part 192.283 using approved procedures by qualified welders. In accordance with Title 49 CFR, Part 192.285, all persons making heat fusion joints must be qualified to make the joints in accordance with Approved Qualified Fusion Procedures. Records of qualified personnel shall be maintained.

b. Laying of Pipe

After stringing and welding of the pipe, open ends will be left at intervals as directed by the City. All open ends, as well as all other exposed ends where work has been discontinued for any reason, shall be temporarily capped to prevent entry of dirt, water and other foreign debris. Prior to lowering any pipe into the trench, the bottom of the ditch shall be cleared of all debris or other items that could prevent from providing a firm continuous support for the pipe. Backfilling of trenches shall be in accordance with the applicable provisions of these specifications.

c. Blowing, Purging and Testing

After all open ends have been connected, but prior to testing, a standard cleaning "pig" shall be blown through the line using compressed air until the line has been cleaned to the satisfaction of the City of all rust scale, dirt or any other foreign matter. After cleaning, the Contractor shall air test all pipelines to 100 PSIG for polyethylene pipes and XXX PSIG for all steel pipeline. All tests shall be for a minimum of eight (8) hours with NO pressure drop. An approved pressure recording device shall be used. The testing shall be in the presence of City personnel and copies will be given to the City for their records. Any leak(s) detected shall be repaired at the Contractors expense and the tests repeated until all leaks are eliminated and a passing test is produced.

d. Record Drawings

Upon completion of the work, the Contractor will furnish to the City a complete and accurate record drawing of the work. The drawing shall show additions and revisions using red pencil or ink. The drawings shall also show locations to all valves, casings, service lines, regulator stations, pressure recorders, mains and any other pertinent information. Where possible, all gas lines shall be dimensioned to the centerline of any street. If the street centerline is not available, the Contractor shall ask the City on the method to be used. All valves shall be referenced by a 3-point method using street centerlines, power poles or fire hydrants as the basis points.

## D. INSTALLATION OF SANITARY SEWER AND POTABLE WATER

This section covers installation of gravity sewer, force mains and potable water lines.

### 1. GENERAL

All pipe, fittings and valves shall be carefully handled at all times to prevent damage to the pipe and other items. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by approved means and shall remain closed until construction is resumed. All joints shall be wiped free of all dirt, sand and foreign materials and the pipe shall be examined for defects prior to installation. Deviations from the piping location, line and grade indicated on the approved plans shall not be made without the prior approval of the Public Works Director or his designee.

2. PIPE LAYING PROCEDURES

a. Gravity Flow Piping

Gravity flow piping shall be installed to the line and grade indicated on the approved construction plans. Before installing the pipe, the ditch bottom shall be graded to insure that the pipe will have uniform bearing for its entire length. Bell holes shall be dug for bell placement. Jointing of the pipes shall be in accordance with the recommendations of the pipe manufacturer.

Installation of the pipe shall proceed in an upstream direction, unless otherwise approved, with the bells facing the direction of lying. All piping will be inspected for straightness, both horizontally and vertically. All gravity piping will be cleaned and televised upon completion. Prior to acceptance, all recorded videos will be reviewed before being accepted by the City.

b. Pressure Piping

Pressure piping shall be installed in strict accordance with the manufacturer's instructions. Before installing the pipe, the ditch bottom shall be graded to insure that the pipe will have uniform bearing for its entire length. Bell holes shall be dug for bell placement.

Suitable and approved thrust blocks or joint restrains shall be installed on all lines (except for flanged piping), at all tees, plugs, caps and any bends. All mechanical joint fittings shall use a "mega-lug" style following ring/gland. All fittings that use concrete as the thrust blocking, shall be separated using 30# builders felt or 8 mil plastic sheeting. All concrete shall be a minimum of 2000 psi compression strength.

The degree of joint deflection or bending shall be no greater than as recommended by the manufacturer.

The minimum cover for all piping shall be thirty (30") inches, unless otherwise noted. Minimum cover for all street or ditch bottom crossings shall be thirty-six (36") inches, unless otherwise noted. Minimum cover or separation between existing utilities shall be that required by the permitting agencies.

c. Sub-Surface Explorations

Whenever necessary to determine the location of existing underground utilities and in combination with Sunshine One-Call, the contractor shall examine all available records and shall make additional explorations and excavations for such purpose. All locations are to be considered to be approximate only and the contractor is responsible for locating and protecting all existing utilities whether or not shown on the drawings.

d. Protecting Underground and Surface Structures

The contractor will temporary support, adequately protect and maintain all underground and surface utility structures, drains, sewer and other obstructions encountered in the course of the work.

e. Trench Water and Dewatering

At all times when pipe laying is not in progress, the pipe opening shall be protected as to allow no trench water to enter the pipe. If required, the contractor shall provide all necessary pumps to dewater the site properly. The contractor shall provide all labor and materials including sheeting, boxes, bulkheads, drains etc., required to keep the excavation dewatered during construction so that the construction may be performed under dry conditions. Any discharge from pumps must be led to natural drainage channels or to drains. Pump discharge quality and method shall conform to FDEP Standards. Unless specifically called out, any cost associated with the dewatering shall be included with the line item bid for each item(s).

f. Unsuitable Conditions

No pipe(s) or structure(s) shall be placed in water or unsuitable soils conditions. Unsuitable soils, as to be determined by the Engineer of Record or Public Works Director (whichever appropriate), shall be removed and replaced with an approved material(s).

g. Construction Equipment

Mechanical equipment shall be used for trenching and excavating. However, in places where the operation of the equipment will cause damage to trees, shrubbery, pavement or other structures, either above or below the surface, hand digging methods shall be employed. When a utility is to be installed along paved streets, only rubber-tired equipment will be allowed to be used. The contractor will be responsible for any damage to streets, lawns or other areas when construction has occurred.

## E. TESTING AND INSPECTION OF SANITARY SEWER AND POTABLE WATER

### 1. GENERAL

During construction and at completion of the work, the **City of Milton** shall be present during **ALL** testing as required in these manual.

In general, tests shall conform to usually accepted testing practices for the specific type and class of test. All data, observations and results will be carefully recorded for the City. Project acceptance may be held contingent on receipt of satisfactory test reports. A minimum of 24 hours notice shall be given prior to performance of any tests specified herein. The test shall be scheduled so that the test can be completed prior to 4 p.m. during normal working days.

2. TESTING OF GRAVITY PIPEWORK
   a. Testing
      It is imperative that all sewers and manholes be built watertight. Upon completion of all sewers and manholes, each will be low pressure air tested. For gravity sewers, including service lines shall be tested in accordance with ASTM F-1417. Manholes shall be tested in accordance with ASTM C-1244. No hydrostatic testing will be allowed. In addition, as specified in Section 4.3.a. above, the pipe shall be flushed, cleaned and televised prior to final acceptance.

3. HYDROSTATIC TESTING OF PRESSURE PIPE
   a. Pressure and Duration During Test
      After the pipe has been installed and backfilled as specified, each valved section of pipe, unless otherwise noted, shall be subjected to a hydrostatic pressure test. Testing shall be 150 p.s.i.g. for all potable water mains and 100 p.s.i.g. for all sewer force mains. Tests shall be at least 2 hours after the pressure has stabilized. All tests shall use a recording chart recorder with the location, time, dated and contractor making the test neatly printed on the chart. The chart(s) will be turned over to the City for their records.

   b. Procedure
      Each section of pipe shall be slowly filled with water and the specified test pressure, as measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe. The pump, pipe connection, gauges, meter and other necessary apparatus shall be furnished by the contractor. All water used for flushing and testing shall be the responsibility of the contractor.
      Before applying the specified test pressure, all air shall be expelled from the pipe. In order to accomplish this, additional taps may be made at various points along the main.

   c. Permissible Leakage
      All installed mains shall be pressure tested and leakage tested in accordance with the latest edition of AWWA Standard C-900.

| **Pipe Size** | **Gals/1000'/24hrs.** | **Gals/1000'/1hr.** |
|---|---|---|
| 3" | 5.76 | 0.24 |
| 4" | 7.92 | 0.33 |
| 6" | 12.00 | 0.50 |
| 8" | 15.84 | 0.66 |
| 10" | 19.92 | 0.83 |
| 12" | 23.76 | 0.99 |

4. CHLORINATION OF POTABLE WATER PIPING
   a. Disinfection

All potable water mains shall be disinfected in accordance with AWWA C-601, latest edition, and current FDEP requirements. All chlorinated water shall be disposed of in accordance with the current FDEP requirements. In the process of chlorination, all valves and hydrants shall be opened so as to provide the chlorinated water to come in contact with each item. Upon completion of the chlorination process, the contractor will flush all mains of the heavily chlorinated water prior to sampling for bacteriological testing. Upon notification from the contractor, the City will take test samples and supply to an FDEP approved laboratory for testing. Any cost associated with the testing will be borne by the contractor. At least two (2) sets of samples will be required, taken at intervals acceptable to the FDEP. If any test fails, the City will repeat the testing until approval is obtained.

5. ACCEPTANCE

Prior to the City accepting any water or pressure sewer system for use, the contractor and the Engineer of Record shall have the approval of the FDEP. A copy of the Clearance/Acceptance letter shall be provide to the City for their records along with two (2) sets of paper and one (1) electronic set of As-Built drawings.

# SECTION 5 – DRAINAGE

## A. GENERAL

The techniques utilized for providing drainage should result in proper stormwater conveyance and treatment for developments and for safe vehicle operation on or off the roadway. Proper drainage of pavement, shoulders, medians and roadside clear zones is important to maintain safe streets and highways.

All components of drainage design and construction shall be in strict accordance with the Land Development Regulations (Section V-6, Stormwater management). The City will not accept for maintenance any road or street or will not approve any development for which adequate provision for drainage is not assured. All stormwater collection and treatment systems shall be in accordance with all FDEP and EPA requirements. Runoff from any new road, street or development shall not cause a violation of the rights of any downstream property owners, nor shall the runoff exceed the capacity of existing downstream structures or result in flood conditions at any point. Finally, no additional excavation or work pertaining to runoff shall be left for the City to perform. During construction, the contractor/owner/permit holder shall insure that all proper stormwater controls are in place and properly maintained so that site erosion is contained. Prior to the acceptance of the stormwater system, all components shall be in proper working order (as designed by the Engineer of Record) and free of debris and silt.

## B. DRAINAGE PIPE AND STRUCTURES

Drainage pipes shall be reinforced concrete (RCP) meeting the requirements of the FDOT Standard Specifications. RCP shall be used under all roadway surfaces. Other types of pipe may be used in areas outside the roadway surfaces upon approval of the City Manager or his designee.

### 1. MATERIALS

a. Concrete

Conform to the requirements in SECTION 1, F.1.

b. Forms

Conform to the requirements in SECTION 1, F.1.

c. Reinforcement

Conform to the requirements in SECTION 1, F.1.

d. Placing, Curing and Finishing

Conform to the requirements of SECTION 1, F.1.

e. Masonry

Bricks for accessories shall be hard common clay brick.
Mortar shall be one part Portland Mortar Mix to three (3) parts masonry sand. Special commercial mortar mixes may be used if approved by the Engineer. All masonry materials shall conform to the ltest applicable ASTM specification.

1) Set all masonry units in full beds of mortar, with full joints and strike all joints flush.
2) Masonry reinforcements shall be galvanized Dur-O-Wal or approved equal and shall be installed at every other bed joint.

f. Catch Basin, Drop Inlet, Junction Box, Box Culvert and Headwall Construction

All bases shall be precast into each structure. Alternately, separate concrete bases may be poured on undisturbed dry subgrade to the dimensions shown on the plans.

Based on the depth or size of the structures, cast-iron steps may be required. All cast-iron castings shall be heavy duty traffic rated units with the wording STORM cast into the lid.

All piping entering a structure shall terminate at the interior wall. All pipes shall be grouted to the full wall thickness between the pipe and the structure.

g. Reinforced concrete pipe

RCP shall conform to the requirements of ASTM C-76, Class III. Cement used for the manufacturing of the pipe shall be Type II, conforming to ASTM C-150. All RCP shall have a flexible water tight gasket. All pipes placed within dedicated City right-of-ways shall have each joint warped in filter fabric. The filter fabric shall be of the engineered type used for trench drains and retaining walls.

2. LAYING OF STORM DRAIN PIPING

a. General

Before lowering pipe into tranches, the bottom of the ditch shall be graded so that when the pipe rests in the ditch, it will have bearing for its entire length. After placing the pipe in the ditch, the ends shall be wiped free from all dirt, sand and foreign material and the inside of the pipe shall be cleaned. The joints shall then be made in accordance with the recommendations of the pipe manufacturer. The pipe shall be handled and installed in strict accordance with the manufacturers printed instructions.

b. Direction of Laying

The laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow. All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered so that when laid, they will form a uniform invert in a straight line.

c. Protecting Underground Surface Structures

The contractor will temporary support, adequately protect and maintain all underground and surface utility structures, drains, sewers and other obstructions encountered in the progress of the work.

d. Unsuitable Condition

No pipe(s) or structure(s) shall be placed in water, unsuitable soils conditions, when the trench conditions or weather is unsuitable for work. All discharge structures shall incorporate a scupper or oil skimmer using aluminum and stainless steel hardware. No wood products will be allowed.

# TABLE II – 4
## RECOMMENDED MINIMUM DESIGN SPEED, MPH

| TYPE OF ROADWAY | URBAN *SPEED RESTRICTIONS WITH | WITHOUT |
|---|---|---|
| Arterial | 35 | 50 |
| Collector | 30 | 40 |
| Local** | 20 | 30 |

* Speed restrictions are features of the design which would effectively limit the operating speed, such as:

- A short length or roadway (e.g., a dead-end street).
- Closely spaced stop signs, traffic signals or other control devices.
- Locations that would by nature of the surrounding development or land use, indicate to the driver that lower speeds were necessary.

** Design speeds lower than 30 mph may be used for local, subdivision type roads and streets. Streets with a design speed less than 30 mph shall be posted with appropriate legal speed limit signs.

# TABLE II – 5
## STOPPING SIGHT DISTANCE AND K VALVES

STOPPING SIGHT DISTANCE
(Based on height of eye of 3.50 feet and height of object 6 inches above road surface)

| Design Speed, mph | 20 | 30 | 40 | 50 | 60 | 65 | 70 |
|---|---|---|---|---|---|---|---|
| Stopping Site Distance, Feet | 125 | 200 | 275 to 325 | 400 To 475 | 525 To 650 | 550 To 725 | 625 To 850 |

# TABLE II – 6
## HORIZONTAL CURVATURE

| MAXIMUM CURVATURE, DEGREES | | | |
|---|---|---|---|
| Rural (Based on max superelevation of 0.10 feet per foot) | | Urban (Based on max superelevation of 0.05 feet per foot) | |
| Design Speed | Max Degree of Curve | Design Speed | Max Degree of Curve |
| 30 | 24° 45' (230'Radius) | 30 | 14° |
| 40 | 13° 15' | 35 | 10° |
| 50 | 8° 15' | 40 | 7° 30' |
| 60 | 5° 15' | 45 | 6° |
| 65 | 4° 15' | 50 | 5° |
| 70 | 3° 30' | | |

| Rural Interstate | 3 Deg. Max ( 2 Deg. Desirable Maximum) |
|---|---|

| MINIMUM RADIUS, FEET | | |
|---|---|---|
| Urban – Lower Speed Streets | | |
| Design Speed | Min Radius With .05 feet per foot superelevation | Min Radius Without superelevation |
| 15 | 40 | 50 |
| 20 | 75 | 95 |
| 25 | 140 | 180 |
| 30 | 225 | 300 |

## TABLE II – 7
### RECOMMENDED MAXIMUM GRADES IN PERCENT

| TYPE OF ROADWAY | DESIGN SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20 | 30 | 40 | 50 | 60 | 65 | 70 |
| Arterial | | | 6 | 5 | 4 | 4 | 4 |
| Collector | | | 9 | 8 | 7 | 6 | 5 |
| Local | 11 | 10 | 9 | 8 | 6 | | |
| Truck Route* | | 5 | 5 | 4 | 4 | | |

* Local and collector streets with significant (15% or more) truck traffic.

## TABLE II – 8
### MAXIMUM CHANGE IN GRADE
**(Without using Vertical Curve)**

| Design Speed (mph) | 20 | 30 | 40 | 50 | 60 | 65 | 70 |
|---|---|---|---|---|---|---|---|
| Maximum Change in Grade in Percent | 1.20 | 1.00 | 0.80 | 0.60 | 0.40 | 0.30 | 0.20 |

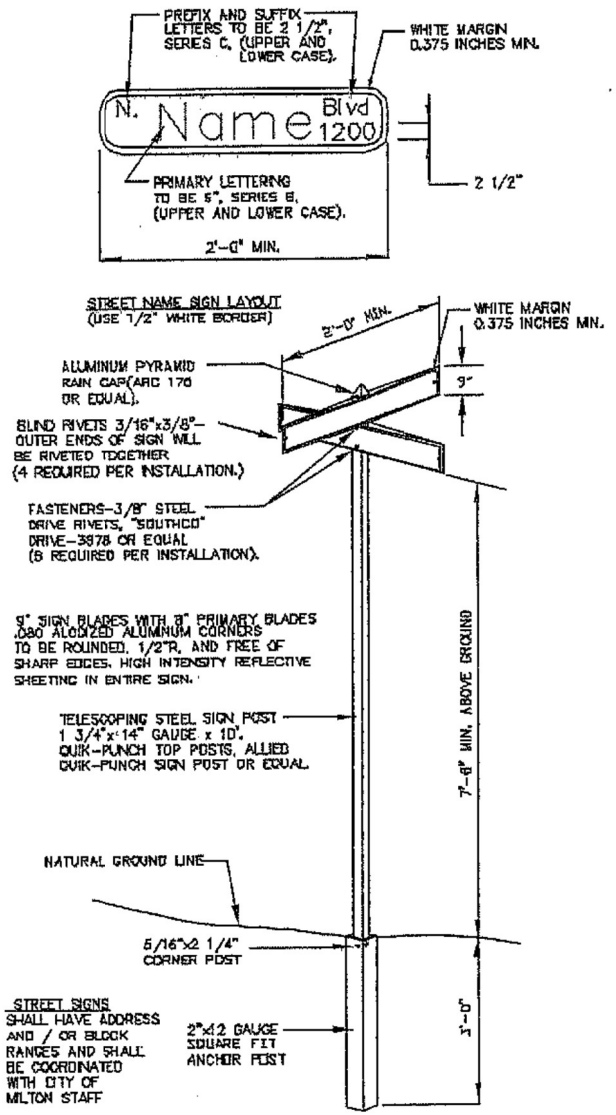
# TABLE II – 10
## DESIGN LENGTHS OF SPEED CHANGE LANES
## FLAT GRADES – 2 PERCENT OR LESS

| Design speed of turning roadway curve, mph | | Stop Con-dition | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Minimum curve radius, eet | | | 30 | 90 | 150 | 230 | 310 | 430 | 550 | 690 |
| Design speed of highway mph | Length of taper. feet* | Total length of DECELERATION LANE, including taper feet: All main highways | | | | | | | | |
| 40 | 190 | 325 | 300 | 275 | 250 | 200 | - | - | - | - |
| 50 | 230 | 425 | 400 | 375 | 350 | 325 | 275 | | - | - |
| 60 | 270 | 500 | 500 | 475 | 450 | 425 | 400 | 325 | 300 | - |
| 65 | 290 | 530 | 550 | 525 | 500 | 475 | 450 | 375 | 325 | |
| 70 | 300 | 600 | 575 | 550 | 550 | 525 | 500 | 425 | 400 | 350 |
| Design speed of highway mph | Length of taper. feet | Total length of ACCELERATION LANE, including taper feet: | | | | | | | | |
| 40 | 190 | - | 325 | 250 | 225 | - | - | - | - | - |
| 50 | 230 | - | 700 | 625 | 600 | 500 | 400 | - | - | - |
| 60 | 270 | - | 1125 | 1075 | 1000 | 900 | 800 | 600 | 400 | - |
| 70 | 300 | - | 1530 | 1500 | 1400 | 1325 | 1225 | 1000 | 825 | 375 |

*** For urban street auxiliary lanes shorter tapers may be used due to lower operating speeds. Refer to AASHTO Policy on Geometric Design of Highways and Streets for allowable taper ates.**

# TABLE II – 11
## RATIO OF LENGTH OF SPEED CHANGE LANE ON GRADE TO LENGTH ON LEVEL

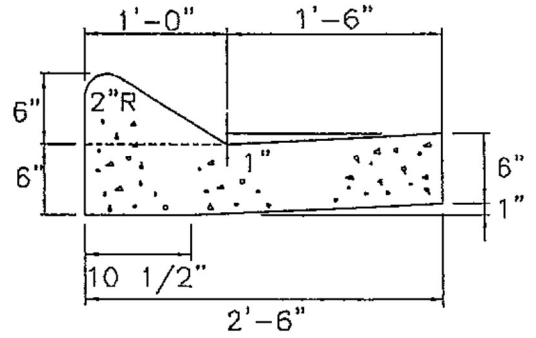
| DECELERATION LANE | | | ACCELERATION LANE | | | | | |
|---|---|---|---|---|---|---|---|---|
| Design Speed of Highway mph | Ratio | | Design Speed of Highway mph | Design Speed of Turning Roadway, mph | | | | |
| All | 3-4% upgrade 0.9 | 3-4% downgrade 1.2 | | 20 | 30 | 40 | 50 | All speeds |
| | | | | 3–4% upgrade | | | | 3–4% downgrade |
| | 5 – 6 % upgrade 0.8 | 5 – 6 % downgrade 1.35 | 40 | 1.3 | 1.3 | - | - | 0.7 |
| | | | 50 | 1.3 | 1.4 | 1.4 | - | 1.65 |
| | | | 60 | 1.4 | 1.5 | 1.5 | 1.6 | 0.6 |
| | | | 70 | 1.5 | 1.6 | 1.7 | 1.8 | 0.6 |
| | | | | 5-6% upgrade | | | | 5-6% downgrade |
| Ratios in this table multiplied by the values in table III – 16 give the length of speed change land for the respective grade. | | | 40 | 1.5 | 1.5 | - | - | 0.6 |
| | | | 50 | 1.5 | 1.7 | 1.9 | - | 0.55 |
| | | | 60 | 1.7 | 1.9 | 2.2 | 2.5 | 0.5 |
| | | | 70 | 2.0 | 2.2 | 2.6 | 3.0 | 0.5 |




# STREET SIGN DETAIL

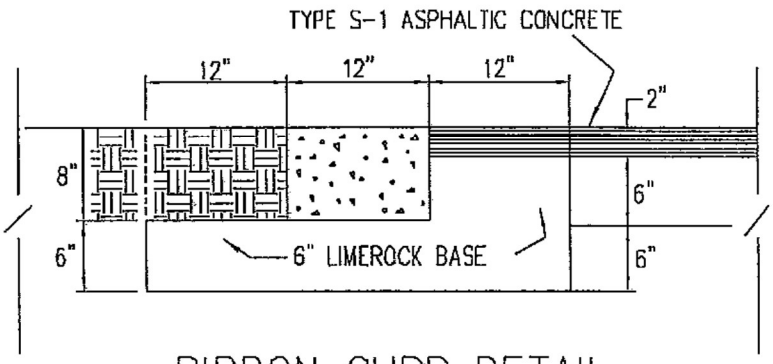
NOT TO SCALE

FIGURE II-3



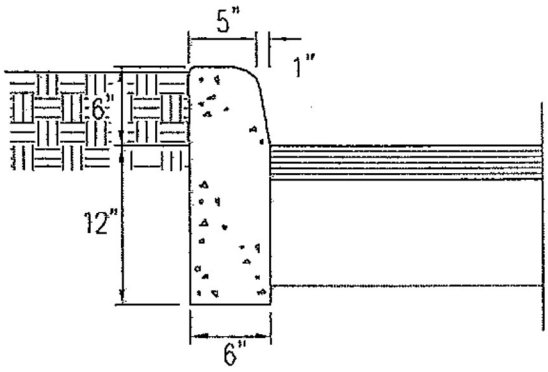

## LAYBACK CURB DETAIL

SCALE NTS



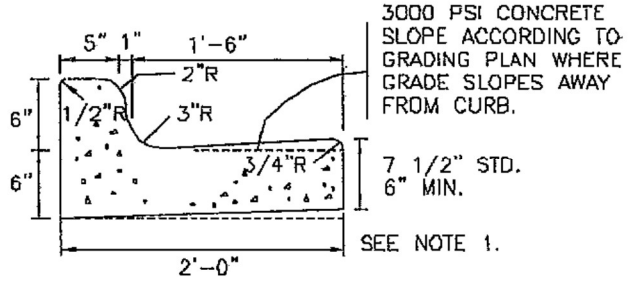

## RIBBON CURB DETAIL

SCALE NTS




## RAISED CURB DETAIL

SCALE NTS

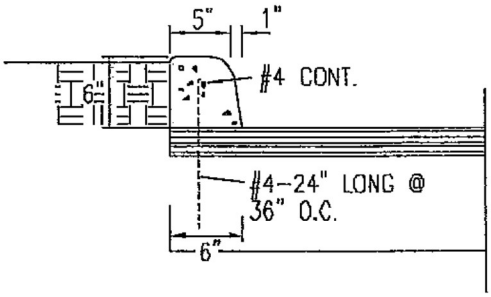



## F.D.O.T. TYPE 'F' CURB & GUTTER

SCALE NTS

NOTE 1:

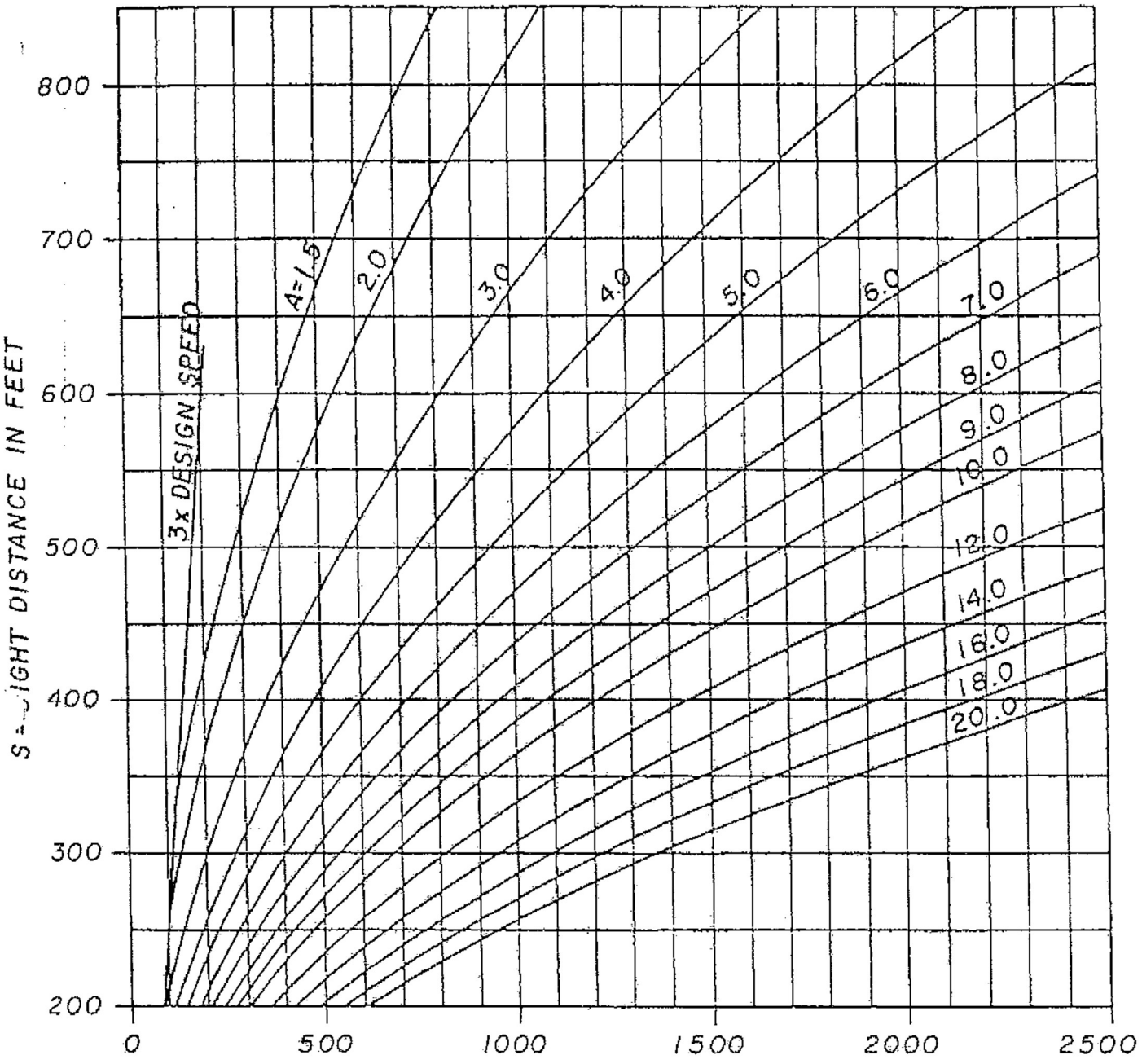
WHEN USED ON HIGH SIDE OF ROADWAYS, THE CROSS SLOPE OF THE GUTTER SHALL MATCH THE ADJACENT PAVEMENT AND THE THICKNESS OF THE LIP SHALL BE 6" UNLESS OTHERWISE SHOWN ON PLANS.




## ISLAND CURB DETAIL

SCALE NTS

# FIGURE II-4

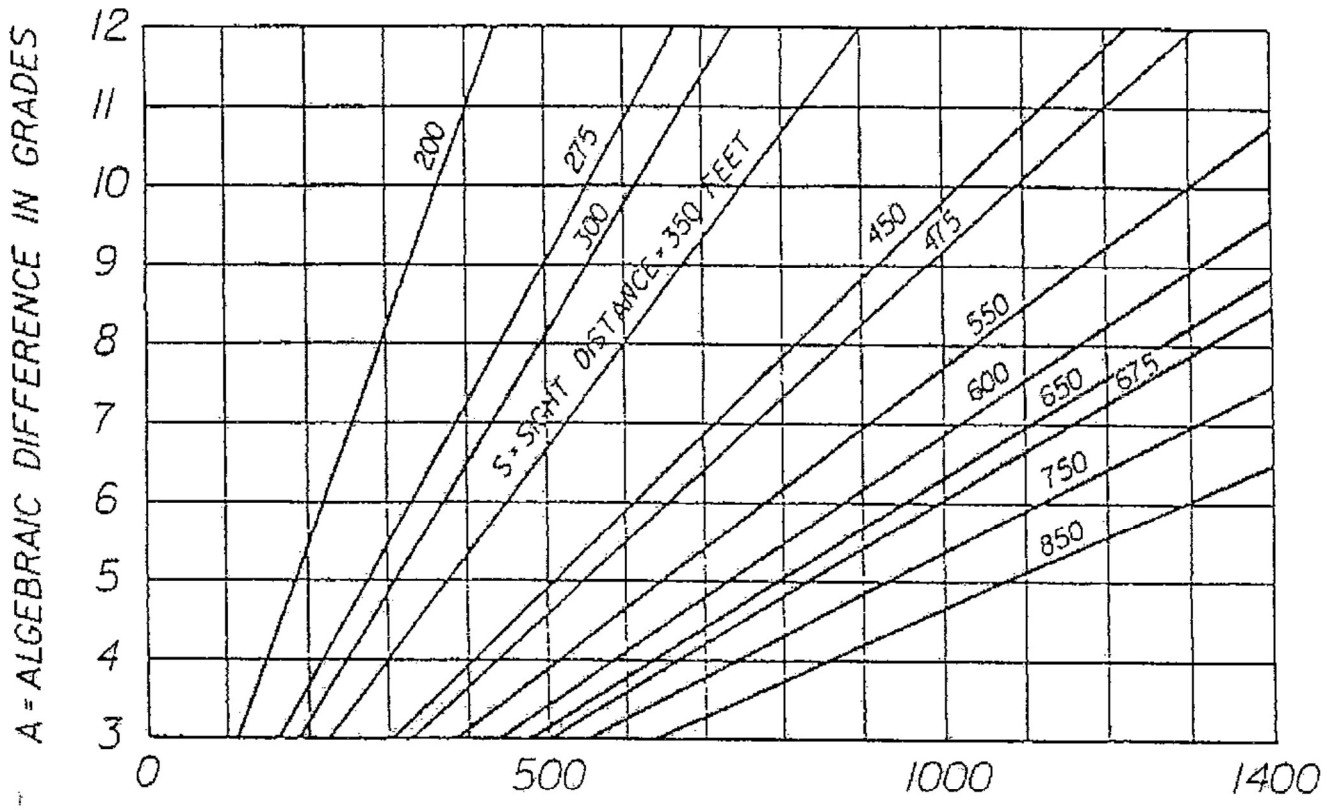



*Lengths of vertical curves are computed from the formula* $L = \frac{AS^2}{1329}$

*A = Algebraic Difference In Grades In Percent*
*S = Sight Distance*

**LENGTH OF CREST VERTICAL CURVE**
**( STOPPING SIGHT DISTANCE )**

**FIGURE II-5**

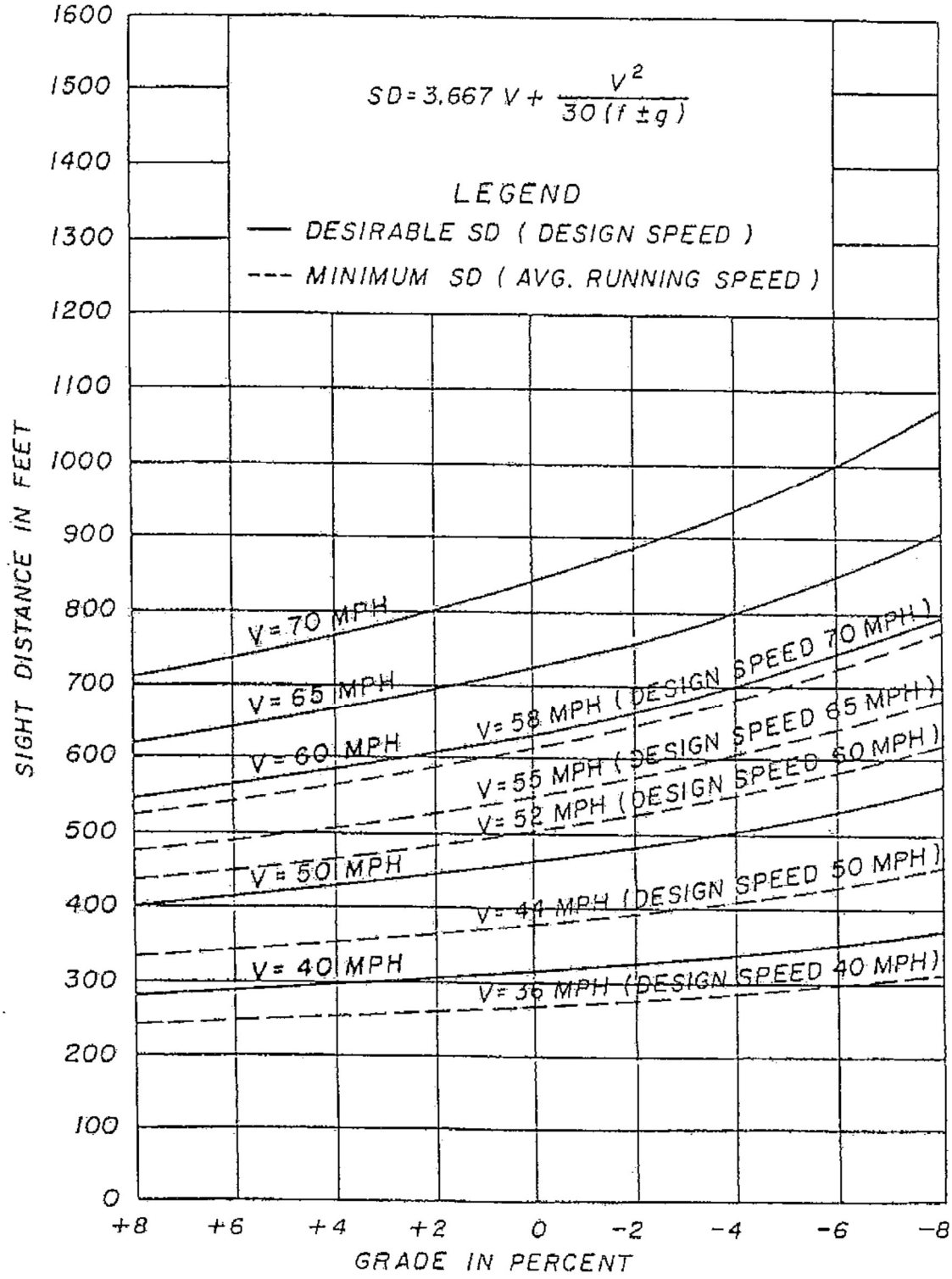



*HEADLIGHT SIGHT DISTANCE*

*Lengths of vertical curves are computed from the formula:*

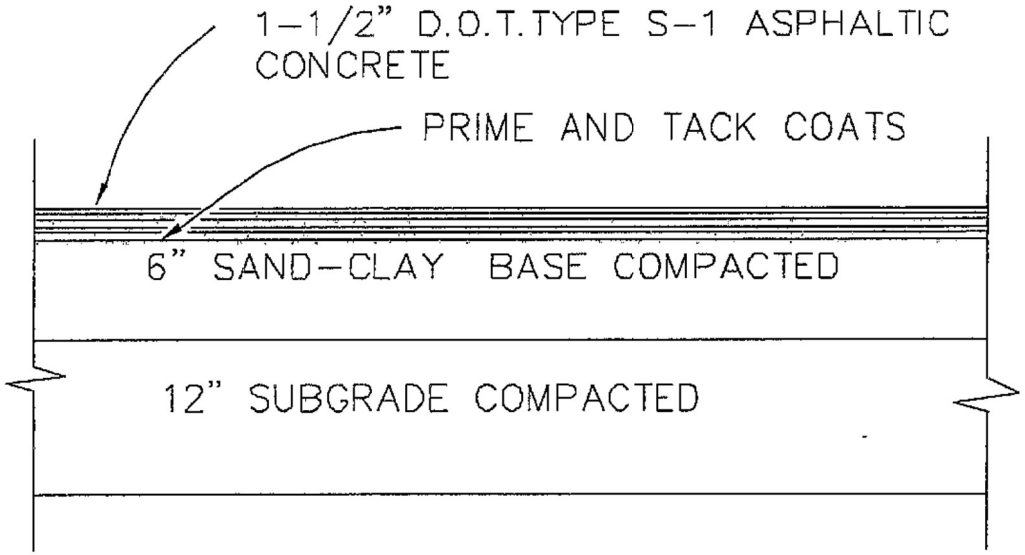
$$L = \frac{AS^2}{400 + 3.5(S)}$$

**LENGTH OF SAG VERTICAL CURVE**
**( STOPPING SIGHT DISTANCE )**
**FIGURE II-6**




**SIGHT DISTANCES FOR APPROACH TO STOP ON GRADES**

**FIGURE II-7**

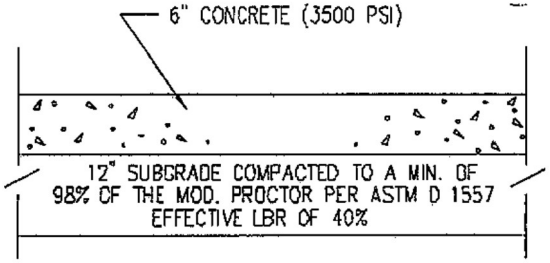



NOTE: PAVEMENT WITHIN MAIN RIGHT-OF-WAYS TO BE 2" ASPHALTIC CONCRETE WITH 8" SAND-CLAY BASE. MATERIALS ARE TO BE OF THE TYPE AND COMPACTED AS SHOWN ABOVE.

## TYPICAL PAVEMENT SECTION

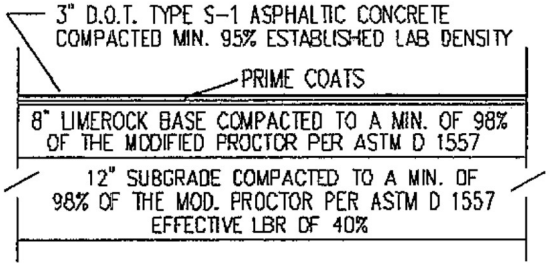
NTS

FIGURE II-9



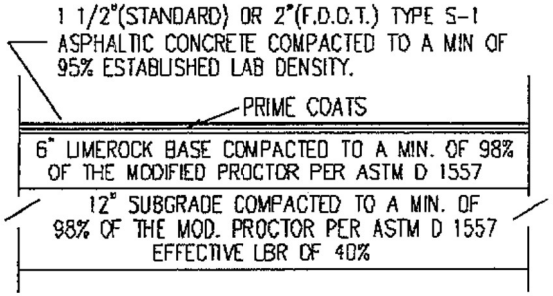

## CONCRETE PAVING SECTION

NOT TO SCALE




## HEAVY DUTY PAVEMENT SECTION

NOT TO SCALE

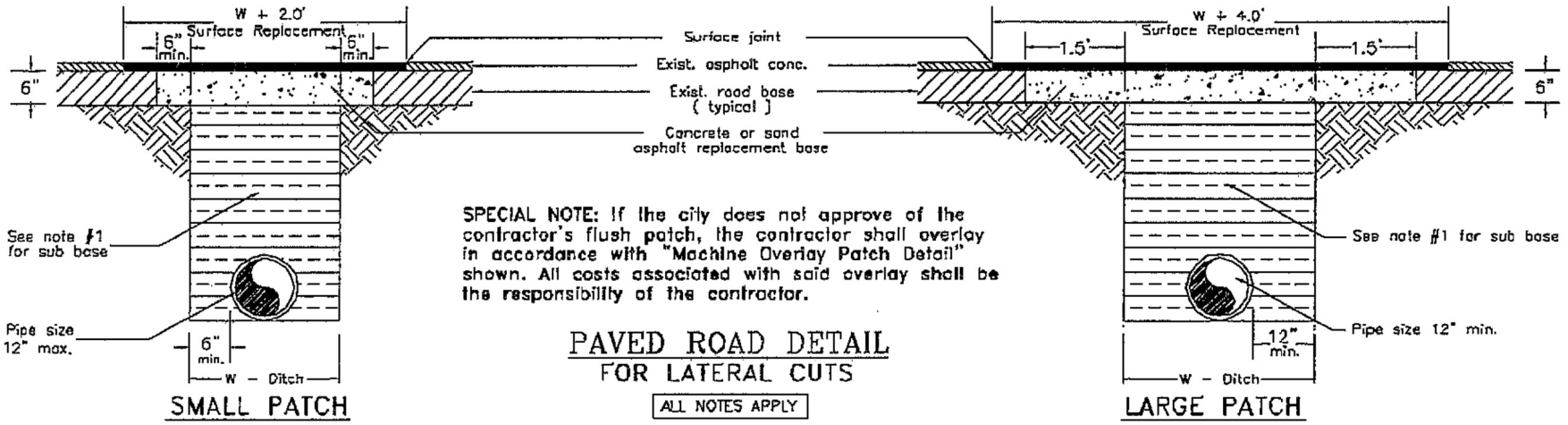



## STANDARD & F.D.O.T. PAVEMENT SECTION

NOT TO SCALE

NOTE:

1. LIMEROCK BASE SHALL HAVE A MAX. L.L. OF 35, MATERIAL SHALL BE NON PLASTIC AND HAVE A MIN. L.B.R. OF 100% FOR ALL PAVEMENT SECTIONS.



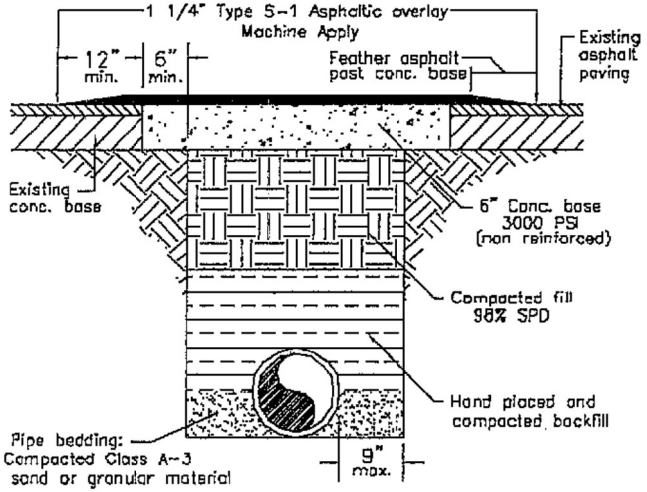

SMALL PATCH

LARGE PATCH

**SPECIAL NOTE:** If the city does not approve of the contractor's flush patch, the contractor shall overlay in accordance with "Machine Overlay Patch Detail" shown. All costs associated with said overlay shall be the responsibility of the contractor.

## PAVED ROAD DETAIL
## FOR LATERAL CUTS

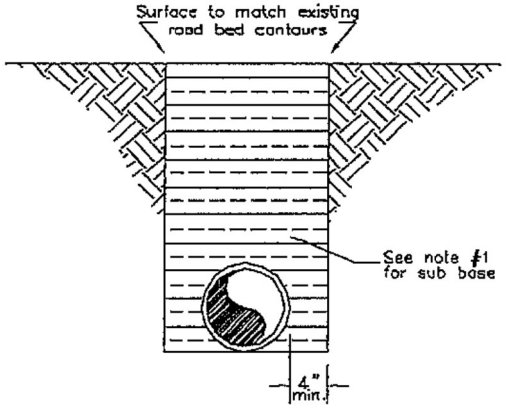
ALL NOTES APPLY




MACHINE OVERLAY PATCH DETAIL

### NOTES

1. Patch work sub base material to be placed in 8" layers (max.), each layer to be tamped to a minimum of 40 lbr.
2. Road cuts shall be : (a) Mechanically sawed to form a surface pavement joint.
   (b) Surface treatment pavement joint shall be lapped and feathered.
   (c) Surface material will be consistent and same material as the existing surface course.
   (d) Concrete replacement base poured in place with a minimum strength of 2500 psi.
3. Longitudinal road cuts of less than one half pavement width to be patched same as lateral patch. Longitudinal road cuts 1/2 or over to be patched with same base material and entire road resurfaced.
4. All open roadway cuts will have a density test performed to insure the roadbed has a 95% compaction. Failure to do so will result in repatching. A copy of the test results will be provided to the City of Milton.

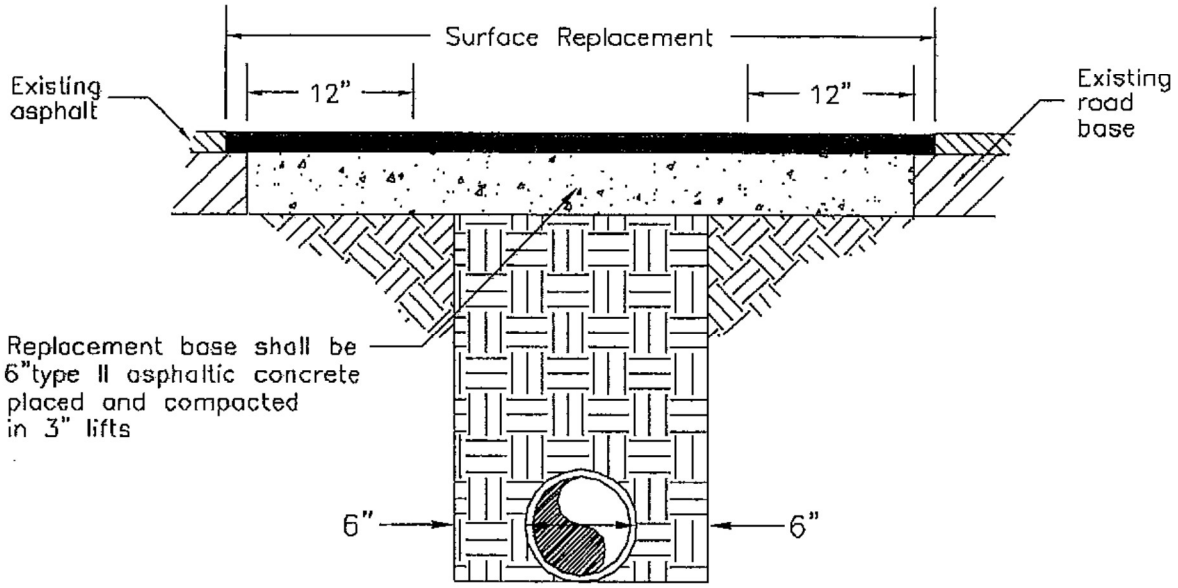



DIRT ROAD PATCH DETAIL

# TYPICAL PATCH DETAILS
## ( FOR CITY STREET )

N.T.S.

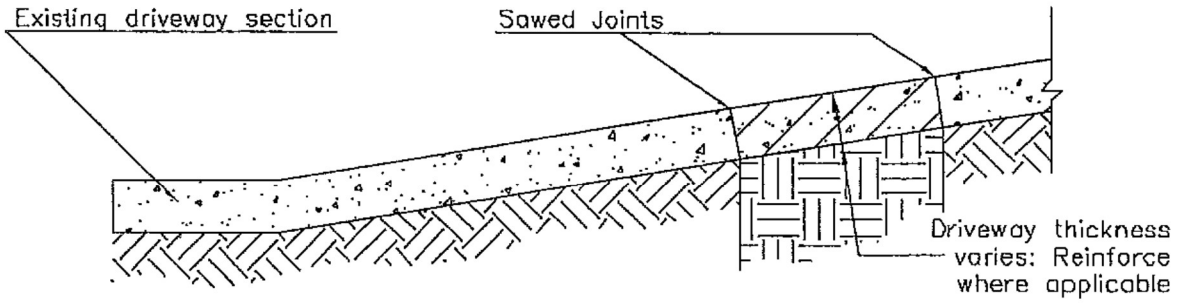
FIGURE II-11




## STREET PATCH

GENERAL NOTES

1. Asphaltic concrete pavement joints shall be mechanically sawed.
2. Surface treatment paved joints shall be lapped and feathered.
3. Surface replacement course to be 1 1/2" type S-1 asphaltic concrete.
4. Sub base material is to be placed and compacted in 8" lifts to a minimum density of 98% of standard proctor.
5. Minimum surface replacement course of longitudinal cuts to be one half of existing road or 12'.
6. Longitudinal cut replacement base shall be full depth asphaltic concrete.
7. Any variance must be approved on an individual basis by the city.
8. Permit from the City of Milton is required. Inspection by the street division or a compaction test by a testing lab is required.
9. Contact the Public Works division and all emergency services (police, fire, and emergency medical services) before completely closing a road and notify same when the road has been re-opened.



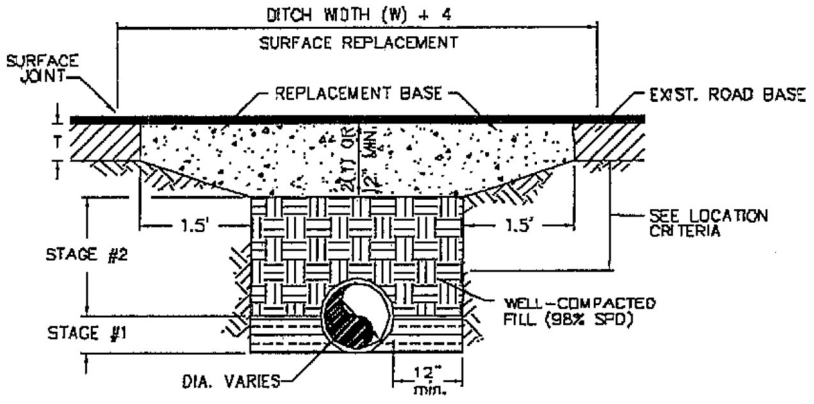

## DRIVEWAY PATCH

# TYPICAL PATCH DETAILS

## ( CITY OF PENSACOLA )

N.T.S.

FIGURE II-12




DENSITY PROCEDURES:

The backfill for the first and second stages shall be placed in 6" layers; (compacted thickness) and shall be compacted to 100% of maximum density as determined by AASHTO T-99.

STAGE #1

The permittee shall provide adequate compacted fill beneath the haunches of the pipe, using mechanical tamps suitable for this purpose. This compaction applies to the material placed beneath the haunches of the pipe and above any bedding required.

STAGE #2

The permittee shall obtain a well-compacted bed and fill along the sides of the pipe and to a point indicating the top of sub grade material.

GENERAL NOTES

Base and backfill materials shall be either of the same type and composition as the materials removed, or of equal or greater structural adequacy. Materials contaminated with deleterious substances during excavation shall not be used.

Replaced base material over ditch shall be twice the thickness of the original base.

Base material shall be placed in two or three layers and each layer thoroughly rolled or tamped to the specified density.

Asphalt concrete pavement joints shall be mechanically sawed.

Surface treatment pavement joints shall be lapped and feathered.

Surface material will be consistent with the existing surface.

LIMEROCK, SAND-CLAY, SHELL, etc. BASES:

6" Layers Compacted Thickness Density Requirements:

98% Under Roadway

95% Outside the Traveled Roadway, such as, Intersections, Crossovers, Turnouts, etc.

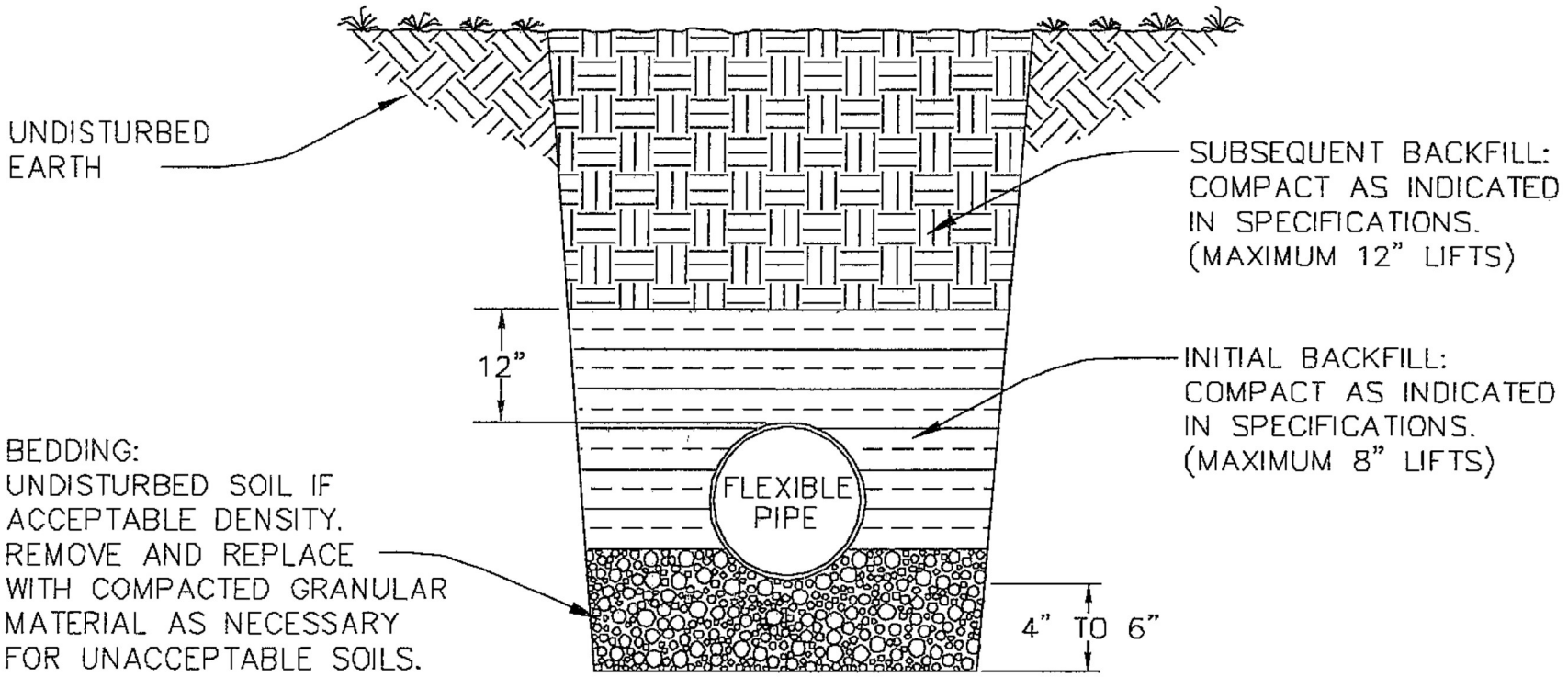
95% Shoulder Pavement

METHOD AASHTO T-180

# REPLACEMENT OF FLEXIBLE PAVEMENT FOR PERMITTED PAVEMENT CUT

N.T.S.

FIGURE II-13




# FLEXIBLE PIPE BEDDING DETAIL

N. T. S.

FIGURE II–14

# GEOTECHNICAL ENGINEERING REPORT

## Carpenters Park Improvements
**Milton, Santa Rosa County, Florida**

**PREPARED FOR:**
**Volkert, Inc.**
6601 North Davis Highway, Suite 102
Pensacola, Florida 32504

NOVA Project Number: 10116-2018169

January 14, 2019

NOVA
PROFESSIONAL | PRACTICAL | PROVEN

January 14, 2019

Volkert, Inc.
6601 North Davis Highway, Suite 102
Pensacola, Florida 32504

**Attention:** Mr. Mike Warnke, P.E., ENV SP – Project Manager

**Subject:** Geotechnical Engineering Report
**CARPENTERS PARK IMPROVEMENTS**
Milton, Santa Rosa County, Florida
NOVA Project Number 10116-2018169

Dear Mr. Warnke:

**NOVA Engineering and Environmental LLC (NOVA)** has completed the authorized Geotechnical Engineering Report for the proposed improements to Carpenters Park located in Milton, Santa Rosa County, Florida. The work was performed in general accordance with NOVA Proposal Number 016-20170572r1, dated July 25, 2018. This report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions, and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
**NOVA Engineering and Environmental LLC**

Jesse A. James E.I.
Assistant Branch Manager
Florida Certificate No. 1100019359

William L. Lawrence, P.E.
Senior Regional Engineer
Florida Registration No. 60147

WILLIAM LEE LAWRENCE, JR. ★ LICENSE ★ No. 60147 ★ STATE OF FLORIDA ★ PROFESSIONAL ENGINEER

Copies Submitted: via electronic mail service

# TABLE OF CONTENTS

# 1.0 INTRODUCTION

## 1.1 PROJECT INFORMATION

Our understanding of this project is based on discussions with the project design team, review of the provided site plan, a site reconnaissance performed during the boring layout, review of aerial photography of the site via internet-based GIS software, and our experience with similar geotechnical conditions in the near vicinity to this project site.

### 1.1.1 Site Plans and Documents

We were furnished with the following plans and documents:

- Document: Carpenter's Park Phase 1
  Prepared by: TSW
  Dated: January 4, 2019

### 1.1.2 Proposed Construction

NOVA understands that this phase of the planned improvements to the existing water-front park facility will include constructing additional sidewalks and a splash pad feature.

### 1.1.3 Maximum Loads

Foundation support for the proposed splash pad is anticipated to be accomplished via conventional shallow footings and a slab-on-grade system. Structural loadings and grading details were not available from the design team at the time of the issuance of this report; we have therefore assumed that an allowable design soil bearing pressure of 1,500 pounds per square foot (psf) will be sufficient for the design of the splash pad foundation.

### 1.1.4 Floor Elevations / Site Grading

We assume that finish site grades will not change greater than +/- 2 feet from existing grades within the footprint of the proposed splash pad feature.

## 1.2 SCOPE OF WORK

**Vilkert, Inc.,** engaged NOVA to provide geotechnical engineering consulting services for the planned **Carpenters Park Improvements** project. This report briefly discusses our understanding of the project, describes our exploratory procedures, and presents our findings, conclusions, and recommendations.

The primary objective of this study was to perform a geotechnical exploration within the areas of the proposed construction and to assess these findings as they relate to geotechnical aspects of the planned site development. The authorized geotechnical engineering services included a site reconnaissance, a soil test boring and sampling program, laboratory testing, engineering evaluation of the field and laboratory data, and the preparation of this report. The services were performed substantially as outlined in our proposal number 016-20170572r1, dated July 25, 2018, and in general accordance with industry standards. As authorized by the client, this geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, as well as a Boring Location Plan, and individual Test Boring Records.
- Site preparation considerations that include geotechnical discussions regarding site stripping and subgrade preparation, and engineered fill/backfill placement.
- Recommendations for controlling groundwater and/or run-off during construction and, the need for permanent dewatering systems based on the anticipated post construction groundwater levels.
- Shallow foundation system recommendations for the proposed splash pad feature.
- Suitability of on-site soils for re-use as structural fill and backfill. Additionally, the criteria for suitable fill materials will be provided.
- Recommended quality control measures (i.e. sampling, testing, and inspection requirements) for site grading, foundation, and pavement construction.

The assessment of site environmental conditions, including the presence of wetlands or detection of pollutants in the soil, rock or groundwater, laboratory testing of samples, or a site-specific seismic study was beyond the scope of this geotechnical study. If requested, NOVA can provide these services.

# 2.0 SITE DESCRIPTION

## 2.1 LOCATION AND LEGAL DESCRIPTION

Carpenters Park is located southeast of the intersection of Munson Highway and Broad Street in Milton, Santa Rosa County, Florida. A Site Location Map is included in Appendix A.

## 2.2 SUBJECT PROPERTY AND VICINITY GENERAL CHARACTERISTICS

The vicinity of the Subject Property is generally developed with mixed residential and light commercial uses, and is bordered by the following:

| DIRECTION | LAND USE DESCRIPTION/OBSERVATIONS |
|---|---|
| NORTH | Munson Highway |
| WEST | Broad Street |
| SOUTH | Blackwater River |
| EAST | Blackwater River |

## 2.3 CURRENT USE OF THE PROPERTY

At the time of our field exploration, the subject waterfront property was being utilized as a park with a playground area, several single-story structures, as well as asphalt paved entrance drives and parking areas. Greenbelt areas of the property were vegetated with short grasses and isolated sapling to mature trees.

# 3.0 FIELD EXPLORATION

Boring locations were established in the field by NOVA personnel using the provided site plan and handheld GPS equipment. The approximate locations are shown in Appendix A. Consequently, referenced boring locations and elevations should be considered approximate. If increased accuracy is desired by the client, NOVA recommends that the boring locations and elevations be surveyed.

Our field exploration was conducted between January 2 and January 9, 2019 and included:

- Two (2), 15-foot deep SPT borings (designated B-1 and B-2) performed within the proposed splash pad feature footprint, and;
- Three (3), 5-foot deep auger borings (designated A-1, A-2 and A-3) performed within the proposed sidewalk alignments.

**Test Borings:** The structural test borings were performed using the guidelines of ASTM Designation D-1586, "Penetration Test and Split-Barrel Sampling of Soils". A mud rotary drilling process was used to advance the borings. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density.

The auger borings were conducted utilizing a 3-inch diameter bucket-type hand auger.

Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers and transported to our laboratory for further evaluation and laboratory testing. Test Boring Records in Appendix B show the standard penetration test (SPT) resistances, or “N-values”, and present the soil conditions encountered in the borings.

These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the split-barrel samples, laboratory test data, and generally accepted geotechnical engineering practices. The stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual.

# 4.0 LABORATORY TESTING

A laboratory testing program was conducted to characterize materials which exist at the site using the recovered split-barrel samples. Selected test data are presented on the Test Boring Records attached in the Appendix. The specific tests are briefly described on the following page.

It should be noted that all soil samples will be properly disposed of 30 days following the submittal of this NOVA subsurface exploration report unless you request otherwise.

## 4.1 SOIL CLASSIFICATION

Soil classification provides a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our explorations, samples obtained during drilling operations are observed in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Test Boring Records. The classification system discussed above is primarily qualitative; laboratory testing is generally performed for detailed soil classification. Using the test results, the soils were classified using the Unified Soil Classification System. This classification system and the in-place physical soil properties provide an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

## 4.2 MOISTURE CONTENT

The moisture content is the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles. This test was conducted in general accordance with ASTM D-2216.

## 4.3 SIEVE ANALYSIS

The sieve analysis consists of passing a soil sample through a series of standard sieve openings. The percentage of fines passing through the No. 200 sieve is generally considered to represent the amount of silt and clay of the tested soil sample. The sieve analysis test was conducted in general accordance with ASTM Designation D-1140.

# 5.0 SUBSURFACE CONDITIONS

## 5.1 GEOLOGY

The site is located in the Santa Rosa County, Florida area and according to the United States Geological Survey (USGS), is situated within the greater Gulf Coastal Plain region. The site is generally covered with Alluvium sediments of the Pleistocene/Holocene periods underlain by the Citronelle formation of the Pliocene/Pleistocene periods. The alluvial sediments typically consist of siliciclastics that are fine to coarse quartz sand containing clay lenses and gravel in places. Sands consists primarily of very fine to very coarse poorly sorted quartz grains; gravel is composed of quartz, quartzite, and chert pebbles. In areas of the Valley and Ridge province gravels are generally composed of angular to sub-rounded chert, quartz, and quartzite pebbles. Coastal deposits in the Santa Rosa County area include fine to medium quartz sand with shell fragments and accessory heavy minerals along Gulf beaches and fine to medium quartz sand, silt, clay, peat, mud and ooze in the Mississippi Sound, Little Lagoon, bays, lakes, streams, and estuaries. The Citronelle formation consists primarily of varicolored/mottled lenticular beds of poorly sorted sand, clayey sand, clay, and clayey gravel. Limonite pebbles and lenses of limonite cemented sand occur locally in weathered Miocene exposures.

Surficial soils in the region are primarily siliciclastic sediments deposited in response to the renewed uplift and erosion in the Appalachian highlands to the north and sea-level fluctuations. The extent and type of deposit is influenced by numerous factors, including mineral composition of the parent rock and meteorological events.

## 5.2 SOIL CONDITIONS

The following paragraph provides a generalized description of the subsurface profiles and soil conditions encountered in the borings conducted during this study. The Log of Boring Records in the Appendix should be reviewed to provide detailed descriptions of the conditions encountered at each boring location. Conditions may vary at other locations and times.

Beneath a stratum of topsoil which varied in thickness from about 3 to 6 inches, the test borings generally encountered very loose to medium dense fine-grained slightly silty sands and silty sands (USCS classifications of SP-SM and SM, respectively) to the maximum depth explored of about 15 feet BEG.

## 5.3 GROUNDWATER CONDITIONS

### 5.3.1 General

Groundwater in the Gulf Coastal Plain typically occurs as an unconfined aquifer condition.

Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix can affect groundwater conditions. The groundwater table is expected to be a subdued replica of the original surface topography. Based on a review of topographic maps and our visual site observations, we anticipate the groundwater flow at the site to be towards the south.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff and other site-specific factors. Groundwater levels in the south Santa Rosa County area are typically lowest in the late fall to winter and highest in the early spring to mid-summer with annual groundwater fluctuations by seasonal rainfall; consequently, the water table may vary at times.

### 5.3.2 Soil Test Boring Groundwater Conditions

A stabilized groundwater table was encountered in the test borings at depths varying between about 1 foot to 2½ feet BEG at the time of our field exploration, which occurred during a period of above normal seasonal rainfall and shortly following an extended period of frequent rain events. We note that the differences in the depths to groundwater can be primarily attributed to the differences in ground surface elevations at which the borings were drilled.

Based on comparisons of current annual monthly rainfall data to historical rainfall data extending back 50+ years in time, we estimate that the normal permanent seasonal high groundwater (SHGW) table for this site will occur within 1 foot above the depths to groundwater measured at each boring location, during the wet season.

# 6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction, our site observations, our evaluation and interpretation of the field and laboratory data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

As previously noted, boring locations were established in the field utilizing handheld GPS equipment and the provided site plan. If increased accuracy is desired by the client, we recommend that the boring locations and elevations be surveyed.

## 6.1 SITE PREPARATION

We anticipate that finish site grades will not change greater than +/- 2 feet from existing grades within the proposed splash pad feature footprint, and along the proposed sidewalk alignments.

We recommend stripping and grubbing the proposed splash pad footprint and sidewalk alignments to remove all topsoil and surficial vegetation, trees and associated root systems, and any other deleterious non-soil materials that are found to be present. The soils exposed at the stripped grade elevation, as well as subsequent lifts of fill soils, should be compacted to a minimum soil density of at least 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). Resulting or additional excavations should be backfilled with structural fill also compacted to a minimum soil density of at least 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557).

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

NOVA should observe the compaction of the subgrade to locate soft, weak, or excessively wet fill or existing soils present at the time of construction. Any unstable materials observed during the evaluation and compaction operations should be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying.

### 6.1.1 Soil Suitability

Fill materials should be relatively clean sands with less than 12 percent fines (material passing the No. 200 sieve), and free of non-soil materials and rock fragments larger than 3 inches in diameter. Soils with fines contents between 13 and 25 percent may also be used as fill soils for this project, but we note that strict moisture control would be required at the time of placement for these moisture-sensitive soils.

Based on visual examination, the existing surficial soils encountered during this exploration are generally suitable for re-use as structural fill soils, provided they are at or near their optimum moisture content at the time of re-use. The majority of the on-site near surface soils can be categorized as SP-SM, or fine-grained slightly silty sands based on the Unified Soil Classification System (USCS). Prior to construction, bulk samples of the proposed fill materials should be laboratory tested to confirm their suitability.

Organic and/or debris-laden material is not suitable for re-use as structural fill. Topsoil, mulch, and similar organic materials can be wasted in architectural areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations.

### 6.1.2 Soil Compaction

Fill should be placed in thin, horizontal loose lifts (maximum 12-inch) and compacted to a minimum soil density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). The upper 12 inches of soil beneath the bottoms of all foundation footings should be compacted to at least 98 percent. In confined areas, such as utility trenches or behind retaining walls, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary.

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

Fill materials used in structural areas should have a target maximum dry density of at least 95 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 3 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather.

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. He/she can also document compliance with the specifications by performing field density tests using thin-walled tube, nuclear, or sand cone testing methods (ASTM D-2937, D-6938, or D-1556, respectively). One test per 400 cubic yards and every 2 feet of placed fill is recommended, with test locations well distributed throughout the fill mass. When filling in small areas, at least one test per day per area should be performed.

## 6.2 GROUNDWATER CONTROL

As was noted previously, a stabilized groundwater table was encountered in the test borings at depths ranging between about 1 foot to 2½ feet BEG at the time of our field exploration. Depending on the areas of the site under consideration, groundwater levels have differing implications for design and construction. The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

Based on our understanding of the proposed construction, groundwater could potentially adversely impact the planned development of this property, most especially with respect to the installation of subsurface utilities in lower-lying areas of the site. As previously noted, groundwater levels are subject to seasonal, climatic and other variations and may be different at other times and locations.

## 6.3 FOUNDATIONS

Foundation support for the proposed splash pad feature is anticipated to be accomplished via conventional shallow footings and slab-on-grade systems. Final structural loadings and grading details were not available from the design team at the time of the issuance of this report.

### 6.3.1 Shallow Foundations

**Design:** After the recommended site and subgrade preparation and fill placement, we recommend that a conventional shallow foundation system consisting of isolated spread footings and/or turn-down slab-on-grade construction be used to support the proposed splash pad feature.

Foundations bearing on densified existing soils and/or compacted structural fill, as recommended in this report, may be designed for a maximum allowable bearing pressure of **1,500 pounds per square foot (psf)**.

We recommend minimum footing widths of 24 inches for ease of construction and to reduce the possibility of localized shear failures. Exterior and interior footing bottoms should be established at least 16 inches below finished surrounding exterior grades.

**Construction:** Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils.

Concrete should be placed as soon as is practical after the foundation is excavated, and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil. If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

# 7.0 CONSTRUCTION OBSERVATIONS

## 7.1 SUBGRADE

Once site grading is completed, the subgrade may be exposed to adverse construction activities and weather conditions. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the NOVA geotechnical engineer should be consulted.

A final subgrade evaluation should be performed by the NOVA geotechnical engineer immediately prior to slab-on-grade placement. If practical, proofrolling may be used to re-densify the surface and to detect any soil, which has become excessively wet or otherwise loosened.

## 7.2 SHALLOW FOUNDATIONS

Foundation excavations for the proposed structures and bulkhead should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils. All foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Due to variable site subsurface and construction conditions, some adjustments in isolated foundation bearing pressures, depth of foundations or undercutting and replacement with controlled structural fill may be necessary.

# APPENDIX A
# Figures and Maps


| | |
|---|---|
| **Scale:** Not To Scale | |
| **Date Drawn:** January 11, 2019 | |
| **Drawn By:** J. James | |
| **Checked By:** W. Lawrence | |

NOVA

140-A Lurton Street
Pensacola, Florida 32505
850.607.7782 ♦ 850.249.6683

**SITE LOCATION MAP**

**Carpenters Park Improvements**

Milton, Santa Rosa County, Florida

*NOVA Project Number 10116-2018169*

Soil Map—Santa Rosa County, Florida
(10116-2018169 Carpenters Park Improvements)


Map Scale: 1:1,180 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Rosa County, Florida
Survey Area Data: Version 15, Sep 5, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

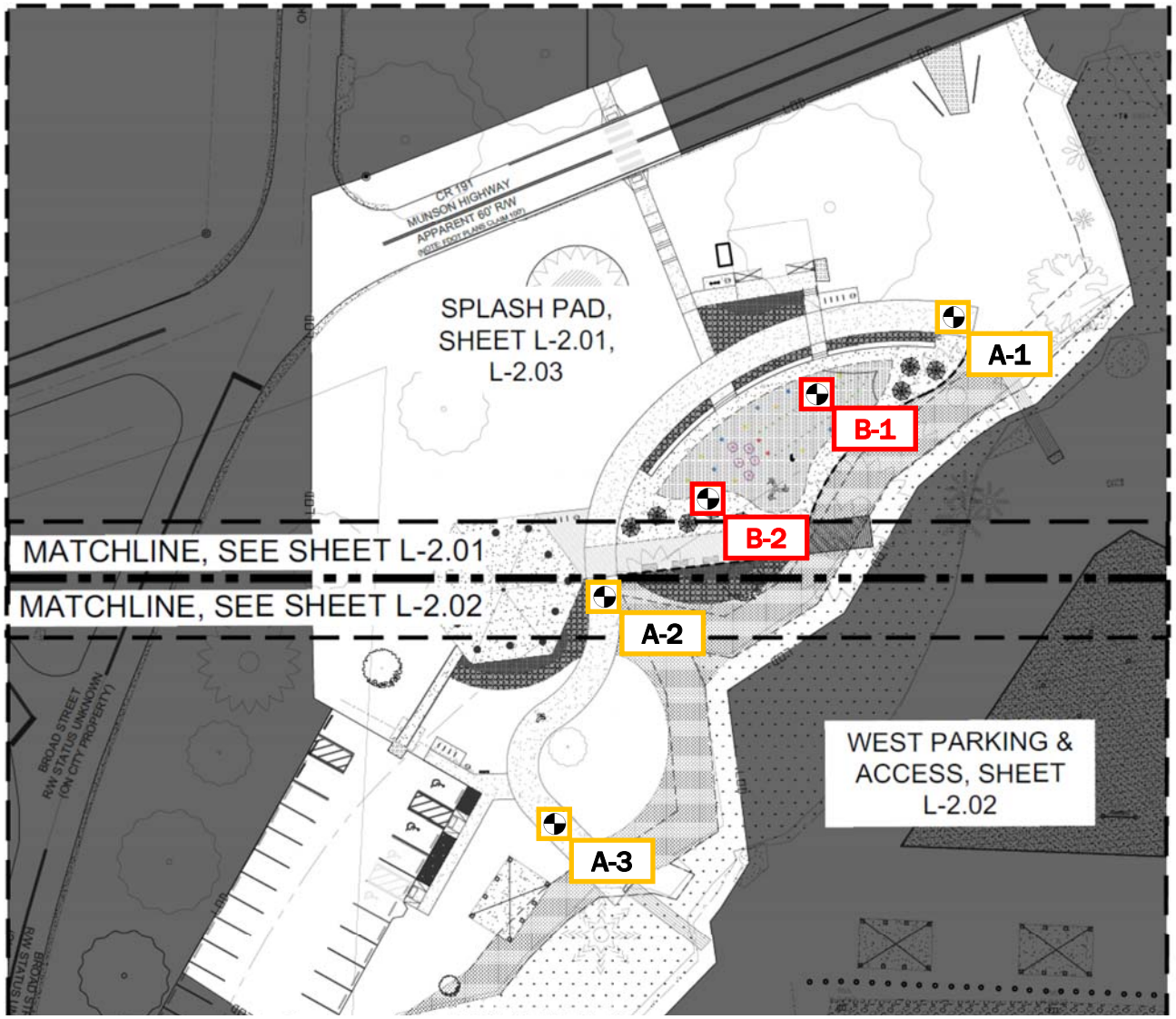
Date(s) aerial images were photographed: Jan 31, 2015—Feb 13, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 3 | Bibb-Kinston association | 3.2 | 63.2% |
| 21 | Lakeland sand, 0 to 5 percent slopes | 0.2 | 3.8% |
| 22 | Lakeland sand, 5 to 12 percent slopes | 1.7 | 33.0% |
| **Totals for Area of Interest** | | **5.1** | **100.0%** |

# APPENDIX B
# Subsurface Data




**LEGEND**

A-x = Pavement Auger Boring

B-x = 15-foot deep Structural SPT Boring

| | | |
|---|---|---|
| **Scale:** Not To Scale<br>**Date Drawn:** January 11, 2019<br>**Drawn By:** J. James<br>**Checked By:** W. Lawrence | NOVA<br>140-A Lurton Street<br>Pensacola, Florida 32505<br>850.607.7782 ♦ 850.249.6683 | **BORING LOCATION PLAN**<br>**Carpenters Park Improvements**<br>Milton, Santa Rosa County, Florida<br>*NOVA Project Number 10116-2018169* |

# KEY TO BORING LOGS

## SYMBOLS AND ABBREVIATIONS

| SYMBOL | DESCRIPTION |
|---|---|
| N-Value | No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot |
| WOR | Weight of Drill Rods |
| WOH | Weight of Drill Rods and Hammer |
|  | Sample from Auger Cuttings |
|  | Standard Penetration Test Sample |
|  | Thin-wall Shelby Tube Sample (Undisturbed Sampler Used) |
| % REC | Percent Core Recovery from Rock Core Drilling |
| RQD | Rock Quality Designation |
|  | Stabilized Groundwater Level |
|  | Seasonal High Groundwater Level (also referred to as the W.S.W.T.) |
| NE | Not Encountered |
| GNE | Groundwater Not Encountered |
| BT | Boring Terminated |
| -200 (%) | Fines Content or % Passing No. 200 Sieve |
| MC (%) | Moisture Content |
| LL | Liquid Limit (Atterberg Limits Test) |
| PI | Plasticity Index (Atterberg Limits Test) |
| K | Coefficient of Permeability |
| Org. Cont. | Organic Content |
| G.S. Elevation | Ground Surface Elevation |

## UNIFIED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | | GROUP SYMBOLS | TYPICAL NAMES |
|---|---|---|---|---|
| COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve* | GRAVELS 50% or more of coarse fraction retained on No. 4 sieve | CLEAN GRAVELS | GW | Well-graded gravels and gravel-sand mixtures, little or no fines |
| | | | GP | Poorly graded gravels and gravel-sand mixtures, little or no fines |
| | | GRAVELS WITH FINES | GM | Silty gravels and gravel-sand-silt mixtures |
| | | | GC | Clayey gravels and gravel-sand-clay mixtures |
| | SANDS More than 50% of coarse fraction passes No. 4 sieve | CLEAN SANDS 5% or less passing No. 200 sieve | SW** | Well-graded sands and gravelly sands, little or no fines |
| | | | SP** | Poorly graded sands and gravelly sands, little or no fines |
| | | SANDS with 12% or more passing No. 200 sieve | SM** | Silty sands, sand-silt mixtures |
| | | | SC** | Clayey sands, sand-clay mixtures |
| FINE-GRAINED SOILS 50% or more passes the No. 200 sieve* | SILTS AND CLAYS Liquid limit 50% or less | | ML | Inorganic silts, very fine sands, rock flour, silty or clayey fine sands |
| | | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays |
| | | | OL | Organic silts and organic silty clays of low plasticity |
| | SILTS AND CLAYS Liquid limit greater than 50% | | MH | Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts |
| | | | CH | Inorganic clays or clays of high plasticity, fat clays |
| | | | OH | Organic clays of medium to high plasticity |
| | | | PT | Peat, muck and other highly organic soils |

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

### RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

### CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Medium Stiff – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

### RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

### MODIFIERS

**These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample**
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

**These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample**
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

**These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample**
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

NOVA

# TEST BORING RECORD B-1

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: S. Ryan LOGGED BY: J. James
DRILLING METHOD: SPT Boring DATE: January 9, 2019
DEPTH TO - WATER> INITIAL: ▽ 2.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

| Depth (feet) | Elevation (ft-MSL) | Description | Graphic | Groundwater | Sample Type | N-Value |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| | | TOPSOIL (Approx. 4-inches) | | | | 10 |
| | | Light brown/orange loose fine-grained slightly silty SAND (SP-SM) | | | | |
| 3 | | Gray loose to medium dense fine-grained slightly silty SAND (SP-SM) | | ▽ | | 12 |
| | | | | | | 7 |
| 6 | | | | | | |
| | | Dark brown medium dense fine-grained slightly silty SAND (SP-SM) | | | | 26 |
| 9 | | | | | | 30 |
| | | | | | | |
| 12 | | Dark gray loose fine-grained silty SAND (SM) | | | | 5 |
| 15 | | | | | | |
| | | Boring Terminated at 15 ft. | | | | |
| 18 | | | | | | |
| 21 | | | | | | |

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢—⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

# TEST BORING RECORD B-2

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: S. Ryan LOGGED BY: J. James
DRILLING METHOD: SPT Boring DATE: January 9, 2019
DEPTH TO - WATER> INITIAL: ▽ 1 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

| Depth (feet) | Elevation (ft-MSL) | Description | Graphic | Groundwater | Sample Type | N-Value |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| | | TOPSOIL (Approx. 6-inches) | | | | 10 |
| | | Light brown loose fine-grained slightly silty SAND (SP-SM) | | ▽ | | |
| | | Gray loose fine-grained silty SAND (SM) | | | | 6 |
| 3 | | | | | | |
| | | Light brown loose fine-grained slightly silty SAND (SP-SM) | | | | 6 |
| 6 | | | | | | |
| | | Dark brown very loose to loose fine-grained silty SAND (SM) | | | | 2 |
| | | | | | | 7 |
| 9 | | | | | | |
| | | Gray loose fine-grained silty SAND (SM) | | | | |
| 12 | | | | | | |
| | | | | | | 9 |
| 15 | | | | | | |
| | | Boring Terminated at 15 ft. | | | | |
| 18 | | | | | | |
| 21 | | | | | | |

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

# TEST BORING RECORD A-1

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: J. James LOGGED BY: J. James
DRILLING METHOD: Auger Boring DATE: January 2, 2018
DEPTH TO - WATER> INITIAL: ▽ 2 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

| Depth (feet) | Elevation (ft-MSL) | Description | Graphic | Groundwater | Sample Type | N-Value |
|---|---|---|---|---|---|---|
| 0 | | TOPSOIL (Approx. 4-inches) | | | | |
| | | Light brown/orange fine-grained silty SAND (SM) | | | | |
| 3 | | Light brown/gray fine-grained silty SAND (SM) | | ▽ | | |
| | | Boring Terminated at 4 ft. | | | | |
| 6 | | | | | | |
| 9 | | | | | | |
| 12 | | | | | | |
| 15 | | | | | | |
| 18 | | | | | | |
| 21 | | | | | | |

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

# TEST BORING RECORD A-2

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: J. James LOGGED BY: J. James
DRILLING METHOD: Auger Boring DATE: January 2, 2018
DEPTH TO - WATER> INITIAL: ▽ 2 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

| Depth (feet) | Elevation (ft-MSL) | Description | Graphic | Groundwater | Sample Type | N-Value |
|---|---|---|---|---|---|---|
| 0 | | TOPSOIL (Approx. 3-inches) | | | | |
| | | Light brown/orange fine-grained silty SAND (SM) | | ▽ | | |
| 3 | | Light brown/gray fine-grained silty SAND (SM) | | | | |
| 6 | | Boring Terminated at 5 ft. | | | | |
| 9 | | | | | | |
| 12 | | | | | | |
| 15 | | | | | | |
| 18 | | | | | | |
| 21 | | | | | | |

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

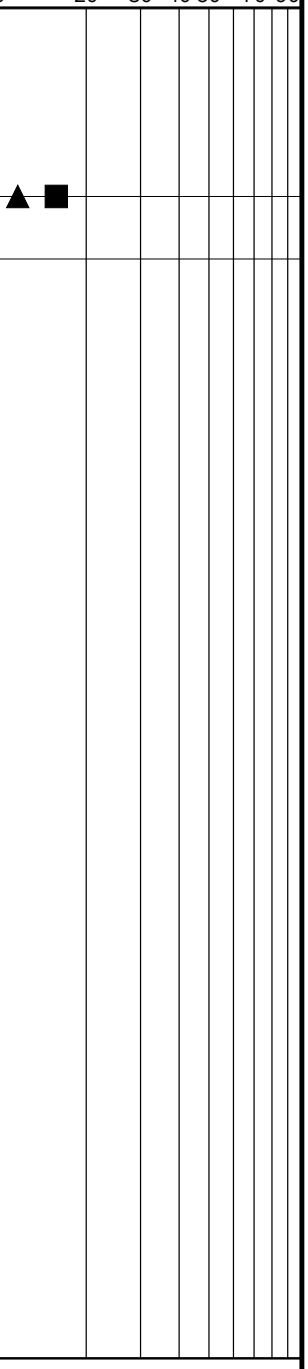
# TEST BORING RECORD A-3

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: J. James LOGGED BY: J. James
DRILLING METHOD: Auger Boring DATE: January 2, 2018
DEPTH TO - WATER> INITIAL: ▽ 1 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

| Depth (feet) | Elevation (ft-MSL) | Description | Graphic | Groundwater | Sample Type | N-Value |
|---|---|---|---|---|---|---|
| 0 | | TOPSOIL (Approx. 4-inches) | | | | |
| | | Light brown/gray fine-grained silty SAND (SM) | | ▽ | | |
| 3 | | | | | | |
| | | Boring Terminated at 4 ft. | | | | |
| 6 | | | | | | |
| 9 | | | | | | |
| 12 | | | | | | |
| 15 | | | | | | |
| 18 | | | | | | |
| 21 | | | | | | |

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE

PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90



This information pertains only to this boring and should not be interpreted as being indicative of the site.

# APPENDIX C
# Laboratory Data

# SUMMARY OF CLASSIFICATION & INDEX TESTING

**Carpenters Park Improvements**
Milton, Santa Rosa County, Florida
*NOVA Project No. 10116-2018169*

| SUMMARY OF CLASSIFICATION AND INDEX TESTING | | | | |
|---|---|---|---|---|
| Boring No. | Sample Depth (ft. BEG) | Natural Moisture (%) | Percent Fines (%- #200) | USCS Soil Classification |
| B-1 | 0-2 | 16 | 8 | SP-SM |
| B-1 | 6-8 | 16 | 11 | SP-SM |
| B-2 | 13-15 | 22 | 17 | SM |
| A-1 | 1-2 | 17 | 15 | SM |
| A-3 | 3-4 | 12 | 16 | SM |

# APPENDIX D
# Qualifications of Recommendations

# QUALIFICATIONS OF RECOMMENDATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study, and our previous experience. If additional information becomes available which might impact our geotechnical opinions, it will be necessary for NOVA to review the information, re-assess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings may differ from those encountered at specific boring locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process has altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, NOVA should be retained by the owner to observe all earthwork and foundation construction to confirm that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations. NOVA is not responsible or liable for the conclusions and recommendations presented in this report if NOVA does not perform these observations and testing services.

This report is intended for the sole use of **Volkert, Inc.** only. The scope of work performed during this study was developed for purposes specifically intended by of **Volkert, Inc.** only and may not satisfy other users' requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Florida. This warranty is in lieu of all other statements or warranties, either expressed or implied.

# Important Information about This

# Geotechnical-Engineering Report

**Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.**

**While you cannot eliminate all such risks, you can manage them. The following information is provided to help.**

## Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

## Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

## Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

## Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

## Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

## A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

## A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

## Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

## Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

## Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

## Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

## Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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