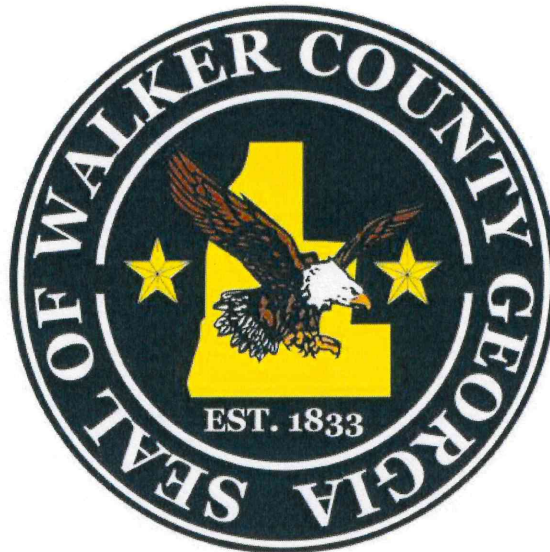


**CONTRACT DOCUMENTS AND SPECIFICATIONS**

**WALKER COUNTY COURTHOUSE**

**ADA RAMP IMPROVEMENTS**

Prepared For  
WALKER COUNTY, GEORGIA



CTI Project No. G20004-02



CTI Engineers, Inc.  
1122 Riverfront Parkway  
Chattanooga, Tennessee 37402  
423.267.7613

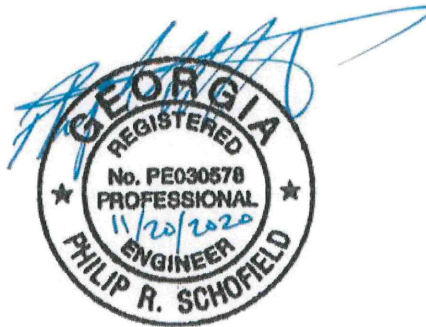
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WALKER COUNTY COURTHOUSE

ADA RAMP IMPROVEMENTS



Prepared For  
WALKER COUNTY, GEORGIA



Prepared By  
CTI ENGINEERS, Inc.  
Chattanooga, Tennessee  
Project No. G20004-02

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**PROCUREMENT REQUIREMENTS,  
FORMS, AND SUPPLEMENTS**

**INVITATION TO BID**

Walker County has issued an invitation for separate sealed proposals for furnishing all materials, labor, tools, equipment, and appurtenances necessary for the Walker County Courthouse ADA Ramp Improvements in Walker County, Georgia.

Proposals will be accepted until 5:00 p.m., local time, on Wednesday, December 16, 2020 at the Commissioner's Office (101 S. Duke Street, LaFayette, Georgia 30728). Send inquiries regarding the project and bidding process by email to: [j.legge@walkerga.us](mailto:j.legge@walkerga.us).

Walker County reserves the right to reject any and all responses.

Walker County, Georgia

Date: November 20, 2020

/s/ Shannon Whitfield, Commission

## INFORMATION FOR BIDDERS

### 1. Receipt and Opening of Bids

Walker County, Georgia (herein called the "Owner"), invites Bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the location and time noted in the Invitation to Bid.

The Owner may consider informal any Bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be considered. No Bidder may withdraw a Bid within 60 days after the actual date of the opening thereof.

### 2. Preparation of Bid

Each Bid shall be submitted on the Bid forms bound in the Contract Documents. All blank spaces for Bid prices must be filled in, in ink or typewritten. All computations will be checked; and in the event of a discrepancy, the unit price will govern. All required enclosed certifications must be fully completed and executed when submitted.

Each Bid must be submitted in a sealed envelope, addressed to the Owner. Each sealed envelope containing a Bid must be plainly marked on the outside as, "Bid for Walker County Courthouse ADA Ramp Improvements."

If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to the Owner at Walker County, 101 S Duke Street, LaFayette, GA 30728, Attention: Joe Legge.

### 3. Subcontracts

The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this Contract must be acceptable to the Owner.

### 4. Facsimile or email Modifications

Any Bidder may modify his Bid by facsimile or email communication at any time prior to the scheduled closing time for receipt of Bids, provided such facsimile or email communication is received by the Owner prior to the closing time, and, provided further, the Owner is satisfied that a written confirmation of the facsimile or email modification over the signature of the Bidder was mailed prior to the closing time. The facsimile or email communication should not reveal the Bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed Bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the facsimile or email modification.

### 5. Overhead, Profit, and Revision of Quantities

The unit or lump sum price for each of the several items in the proposal of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products

obtained by multiplying the quantity shown for each item by the unit price represents the total Bid. Any Bid not conforming to this requirement may be rejected as informal. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed, provided the net monetary value of all such addition or subtraction in quantities of such items of work (i.e., difference in cost) shall not increase or decrease the total original contract price by more than 25 percent, except for work not covered in the Drawings and Detailed Specifications as provided for under General Conditions and Supplemental General Conditions.

#### 6. Qualifications of Bidder

The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein. Conditional Bids will not be accepted.

A Bidder must purchase a set of Contract Documents (including Bidding Requirements and Documents), Specifications, and Drawings through the Engineer in order to be considered a qualified bidder. Addenda will only be sent to those who have purchased documents and are on the list of planholders maintained by CTI Engineers, Inc.

#### 7. Conditions of Work

Each Bidder must inform himself fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a successful Bidder of his obligation to furnish all material and labor necessary to carry out the provision of his Contract. Insofar as possible the Contractor, in carrying out his work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

#### 8. Addenda and Interpretations

No interpretation of the meaning of the Drawings, Specifications, or other prebid documents will be made to any Bidder orally.

Every request for such interpretation should be in writing addressed to [j.legge@walkerga.us](mailto:j.legge@walkerga.us) or Joe Legge, 101 S. Duke Street, LaFayette, Georgia 30728, and to be given consideration must be received at least five days prior to the date fixed for the opening of Bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the Specifications which, if issued, will be mailed and transmitted by email to all prospective Bidders (at the respective addresses and email addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of Bids. Failure of any Bidder to receive any such addendum or interpretation shall not relieve such Bidder from any obligation under his Bid as submitted. All addenda so issued shall become a part of the Contract Documents.



9. Notice of Special Conditions

Attention is particularly called to those parts of the Contract Documents and Specifications which deal with the following:

- a. Inspection and testing of materials
- b. Insurance requirements
- c. Wage rates (if applicable)
- d. Surveys, permits, and regulations

The federal regulations enclosed or herein referred to supersede all conflicting requirements of the Contract Documents.

10. Laws and Regulations

The Bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

11. Obligation of Bidder

At the time of the opening of Bids, each Bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings and Contract Documents (including all addenda). The failure or omission of any Bidder to examine any form, instrument, or document shall in no way relieve any Bidder from any obligation in respect of his Bid.

12. Execution of Bid Documents

The Contractor, in signing his Bid on the whole or any portion of the work, shall conform to the following requirements:

- a. Bids which are not signed by individuals making them shall have attached thereto a power of attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.
- b. Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If a Bid is signed by an attorney-in-fact, there should be attached to the Bid a power of attorney executed by the partners evidencing authority to sign the Bid.
- c. Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the President or other authorized officer of the corporation manually written below the corporate name following the wording "By \_\_\_\_\_." Corporation seal shall also be affixed to the Bid.

13. Method of Award - Lowest Qualified Bidder

The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Bid complying with the conditions of the Information for Bidders. Award will be made on the basis of the prices given in the base Bid either with or without alternates at the

discretion of the Owner. The Bidder to whom the award is made will be notified at the earliest possible date. The Owner reserves the right to reject any and all Bids and to waive any informality in Bids received whenever such rejection or waiver is in its interest.

A responsive Bidder shall be one who submits his Bid in the proper form without qualification or intent other than as called for in the Specifications and on the Contract Drawings and who binds himself on behalf of his Bid to the Owner with the proper bid bond or certified check completed and attached, and who properly completes all forms required to be completed and submitted at the time of the bidding.

A responsible Bidder shall be one who can fulfill the following requirements:

- a. The Bidder shall maintain a permanent place of business. This requirement applies to the Bidder where the Bidder is a division of a corporation, or where the Bidder is 50 percent or more owned by a person, corporation, or firm.
- b. The Bidder shall demonstrate that he has adequate construction management experience and sufficient equipment resources to properly perform the work under and in conformance with these Contract Documents. This evaluation will be based upon a list of completed or active projects and a list of construction equipment available to the Bidder to perform the work.
- c. The Bidder shall demonstrate that he is familiar with the work under these Contract Documents. This evaluation will be based upon a list of major equipment items the Bidder proposes to furnish and a list of subcontractors the Bidder proposes to use in prosecuting the work.
- d. The Bidder shall demonstrate that he has financial resources of sufficient strength to meet the obligations incident to the performance of the work covered by these Contract Documents. The Bidder shall complete the Statement of Bidder's Qualifications in the Bid forms. The ability to obtain the required Performance and Payment Bonds will not alone demonstrate adequate financial capability.
- e. The Bidder may demonstrate financial capability by submitting a suitable financial statement of an Equity Partner, provided an agreement is executed binding the Bidder and said Equity Partner, jointly and severally, to fulfill all duties, obligations, and responsibilities of the Contractor under these Contract Documents if the Contract is awarded to the Bidder. The agreement shall be submitted with the Bid and shall be satisfactory to the Owner's attorney or the Bid may be declared nonresponsive.
- f. The Bidder shall furnish all data required by these Contract Documents. Failure to do so may result in the Bid being declared nonresponsive. Acceptance of the Bidder's documentation and substantiation or contract award by the Owner does not relieve the Bidder of liability for nonperformance as covered in the Contract Documents, nor will the Bidder be exempted from any other legal recourse the Owner may elect to pursue.

#### 14. Employment of Local Labor

Preference in employment on the Project shall, insofar as practicable, be given to qualified local labor.

## 15. Environmental Controls

- Comply with federal, state and local regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment and noise pollution.
- Protection of Natural Resources: Preserve the natural resources within the project boundaries or restore to an equivalent condition.
- Temporary Construction: Remove indications of temporary construction facilities, such as haul roads, work areas, structures, stockpiles of waste areas.
- Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters.
- Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.
- Store and service construction equipment at areas designated for collection of oil wastes.
- Dust Control, Air Pollution, and odor Control: Prevent creation of dust, air pollution and odors.
- Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to the lowest practical level.
- Store volatile liquids, including fuels and solvents, in closed containers.
- Properly maintain equipment to reduce gaseous pollutant emissions.
- Noise control: Perform demolition operations to minimize noise.
- Repetitive, high level impact noise will be permitted only between the hours of 7:00 a.m. and 8:00 p.m. Aside from this, there are no work hour restrictions.

## 16. Indemnification and Insurance Requirements

### Indemnification

The Contractor shall indemnify and hold harmless Walker County against any and all claims, including but not limited to, personal injury or property damage, and attorney's fees incurred by Walker County in its legal defense, arising out of or resulting from the performance of the products or from the services, of which, Walker County is contracting hereunder, provided such is caused in whole or in part by any negligent act or omission of the Contractor or any subcontractor or any of their agents or employees, or arising from any job-related injury.

Said indemnification and hold harmless on behalf of Walker County shall be in addition to any and all other legal remedies available to Walker County and shall not be considered to be Walker County's exclusive remedy.

It is agreed by the parties hereto that specific consideration has been received by the vendor or contractor under this agreement for this hold harmless/indemnification provision.

### INSURANCE REQUIREMENTS

Contractor will be required to procure and maintain, at its own expense and without cost to Walker County, until the expiration of the one year warranty following final acceptance by Walker County of all products and services covered by the contract, the following types of insurance as a minimum, the following insurance limits: a) Workers' Compensation statutory limits; b) Comprehensive General Liability Insurance, a total of \$1,000,000 for each occurrence and \$2,000,000 in aggregate; c)

Comprehensive Automobile Liability Insurance, a total of \$1,000,000 for each occurrence and \$2,000,000 in aggregate. **CONTRACTOR WHO IS AWARDED BID MUST OBTAIN A PERFORMANCE BOND. THE CONTRACTOR SHALL ALSO PROVIDE A CERTIFICATE OF INSURANCE TO WALKER COUNTY DEMONSTRATING THE AFOREMENTIONED INSURANCE REQUIREMENTS HAVE BEEN MET PRIOR TO THE COMMENCEMENT OF WORK UNDER THE CONTRACT.**

The Comprehensive General Liability and Auto Liability certificates of insurance shall indicate that the policies have been endorsed to cover Walker County Government as an **additional insured** and must reference specific projects by name and that these policies may not be canceled or modified without thirty (30) days prior written notice to Walker County.

The insurance coverage enumerated above constitutes the minimum requirements and shall in no way lessen or limit the liability of the vendor or contractor under the terms of the contract. Sub-Contractor's insurance shall be the responsibility of the Contractor.

Surety and insurance companies must have an AM Best rating of A+ or greater, be listed in the Federal Registry of Companies holding Certificates of Authority and Acceptable Sureties on Federal Bonds, be licensed by the Georgia Insurance Department and the Georgia Secretary of State to do business in the State of Georgia.

**Contractor shall incorporate a copy of the insurance requirements as herein provided in each and every subcontract with each and every Subcontractor in any tier, and shall require each and every Subcontractor of any tier to comply with all such requirements.**

Contractor agrees that if for any reason Subcontractor fails to procure and maintain insurance as required, all such required insurance shall be procured and maintained by Contractor at Contractor's expense. No Contractor or Subcontractor shall commence any work of any kind under this Contract until all insurance requirements contained in this Contract have been complied with and until evidence of such compliance satisfactory to Walker County as to form and content has been filed. The Accord Certificate of Insurance or a pre-approved substitute is the required form in all cases where reference is made to a Certificate of Insurance or an approved substitute. The Contractor shall agree to waive all rights of subrogation against Walker County, their officers, officials and employees from losses arising from work performed by the Contractor for Walker County. The Contractor shall make available, through its records or records of its Insurer, information regarding a specific claim. Any loss run information available from the Contractor or its insurer will be made available to Walker County upon request.

## 17. Terms and Conditions

All Proposals and supporting materials as well as correspondence relating to this RFP become property of Walker County when received. Any proprietary information contained in the submittal should be so indicated. However, a general indication that the entire contents, or a major portion of the Proposal is proprietary will not be honored.

- All applicable State of Georgia and federal laws, county ordinances, licenses and regulations of all agencies having jurisdiction shall apply to the Contractor and Project throughout and are hereby incorporated herein as if fully stated. This Contract and all questions concerning the execution, validity or invalidity, capability of the parties, and the performance of the Agreement, shall be interpreted in all respects in accordance with the laws of the State of Georgia.
- Professionals requiring special licenses must be licensed in the State of Georgia, and shall be responsible for those portions of the work as may be required by law.
- Sub-Contractors as part of the project team must be clearly identified in the submittal, including roles, resumes of key personnel and project references. The Contractor is responsible for obtaining E-verify Affidavits from its subcontractors and submitting verification to Walker County prior to executing a contract with any subcontractor.
- Walker County reserves the right to reject any and all bids.

## CONTRACTOR'S IDENTIFICATION

This form shall be attached to the sealed envelope containing the Bid. Failure to provide the following information on the sealed envelope will be considered a non-responsive Bid.

**BIDDER:**

Company Name \_\_\_\_\_

Owner Name \_\_\_\_\_

Phone No. \_\_\_\_\_

Cell No. \_\_\_\_\_

E-Mail \_\_\_\_\_

Physical Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Mailing Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

---

**SEALED BID PROPOSAL FOR WALKER COUNTY, GEORGIA**

**FOR THE CONSTRUCTION OF**

**WALKER COUNTY COURTHOUSE  
ADA RAMP IMPROVEMENTS**

**Bid Date \_\_\_\_\_ Bid Time \_\_\_\_\_**

- Please place proposal fee form as second page after this cover sheet.
- Please include references with your submission.

**BID**

Project Description: Walker County Courthouse ADA Ramp Improvements

Proposal of \_\_\_\_\_  
(hereinafter called "Bidder"), doing business as \_\_\_\_\_  
a corporation, a partnership, an individual

To Walker County, Georgia (hereinafter called "Owner").

Gentlemen:

The Bidder, in compliance with the Invitation to Bid for the construction of this project having examined the Drawings and Specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the Contract Documents, at the price(s) stated below. This price(s) is to cover all expenses including overhead and profit incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written Notice to Proceed of the Owner as stipulated in the Specifications.

Bidder acknowledges receipt of the following addenda:

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

Bidder agrees to perform all the construction of the project complete with appurtenant and accessory work described in the Specifications and shown on the plans for the attached price(s).

The attached price(s) shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.

Bidder understands that the Owner reserves the right to reject any or all Bids and to waive any informalities in the bidding.

The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving Bids.

Upon receipt of written notice of the acceptance of this Bid, Bidder will execute the formal contract attached within ten days.

Respectfully submitted:

\_\_\_\_\_  
By \_\_\_\_\_

Signature

Title \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Business Address

ATTEST:

\_\_\_\_\_

Name \_\_\_\_\_  
(Please Type)

Title \_\_\_\_\_

(SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.



**BID SCHEDULE  
WALKER COUNTY COURTHOUSE  
ADA RAMP IMPROVEMENTS  
WALKER COUNTY, GEORGIA**

**LUMP SUM BID**

The Bid for the furnishing of all labor, materials, and equipment for demolition of the existing ramp and the construction of the new ADA compliant ramp as required for a complete operating installation as described in the Contract Documents and including all demolition, haul off, concrete curb, wall, sidewalk installation (all concrete shall be 4,000 psi), railing, ramps, asphalt pavement, striping, etc, complete-in-place for the lump sum of \_\_\_\_\_

\_\_\_\_\_ Dollars and \_\_\_\_\_ Cents \$

BIDDER

DATE

BY

(Signature) TITLE

ADDRESS

CITY

STATE

ZIP CODE

PHONE

FAX

EMAIL

**NONCOLLUSION AFFIDAVIT OF PRIME BIDDER**

**SCOPE OF WORK:** Walker County Courthouse ADA Ramp Improvements

**LOCATION:** Walker County, Georgia

**STATE OF:** \_\_\_\_\_

**COUNTY OF:** \_\_\_\_\_

\_\_\_\_\_  
Being first duly sworn, deposes and says that he/she is

\_\_\_\_\_  
(sole owner, partner, president, secretary, etc....)

The party making the foregoing Proposal; that such Proposed Fee is genuine and not collusive; that said Respondent has not colluded, conspired, connived, or agreed, directly or indirectly, with another Respondent or person, to put in a sham Proposal, or that such other person shall refrain from responding to the Request for Proposals, and has not in any manner, directly or indirectly, sought by agreement or collusion, or any communication, or conference, with any person to fix the amount of bids of affiant or any other Respondent, or to fix any overhead, profit, or cost element of said amount of bids, or of that of any other Respondent, or to secure an advantage against Walker County or any other person interested in the proposed contract; and that all statements contained in said Proposal are true, and further, that such Respondent has not directly or indirectly submitted this Proposal, or contents thereof, or divulged information or data relative thereto to any association or to any member or agent thereof.

\_\_\_\_\_  
Affiant

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE  
\_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
Notary Public  
My Commission Expires: \_\_\_\_\_

**GEORGIA SECURITY AND IMIGRATION COMPLIANCE ACT AFFIDAVIT**

Contract No. and Name: Walker County Courthouse ADA Ramp Improvements

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

**STATE OF GEORGIA  
CONTRACTOR AFFIDAVIT**

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with Walker County has registered with and is participating in a federal work authorization program\*, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract with Walker County, Contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. § 13-10-91 on the Subcontractor Affidavit provided or using a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to Walker County and the Georgia Department of Transportation at the time the subcontractor(s) is retained to perform such service.

\_\_\_\_\_  
EEV / E-verify™ User Id (Account) Number

\_\_\_\_\_  
Date of Authorization

\_\_\_\_\_  
BY: Authorized Officer or Agent  
(Contractor Name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title of Authorized Officer or Agent of Contractor

\_\_\_\_\_  
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

\_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_

\*any of the electronic verification work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603

**GEORGIA SECURITY AND IMIGRATION COMPLIANCE ACT AFFIDAVIT**

Contract No. and Name: Walker County Courthouse ADA Ramp Improvements

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

**STATE OF GEORGIA  
SUBCONTRACTOR AFFIDAVIT**

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with Walker County has registered with and is participating in a federal work authorization program\*, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract with Walker County, Contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. § 13-10-91 on the Subcontractor Affidavit provided or using a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to Walker County and the Georgia Department of Transportation at the time the subcontractor(s) is retained to perform such service.

\_\_\_\_\_  
EEV / E-verify™ User Id (Account) Number

\_\_\_\_\_  
Date of Authorization

\_\_\_\_\_  
BY: Authorized Officer or Agent  
(Contractor Name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title of Authorized Officer or Agent of Contractor

\_\_\_\_\_  
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

\_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_

\*any of the electronic verification work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603

# **CONTRACTING REQUIREMENTS**

**CONTRACT**

THIS CONTRACT, made this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between Walker County, Georgia, hereinafter called "Owner" and \_\_\_\_\_  
\_\_\_\_\_ doing business as a \_\_\_\_\_  
\_\_\_\_\_ corporation, individual, or partnership hereinafter called "Contractor."

WITNESSETH: That for and in consideration of the payments and agreements hereafter mentioned:

1. The Contractor will commence and complete the construction of the Walker County Courthouse ADA Ramp.
2. The Contractor will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the completion of the work described herein.
3. The Contractor will commence the work required by the Contract Documents within 10 calendar days after the contract start date of the written Notice to Proceed.
4. The Contractor agrees to perform all of the Work described in the Contract Documents and comply with the terms therein for the sum of \_\_\_\_\_.
5. The term "Contract Documents" means and includes the following:
  - a. Invitation to Bid
  - b. Information for Bidders
  - c. Bid
  - d. Bid Schedule
  - e. Contract
  - f. Notice to Proceed
  - g. Change Order(s)
  - h. Drawings prepared by CTI Engineers, Inc., numbered 1 thru 5, A3, A4, T14, T18.
  - i. Specifications prepared or issued by CTI Engineers, Inc., dated November 2020.
  - j. Addenda:  
No. \_\_\_\_\_, dated \_\_\_\_\_, 20\_\_  
No. \_\_\_\_\_, dated \_\_\_\_\_, 20\_\_  
No. \_\_\_\_\_, dated \_\_\_\_\_, 20\_\_
6. The Owner will pay to the Contractor in the manner and at such times as set forth in the General Conditions such amounts as required by the Contract Documents.
7. This Contract shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Contract in four (4) copies each of which shall be deemed an original on the date first above written.

OWNER:

WALKER COUNTY, GEORGIA

By \_\_\_\_\_

Name \_\_\_\_\_  
(Please Print or Type)

Title \_\_\_\_\_

WITNESS:

\_\_\_\_\_

Name \_\_\_\_\_  
(Please Print or Type)

Title \_\_\_\_\_

(SEAL)

CONTRACTOR:

\_\_\_\_\_

By \_\_\_\_\_

Name \_\_\_\_\_  
(Please Print or Type)

Address \_\_\_\_\_

\_\_\_\_\_

ATTEST:

\_\_\_\_\_

Name \_\_\_\_\_  
(Please Print or Type)

Title \_\_\_\_\_

(SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a Notary.

**NOTICE TO PROCEED**

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Project Description: The work is located at Walker County Courthouse Walker County, Georgia. The project consists of the installation of ADA ramp improvements.

You are hereby notified to commence work in accordance with the Contract dated \_\_\_\_\_, 20\_\_\_\_, on or before \_\_\_\_\_, 20\_\_\_\_.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

WALKER COUNTY, GEORGIA

By \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above Notice to Proceed is hereby acknowledged by \_\_\_\_\_, this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

By \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_



# **PROJECT CLOSEOUT**

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

Project: Walker County Courthouse ADA Ramp Improvements

Agreement Date: \_\_\_\_\_

Contractor: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Owner: Walker County, Georgia  
101 S Duke Street  
LaFayette, Georgia 30728

A walk-through inspection of the project was conducted on \_\_\_\_\_, 20\_\_\_\_, with representatives of the Contractor and Owner participating. A final Punch List of work remaining to be completed or deficiencies noted was prepared.

**CONTRACTOR:** The Contractor will complete or correct all work noted on the list of remaining work items dated \_\_\_\_\_, and supplements issued thereto within \_\_\_ days of the substantial completion date unless time is extended by Owner. The failure to include any items on the list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.

By: \_\_\_\_\_ Title: \_ Date: \_\_\_\_\_

**OWNER:** The Owner accepts the work as substantially complete and accepts full possession thereof including the responsibilities for security, maintenance, and insurance.

By: \_\_\_\_\_ Title: \_ Date: \_\_\_\_\_

**DIVISION 01**  
**GENERAL REQUIREMENTS**



## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. The work described in these Contract Documents consists of furnishing, delivering, and installing all materials, equipment, and products for the construction of the Walker County Courthouse ADA Ramp Improvements, as shown on the Drawings.
- B. Furnish all materials, power, equipment, tools, labor, transportation, and other items necessary or convenient to the Contractor for the installation of the equipment, materials, and products specified or described in these Contract Documents and for the completion of all work to be performed by the Contractor as specified herein.

##### 1.2 PROJECT COORDINATION

- A. The Contractor shall be responsible for project coordination, which includes but is not limited to the following:
  - 1. Work of employees and subcontractors under contract to him. Conduct work to ensure compliance with schedules.
  - 2. Submission of all invoices, progress schedules, progress reports, progress estimates, and other data needed in support of requests for payment.
  - 3. Product and equipment deliveries adequate to maintain the schedule of construction. Report noncompliance to Owner with a recommendation for remedy.
  - 4. Obtaining and use of all temporary structures, offices, storage sheds, and utilities.
  - 5. Obtaining any required building permits, special permits, and approvals from all authorities having jurisdiction.
  - 6. Testing laboratory activities associated with Contractor's scope of work.
  - 7. Check-out of systems and equipment and start-up operations.
  - 8. Work and operations between the Contractor and all trades in such a manner that no union labor dispute of jurisdiction arises regarding unloading, handling, installations, and connections to utilities and otherwise of the various items in the various trades.

##### 1.3 SUBSTANTIAL COMPLETION

- A. The work will not be considered to be fully functional and usable by the Owner for its intended purposes and will not be considered substantially complete until the following items are submitted:
  - 1. Copies of specified inspection and test reports and certifications on materials.
  - 2. Copies of written warranties on equipment and products in accordance with Section 01 78 36, Warranties and Bonds.

B. In addition to the above submissions, the work will not be considered to be fully functional and useful by the Owner for its intended purposes and will not be accepted as substantially complete until all of the following components and/or items have been completed:

1. Roadways, parking areas, and stone surfaces.
2. Drainage.
3. Slope protection and riprap.
4. Signage and identification.
5. The following items, unless waived in writing by the Owner due to inclement weather:
  - a. Finish grading.
  - b. Seeding and mulching.
  - c. Pavements and surface treatment.
  - d. Sidewalks.
  - e. Landscaping.

#### 1.4 FINAL COMPLETION

A. The work under these Contract Documents will not be considered for final acceptance as complete until all of the following items have been completed or submitted:

1. Any items not completed at the time of substantial completion, including all remaining punch list items.
2. Final cleanup.
3. Restoration of all disturbed or damaged properties.
4. Executed project close-out documents included with the Contract Documents.

#### 1.5 ACCEPTANCE AND START-UP OF OPERABLE COMPONENTS

- A. Because of the need to maintain operation during construction, it may be necessary to accept as substantially complete and start-up operable components of the project at various times prior to the completion and acceptance of the entire project.
- B. An "operable component" of the project, as used herein, shall mean a complete process subsystem capable of independent operation and shall include all associated structures, equipment, piping, controls, etc.
- C. Acceptance and start-up of operable components shall not relieve the Contractor of his obligation to substantially complete the project within the Contract Time.

END OF SECTION

**SECTION 01 11 01**

**WEATHER DELAYS**

**PART 1 - GENERAL**

**1.1 EXTENSIONS OF CONTRACT TIME**

- A. If the basis exists for an extension of time in accordance with the Conditions of the Contract, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.

**1.2 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE**

- A. The Owner has reviewed weather data available from the National Oceanic and Atmospheric Administration and determined a Standard Baseline of average climatic range for the Metro Chattanooga area.
- B. Standard Baseline is defined as the normal number of calendar days for each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.
- C. Standard Baseline is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12	11	8	7	7	6	7	5	4	5	6	11

**1.3 ADVERSE WEATHER AND WEATHER DELAY DAYS**

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions within a twenty-four (24) hour day that prevents construction activity exposed to weather conditions or access to the site:
  - 1. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure.
  - 2. Temperatures that do not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
  - 3. Sustained wind in excess of twenty-five (25) m.p.h.
- B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days:
  - 1. resulting from precipitation days that occur beyond the standard baseline;
  - 2. only if there is a hindrance to site access or sitework and Contractor has taken all reasonable accommodations to avoid such hindrance; and,

3. at a rate no greater than 1 make-up day for each day or consecutive days of precipitation beyond the standard baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the Designer.
- C. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day and critical path construction activities were included in the day's schedule, including a weekend day or holiday if Contractor has scheduled construction activity that day.
- D. Contractor shall take into account that certain construction activities are more affected by adverse weather and seasonal conditions than other activities, and that "dry-out" or "mud" days are not eligible to be counted as a Weather Delay Day until the standard baseline is exceeded. Hence, Contractor should allow for an appropriate number of additional days associated with the Standard Baseline days in which such applicable construction activities are expected to be prevented and suspended.

#### 1.4 DOCUMENTATION AND SUBMITTALS

- A. Submit daily jobsite work logs showing which and to what extent critical path construction activities have been affected by weather on a monthly basis.
- B. Submit actual weather data to support claim for time extension obtained from nearest NOAA weather station or other independently verified source approved by Designer at beginning of project.
- C. Use Standard Baseline data provided in this Section when documenting actual delays due to weather in excess of the average climatic range.
- D. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in the Conditions of the Contract.
- E. If an extension of the Contract Time is appropriate, such extension shall be made in accordance with the Conditions of the Contract, and the applicable General Requirements.

END OF SECTION



## SECTION 01 22 00

### MEASUREMENT AND PAYMENT

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplemental Conditions or General Provisions and other Division 1 specification sections, apply to this section.

##### 1.2 LUMP SUM PRICES

- A. Lump sum prices shall include all items of work shown on the Drawings, specified, or otherwise required or necessary for complete, working systems including work, services, fees, equipment or material not specifically listed, overhead, profit, and applicable taxes.

##### 1.3 SCHEDULE OF VALUES

- A. A "Schedule of Values" is required to facilitate payment for partial completion of lump sum items as the project progresses.

#### PART 2 - PARTIAL PAYMENT

- A. Partial payment may be made for stored material on site, providing:
  1. The material meets the specifications outlined elsewhere in these documents.
  2. The material is stored according to the recommendations of the Engineer and/or manufacturer.
  3. The Contractor submits copies of all shipping invoices for the stored materials delivered to the site.

#### PART 3 - MEASUREMENT AND PAYMENT

##### 3.1 MEASUREMENT AND PAYMENT

- A. Measurement and payment for all items of work shown on the Drawings, specified, or otherwise required or necessary for complete, working systems shall be made at the lump sum prices listed in the Bid Schedule. No separate payment shall be made for items of work, services, fees, or equipment not specifically listed, but payment for those items shall be included in the payment for items listed.

END OF SECTION



## SECTION 01 29 76

### APPLICATIONS FOR PAYMENT

#### PART 1 - GENERAL

##### 1.1 REQUIREMENTS INCLUDED

- A. Submit Applications for Payment to the Owner.

##### 1.2 RELATED DOCUMENTS

- A. Contract between Owner and Contractor.
- B. Section 01 78 00, Project Closeout.

##### 1.3 FORMAT AND INFORMATION REQUIRED

- A. Submit applications typed on forms acceptable to the Owner.
- B. Provide itemized data on application:
  - 1. Format, schedules, line items, unit prices, units completed by month and project-to-date, and values.
  - 2. Documentation of employee wages, as requested.

##### 1.4 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

###### A. Application Form

- 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
- 2. Fill in summary of dollar values to agree with respective totals indicated.
- 3. Execute certification with signature of a responsible officer.

###### B. Continuation Sheets

- 1. Fill in total list of all scheduled component items of work, with item number and scheduled dollar value for each item.
- 2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified for the Bid Schedule.
- 3. List each Change Order executed prior to date of submission. List by Change Order number and description, as for an original component item of work.

4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the application for payment.

#### 1.5 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. Substantiating Data. When the Owner requires substantiating data, submit suitable information, with a cover letter identifying:
  1. Project.
  2. Application number and date.
  3. Detailed list of enclosures.
  4. For stored products:
    - a. Item number and identification as shown on application.
    - b. Description of specific material.
- B. Submit one copy of data and cover letter for each copy of application.

#### 1.6 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in application form as specified for progress payments.

#### 1.7 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the Owner at the times stipulated in the Contract.
- B. Number: Four copies of each application.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## SECTION 01 31 19

### PROJECT MEETINGS

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. This section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Pre-Construction Conference.
  - 2. Coordination Meetings.
- B. Construction schedules are specified in another Division 1 section.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and other Division 1 specification sections, apply to this section.

##### 1.3 PRE-CONSTRUCTION CONFERENCE

- A. Attend and participate in a pre-construction conference and organizational meeting at the project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees. The Owner and their consultants, the contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda. Discuss items of significance that could affect progress including such topics as:
  - 1. Tentative construction schedule.
  - 2. Critical work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders.
  - 5. Procedures for processing Applications for Payment.
  - 6. Distribution of Contract Documents.
  - 7. Submittal of shop drawings, product data and samples.
  - 8. Preparation of record documents.
  - 9. Use of the premises.
  - 10. Office, work and storage areas.
  - 11. Equipment deliveries and priorities.
  - 12. Safety procedures.
  - 13. First aid.
  - 14. Security.
  - 15. Housekeeping.
  - 16. Working hours.

#### 1.4 COORDINATION MEETINGS

- A. Conduct project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

## SECTION 01 42 13

### ABBREVIATIONS

#### PART 1 - GENERAL

##### 1.1 GENERAL

- A. Wherever in these Specifications and Contract Documents the abbreviations, or pronouns in place of them are used, the intent and meaning shall be interpreted as specified herein.

##### 1.2 ABBREVIATIONS

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standard Committee
ANSI	American National Standards Institute
AMCA	Air Moving and Conditioning Association
APA	American Plywood Association
APHA	American Public Health Association
API	American Petroleum Institute
APWA	American Public Works Association
ARC	Appalachian Regional Commission
AREA	American Railroad Engineering Association
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tower Institute

DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
EPA	Environmental Protection Agency
EPD	Georgia Environmental Protection Division
FM	Factory Mutual
FmHA	Farmers Home Administration
FS	Federal Specifications
HEI	Heat Exchange Institute
IBC	International Building Code
IEEE	Institute of Electronic and Electrical Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
IPC	Institute of Printed Circuits
ISA	Instrument Society of America
MBMA	Metal Building Manufacturers Association
MSS	Manufacturers Standardization Society of the Valve and Fitting Industry
MUTCD	Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAPF	National Association of Piping Fabricators
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRMA	National Ready-Mix Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
SBC	Southern Building Code Congress International, Inc.
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSCRB	Standard Specification Construction of Roads and Bridges, Department of Transportation, State of Georgia
SSPC	SSPC: The Society for Protective Coatings
SSRBC	Standard Specifications for Road and Bridge Construction, Tennessee Department of Transportation
SSRS	Standard Specifications for Roads and Structures, latest edition, North Carolina Department of Transportation, Division of Highways
TCA	Tile Council of America
TDEC	Tennessee Department of Environment and Conservation
TEMA	Tubular Exchangers Manufacturers Association
UBC	Uniform Building Code
UL	Underwriters Laboratories
USDC	United States Department of Commerce
WEF	Water Environment Federation (Formerly WPCF)
WPCF	Water Pollution Control Federation

END OF SECTION



## SECTION 01 42 19

### APPLICABLE CODES AND STANDARDS

#### PART 1 - GENERAL

##### 1.1 GENERAL

- A. All materials, equipment, fabrication, and installation practices shall comply with the following applicable codes and standards, unless the Contractor's quality standards establish more stringent quality requirements, as determined by the Engineer.

1. Pressure Piping and Tubing

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
NAPF	National Association of Piping Fabricators
NSF	NSF International

2. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

3. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	SSPC: The Society for Protective Coatings

4. Gear Reducers and Bearings

AFBMA	Anti-friction Bearing Manufacturers Association
AGMA	American Gear Manufacturers Association

5. Ventilating Fans

AMCA	Air Moving and Conditioning Association
PFMA	Power Fan Manufacturers Association

6. Electrical and Instrumentation

EIA	Electronic Industries Association
IEEE	Institute of Electrical and Electronic Engineers
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
NEMA	National Electrical Manufacturers Association

NFPA National Fire Protection Association  
UL Underwriter's Laboratories

7. Aluminum Structures

AA Aluminum Association  
AAMA Architectural Aluminum Manufacturers Association

8. Steel Structures

AISC American Institute of Steel Construction  
API American Petroleum Institute  
AWWA American Water Works Association  
SJI Steel Joist Institute

9. Concrete Structures

ACI American Concrete Institute

10. Welding

ASME American Society of Mechanical Engineers  
AWS American Welding Society

11. Safety

OSHA Occupational Safety and Health Act

12. General Building Construction

FM Factory Mutual Fire Insurance Corporation  
IBC International Building Code by the International Code Council  
NFPA National Fire Protection Association

13. Subgrades and Pavement

SSCRB Standard Specification Construction of Roads and Bridges,  
Department of Transportation, State of Georgia, 1993 Edition, and  
Supplemental Specifications  
SSRBC Standard Specifications for Road and Bridge Construction,  
Tennessee Department of Transportation  
SSRS Standard Specifications for Roads and Structures, latest edition,  
North Carolina Department of Transportation, Division of Highways.

14. Ductwork and Sheet Metal Work

SMACNA Sheet Metal and Air Conditioning Contractors National  
Association

15. Plumbing

AGA	American Gas Association
NSF	NSF International
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

16. Refrigeration, Heating, and Air Conditioning

ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers

17. Pressure Vessels

ASME	American Society of Mechanical Engineers
------	--

18. Wood

AF&PA	American Forest & Paper Association
AWPA	American Wood Preservers' Association

In addition, all work shall comply with the applicable requirements of local codes, utilities, and other authorities having jurisdiction.

- B. All material and equipment, for which a UL Standard, an AGA approval, or an ASME requirement is established, shall be so approved and labeled or stamped. Label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

END OF SECTION



## SECTION 01 60 00

### MATERIALS AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the project.
- B. Standards. Refer to Section 01 42 19, Applicable Codes and Standards, for applicability of industry standards to products specified.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provision of Contract and other Division 1 Specification sections, apply to this section.

##### 1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "system," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.
  - 1. "Products" are items purchased for incorporation in the work, whether purchased for the project or taken from previously purchased stock. In all cases, products shall be new and unused. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
    - a. "Named products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
  - 2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the work.
  - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

##### 1.4 QUALITY ASSURANCE

- A. Source Limitations. To the fullest extent possible, provide products of the same kind, from a single source.
- B. Compatibility of Options. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected shall be compatible

with products previously selected, even if previously selected products were also options.

1. Each prime Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate Contractors.

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION

A. General Product Requirements. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.

1. Provide products complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures. Product selection is governed by the Contract Documents and governing regulations. Procedures governing product selection include the following:
1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
  2. Semiproprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
    - a. Where products or manufacturers are specified by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
  3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
  4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
  5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
    - a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
  6. Compliance with Standards, Codes, and Regulations: Where the Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
  7. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer to comply with other specified requirements. The Engineer will select the color, pattern, and texture from the product line selected.

## 2.2 SHOP PRIMING AND PAINTING

- A. Shop prime and/or shop finish all shop fabricated equipment prior to shipping.
- B. Surface preparation, primers, finishes, number of coats, and film thicknesses shall comply with manufacturer's recommendations.
- C. Coat interior, inaccessible surfaces of equipment with an epoxy system suitable for the lifetime of the equipment at anticipated operating conditions and temperatures, unless otherwise specified or accepted.
- D. Coat exterior and accessible interior surfaces with an appropriate epoxy system, unless otherwise specified or accepted.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work.
  - 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION



## SECTION 01 65 00

### TRANSPORTATION AND HANDLING

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. Provide transportation of all equipment, materials, and products furnished under these Contract Documents to the site of the work. In addition, provide preparation for shipment and storage, unloading, handling and rehandling, short-term storage, extended storage, storage facilities, maintenance and protection during storage, preparation for installation, and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the work.

##### 1.2 TRANSPORTATION

- A. Suitably box, crate, or otherwise protect all equipment during transportation.
- B. Ship and deliver all equipment in the largest assembled sections practical or permitted by carrier regulations to minimize the number of field connections.
- C. Ensure that the equipment is assembled and transported in such a manner so as to clear buildings, power lines, bridges, and similar structures encountered during shipment or delivery to the site of the work.
- D. Ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment where equipment will be installed using existing cranes or hoisting equipment.
- E. Small items and appurtenances such as gauges, valves, switches, instruments, and probes which could be damaged during shipment shall be removed from the equipment prior to shipment and packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.
- F. Paint temporary shipping braces and supports orange or yellow for easy identification.

##### 1.3 HANDLING

- A. Carefully handle all equipment, materials, and products to prevent damage or excessive deflections during unloading or transportation. All equipment, materials, and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the work.
- B. Strictly follow lifting and handling drawings and instructions furnished by the manufacturer or supplier. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when the distance

between lifting points exceeds that permitted by standard industry practice. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

- C. Under no circumstances shall equipment or products such as pipe, structural steel, casting, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.
- D. Handle items such as nonmetallic pipe, nonmetallic conduit, flagpoles, and lighting poles using nonmetallic slings or straps.

END OF SECTION

## SECTION 01 66 00

### STORAGE AND PROTECTION

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. Equipment shall be received, inspected, unloaded, handled, stored, maintained, and protected by the Contractor in a suitable location on or off site, if necessary, until such time as installation is required.
- B. Storage and protection of Contractor-furnished equipment shall be in strict conformance with the requirements of the applicable provisions of the General Conditions and Supplemental General Conditions of these Specifications.

##### 1.2 STORAGE

- A. Provide satisfactory storage facilities which are acceptable to the Engineer. In the event that satisfactory facilities cannot be provided on site, satisfactory warehouse, acceptable to the Engineer, will be provided by the Contractor for such time until the equipment, materials, and products can be accommodated at the site.
- B. Equipment, materials, and products which are stored in a satisfactory warehouse acceptable to the Engineer will be eligible for progress payments as though they had been delivered to the job site.
- C. Maintain and protect all equipment, materials, and products placed in storage and bear all costs of storage, preparation for transportation, transportation, rehandling, and preparation for installation.
- D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.
- E. Building products and materials such as cement, grout, plaster, gypsum-board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location, unless otherwise permitted in writing by the Engineer. Building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.
- F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

##### 1.3 EXTENDED STORAGE

- A. In the event that certain items of major equipment such as air compressors, pumps, and mechanical aerators have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Engineer. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants, and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

END OF SECTION



## SECTION 01 74 23

### FINAL CLEANING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for final cleaning at Substantial Completion.
  - 1. Special cleaning requirements for specific elements of the work are included in appropriate sections of Divisions 2 through 48.
- B. General project closeout requirements are included in Section 01 78 00, Project Closeout.
- C. Multiple Prime Contracts. Except as otherwise indicated, each prime Contractor is responsible for final cleaning his own work.
- D. Environmental Requirements. Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
  - 1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
  - 2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division 1 Specification sections, apply to this section.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Cleaning Agents. Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General. Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion for the entire project or a portion of the project.
  - 1. Clean the project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
  - 2. Remove tools, construction equipment, machinery and surplus material from the site.
  - 3. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - 4. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
  - 5. Broom clean concrete floors in unoccupied spaces.
  - 6. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - 7. Remove labels that are not permanent labels.
  - 8. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
  - 9. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
  - 10. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

11. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
  12. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
  13. Leave the project clean and ready for occupancy.
- C. Compliances. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.
1. Where extra materials of value remain after completion of associated construction have become the Owner's property, dispose of these materials as directed.

END OF SECTION





## SECTION 01 78 00

### PROJECT CLOSEOUT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
  - 1. Inspection procedures.
  - 2. Project record document submittal.
  - 3. Operating and maintenance manual submittal.
  - 4. Submittal of warranties.
  - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate sections in Divisions 2 through 48.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract and other Division 1 specification sections, apply to this section.

##### 1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures. Before requesting inspection for certification of substantial completion, complete the following. List exceptions in the request.
  - 1. Advise Owner of pending insurance change-over requirements.
  - 2. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures. On receipt of a request for inspection, the Owner will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Owner will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
  - 1. The Owner will repeat inspection when requested and assured that the work has been substantially completed.
  - 2. Results of the completed inspection will form the basis of requirements for substantial completion.
- C. Reinspection Procedure. The Owner will reinspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Owner.

1. Upon completion of reinspection, the Owner will prepare a certificate of final acceptance or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
2. If necessary, reinspection will be repeated.

#### 1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
  1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
  2. Submit an updated final statement, accounting for final additional changes to the contract sum.
  3. Submit a certified copy of the Owner's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Owner.
  4. Submit specific warranties, maintenance agreements, final certifications, and similar documents.
  5. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.
  6. Deliver any specified tools, spare parts, extra stock, and similar items.
  7. Submit all project close out forms completed and executed.
  8. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.1 FINAL CLEANING

- A. General. General cleaning during construction is required by these specifications.
- B. Cleaning. Employ experienced workers or professional cleaners for final cleaning. Clean all work areas to original condition or to satisfaction of Owner.
  1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

2. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- C. Removal of Protection. Remove temporary protection and facilities installed for protection of the work during construction.
  - D. Compliance. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
1. Where extra materials of value remaining after completion of associated work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION



## SECTION 01 78 36

### WARRANTIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section specifies general administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
  - 1. General closeout requirements are included in Section 01 78 00, Project Closeout.
  - 2. Specific requirements for warranties for the work and products and installations that are specified to be warranted, are included in the individual sections of Divisions 2 through 49.
- B. Disclaimers and Limitations. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract and other Division 1 specification sections, apply to this section.

##### 1.3 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

##### 1.4 WARRANTY REQUIREMENTS

- A. Standard Warranty: Warrant all equipment, materials, products, and workmanship provided under these Contract Documents for a period of 12 months after the date of substantial completion established by the Owner.
- B. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
- C. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty.

- D. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. Complete warranty work as soon as possible after receipt of notice from the Owner for a warranty claim. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefitted from use of the work through a portion of its anticipated useful service life.
- E. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
  - 2. If the required repairs or replacements have not been completed or if positive and good faith efforts have not been made to complete the repairs or replacements within 30 consecutive calendar days after receipt of notice from the Owner of the warranty claim, the Owner shall be authorized to proceed with the repairs or replacements and the cost thereof shall be assessed against the Contractor. Evidence of positive and good faith efforts shall include, as a minimum, joint visits by the Contractor and affected equipment vendors and manufacturers, and certified copies of purchase orders or invoices.
- F. The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. Multiple Equipment Failures. In the event of multiple equipment failures of major consequence prior to the expiration of the one-year warranty described above, disassemble, inspect, and modify or replace the affected equipment as necessary to prevent further occurrences. As used herein, "multiple equipment failures" shall be interpreted to mean two or more successive failures of the same kind in the same item of equipment or failures of the same kind in two or more items of similar equipment. Major equipment failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts or structural members, broken or chipped gear teeth, overheating, premature bearing failure, excessive wear, or excessive leakage around seals. Should multiple equipment failures occur in a given item or type of equipment, disassemble, inspect, modify or replace, as necessary, all equipment of the same size and type, and rewarrant for 12 months.

## 1.5 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date certified for substantial completion. If the Owner's Certificate of Substantial Completion designates a commencement date for warranties other than the date of substantial completion for the work, or a designated portion of the work, submit written warranties upon request of the Owner.

1. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval prior to final execution.
1. Refer to individual sections of Divisions 2 through 49 for specific content requirements, and particular requirements for submittal of special warranties.
- C. Form of Submittal. At final completion, compile two copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Contract Documents.
1. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION





**DIVISION 03**  
**CONCRETE**



## SECTION 03 30 00

### CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. This section specifies cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 specification sections, apply to this section.

##### 1.3 SUBMITTALS

- A. General. Submit the following in accordance with conditions of contract and Division 1 specification sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by Engineer.
- C. Shop drawings for reinforcement, describing the fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures. Splices, clearances, and tolerances shall comply with ACI 318 requirements.
- D. Shop drawings for formwork, prepared by a registered professional engineer, for fabrication and erection of forms for suspended slabs, beams, and other elevated concrete elements.
  - 1. Engineer's review is for general design compliance only. Design of formwork for structural stability and efficiency is Contractor's responsibility.
- E. Laboratory test reports for concrete materials and mix design test.
- F. Materials certificates for the items listed below. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification for admixture manufacturers that chloride content complies with specification requirements.
  - 1. Aggregates.
  - 2. Cement.
  - 3. Admixtures.
  - 4. Reinforcement (including welds).
  - 5. Curing compounds.

6. Waterstops.
7. Bonding compounds.

#### 1.4 QUALITY ASSURANCE

- A. Codes and Standards. Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
  1. ACI 318, "Building Code Requirements for Reinforced Concrete."
  2. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- B. Concrete Testing. The Owner will engage an independent testing laboratory to conduct testing of materials and concrete to ensure compliance with this Specification.
- C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting, of rejected materials or installed work which fails its initial testing, shall be done at Contractor's expense.

### PART 2 - PRODUCTS

#### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete. Plywood, metal, metal-framed plywood-faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.
  1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class 1.
  2. Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class 1, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete. Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns and Supports. Metal, fiberglass-reinforced plastic, or paper or fiber tubes. Provide paper or fiber tubes of laminated plies with water-resistant adhesive and wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- D. Form Coatings. Provide commercial formulation form-coating compounds with a maximum VOC of 350 g/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- E. Form Ties. Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1½ inches to exposed

surface. Provide ties that, when removed, will leave holes not larger than 1 inch diameter in concrete surface. Tie holes shall be filled with non-shrink grout.

## 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars. ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars. ASTM A 775.
- C. Steel Wire. ASTM A 82, plain, cold-drawn steel.
- D. Welded Wire Fabric. ASTM A 185, welded steel wire fabric.
- E. Welded Deformed Steel Wire Fabric. ASTM A 497.
- F. Supports for Reinforcement. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.
  - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

## 2.3 CONCRETE MATERIALS

- A. Portland Cement. ASTM C 150, Type I. Use one brand of cement throughout project unless otherwise acceptable to Engineer.
- B. Fly Ash. ASTM C 618, Type C or Type F.
- C. Coarse Aggregate. ASTM C 33, Class Designation 3S, Grading Size No. 67, and as herein specified. Provide coarse aggregate from a single source for all exposed concrete.
- D. Fine Aggregate. Natural siliceous river sand, consisting of hard, clean, sharp, strong, durable, and uncoated particles, conforming to the requirements of ASTM C 33.

Fine aggregate shall have a fineness modulus of 2.40 minimum and 3.00 maximum and the material passing the No. 200 sieve shall not exceed 3.0 percent by weight of the total sample. Coal and lignite shall not exceed 0.5 percent by weight of the total sample for all concrete. The fineness modulus of fine aggregate incorporated in the work shall not vary more than 0.10 plus or minus from the fineness modulus of the fine aggregate in the appropriate preliminary mix design approved by the Engineer.

- E. Water: Drinkable.
- F. Admixtures, General. Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.

1. Available Manufacturers: Provide admixtures from single source manufacturer for air entrainment and water reducing admixtures. Manufacturers of admixtures shall include but not be limited to the following provided single source availability requirements are met:
    - a. Master Builders, Inc.
    - b. W. R. Grace and Company.
    - c. Euclid Chemical Company.
  2. Air-Entraining Admixture. ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
  3. Water-Reducing Admixture: ASTM C 494, Type A.
  4. High-Range Water-Reducing Admixture (Super Plasticizer). ASTM C 494, Type F or Type G.
  5. Water-Reducing, Accelerating Admixture. ASTM C 494, Type E. Accelerating admixtures must be nonchloride type and are for use only when specifically authorized by the Engineer. Submittal of separate mix design using accelerating admixture will be required.
  6. Water-Reducing, Retarding Admixture. ASTM C 494, Type D. Retarding admixtures must be nonchloride type and are for use only when specifically authorized by the Engineer. Submittal of separate mix design using retarding admixture will be required.
- G. Fibrous Reinforcement: Engineered polypropylene fibers designed for secondary reinforcement of concrete slabs. (Use only where specially called for on the Drawings.)
1. Available Manufacturers: Subject to compliance with requirements, manufacturers whose products may be incorporated in the work include, but are not limited to, the following:
    - a. W. R. Grace and Company.
    - b. Synthetic Industries.

## 2.4 RELATED MATERIALS

- A. Waterstops. Provide waterstops at construction joints and other joints as indicated on the Drawings.
1. Polyvinyl Chloride Waterstops. Corps of Engineers CRD-C 572.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
      - 1) The Burke Company.
      - 2) Greenstreak Plastic Products Company.
      - 3) W. R. Meadows, Inc.
      - 4) Progress Unlimited.
      - 5) Schlegel Corp.
      - 6) Vinylex Corp.

2. Bentonite Clay Waterstops. Specially formulated joint sealant, manufactured in coils with a rectangular cross section, which swells upon contact with water. Adhesive supplied by the water stop manufacturer shall be used to secure the waterstop to existing concrete prior to placing adjoining concrete.
  - a. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, "Waterstop-RX," Volclay - CETCO (Colloid Environmental Technologies Company).
- B. Granular Base. Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.
- C. Sand Cushion. Clean, manufactured or natural sand.
- D. Vapor Retarder. Provide polyethylene sheet vapor retarder cover not less than 8 mils thick over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154.
- E. Liquid Membrane-Forming Curing Compound. Liquid-type membrane-forming curing compound with fugitive dye complying with ASTM C 309, Type I-D, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers whose products may be incorporated in the work include, but are not limited to, the following:
    - a. Dayton Superior Corp.
    - b. Euclid Chemical.
    - c. Sonneborn Rexnord.
- F. Epoxy Bonding Agent. ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Burke Epoxy M.V.," The Burke Company.
    - b. "Euco Epoxy System #452 or #620," Euclid Chemical Co.
    - c. "Sikadur 32 Hi-Mod," Sika Corporation.
- G. Chemical Hardener. U.S. Army Corps of Engineers Specification 204, liquid hardener composed of magnesium and zinc fluorosilicates combined with an anionic surfactant to improve wetting penetration. Hardener to be colorless, nontoxic, nonflammable, and compatible with and providing good adhesion for subsequent topping and/or coatings. Install hardener in accordance with manufacturer's recommendations on interior concrete floors of shops, garages, vehicle service areas, and elsewhere as indicated on the Drawings.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Lapidolith," Sonneborn.

- H. Joint Filler. At joints in slabs and elsewhere as indicated on the Drawings, use preformed strips of asphalt saturated fiberboard (1/2-inch nominal thickness) complying with ASTM D 1751.

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
  - 1. Fly ash may be substituted for cement in amounts not to exceed 20 percent of the specified cement content by weight providing that the mix conforms with all other requirements.
- B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of concrete placement. Do not begin concrete production until proposed mix designs have been reviewed by Engineer.
- C. Design mixes to provide normal weight concrete with the following properties:

Property	Concrete Class	
	A	B
28-day Compressive Strength:		
Average of Three Consecutive Specimens	4,000 psi	2,500 psi
Minimum Any One Specimen	3,200 psi	2,000 psi
Minimum Cement Content (sacks/cubic yard)	6.5	5.0
Maximum Water-to-Cement Ratio:		
By Weight (pound/pound)	0.49	0.54
By Sack (gallon/sack)	5.5	6.0
Air Content (percent by volume):		
Minimum	4.5	4.5
Maximum	5.5	5.5
Ratio of Coarse to Fine Aggregate (by weight):		
Minimum	1.0	1.0
Maximum	2.0	2.5
Stone Gradation	#67	#67

Class "A" concrete shall be used for all concrete work unless Class "B" is specifically called for on the Drawings.

- D. Adjustment to Concrete Mixes. Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.



## 2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in all concrete.
- B. Use nonchloride accelerating admixture in concrete placed at ambient temperatures below 50°F (10°C) when authorized by the Engineer.
- C. Use high-range water reducing admixture (HRWR) in pumped concrete.
- D. Admixtures. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.
- E. Slump Limits. Proportion and design mixes to result in concrete slump at point of placement as follows:
  - 1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
  - 2. Walls: 2½ to 4 inches.
  - 3. Floors and slabs: 2 to 3 inches.
  - 4. Beams: 2 to 3 inches.
  - 5. Blocks and Footings: 2 to 4 inches.

Concrete having a slump greater than 1 inch over the specified maximum shall be rejected.

In pumped concrete, the maximum slump of the concrete at the suction of the pump may be increased above the maximum specified slump by the amount of slump loss in the pumping system up to a maximum of 1 inch.

## 2.7 CONCRETE MIXING

- A. Job-Site Mixing. Only allowed when specifically authorized by the Engineer.
- B. Ready-Mix Concrete. Comply with requirements of ASTM C 94, and as specified.
  - 1. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1½ hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

## 2.8 EPOXY ANCHORS AND DOWELS

- A. Anchors. Unless shown otherwise, dowels or anchors placed in existing or hardened concrete shall be stainless steel Type 316 ASTM F 593 and ASTM F 594, threaded rod with hex nuts.
- B. Epoxy adhesive shall be as follows:
  - 1. Two component, 100% solid (containing no solvents), non-sag paste, insensitive to moisture, grey in color.
  - 2. Conform to NSF Standard 61 for use in conjunction with drinking water systems.

3. Conform to ASTM C 881-90; Type IV; Grade 3; Class A, B, and C with the exception of gel time.
4. Maximum shrinkage during cure per ASTM D 2566 of 0.00051 in./in.
5. Compressive strength, ASTM D 695: 10,300 psi minimum.
6. Shelf life: 3 years minimum.
7. Water solubility: None.
8. Heat deflection temperature, ASTM D648: 140°F minimum.
9. Epoxy adhesive shall be Epcon C-6, manufactured by ITW Ramset.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

### 3.2 FORMS

- A. General. Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges at  $\frac{3}{4}$  inch unless indicated otherwise on the Drawings, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

- F. Provisions for Other Trades. Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

### 3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. General. Following leveling and tamping of granular base for slabs on grade, place vapor retarder/barrier sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.
- C. After placement of vapor retarder/barrier, cover with sand cushion and compact to depth as shown on Drawings.

### 3.4 PLACING REINFORCEMENT

- A. General. Comply with ACI 318 and the CRSI's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
  - 1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
  - 2. Field bending of reinforcement using heat and/or welding of reinforcement is NOT permitted.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer.
- D. Place reinforcement to obtain at least minimum coverage for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. Construction and Control Joints. Locate and install construction and control joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Engineer.
1. Provide keyways at least 1½ inches deep with a width of approximately one-half the thickness of the thinnest section being joined at construction and control joints in walls, slabs, between walls and slabs, and between walls and footings unless otherwise indicated. Acceptable bulkheads designed for this purpose may be used for slabs.
  2. Place construction and control joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements or at control joints.
  3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete at construction joints.
- B. Waterstops. Provide waterstops in construction and control joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions.
- C. Isolation Joints in Slabs-on-Ground for Floors of Buildings, Sidewalks, and Driveways. Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated. Construct isolation joints using preformed joint filler board.
- D. Contraction Joints in Slabs-on-Ground for Floors of Buildings, Sidewalks, and Driveways. Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts ⅛ inch wide by ¼ of slab depth or inserts ¼ inch wide by ¼ of slab depth, unless otherwise indicated.
1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
  2. Begin saw cutting of contraction joints in floor slabs as soon as possible after slab finishing as may be safely done without dislodging aggregate. Saw cutting must be completed within 8 hours following slab placement.
  3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and locate to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

### 3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General. Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Forms for Slabs. Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

### 3.7 PREPARATION OF FORM SURFACES

- A. General. Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed.
- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

### 3.8 CONCRETE PLACEMENT

- A. Inspection. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.
- B. General. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
- C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
  - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
  - 2. One operable, back-up, mechanical vibrator shall be on site prior to beginning concrete placement.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of

concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

- E. Placing Concrete Slabs. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
  3. Maintain reinforcing in proper position during concrete placement.
- F. Cold-Weather Placing. If permitted by the Engineer, comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C) and not more than 80°F (27°C) at point of placement.
  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, and other materials containing antifreeze agents or chemical accelerators unless authorized by the Engineer.
  4. Provide adequate means for maintaining the temperature of the air surrounding the concrete at 70°F for three days, or 50°F for five days, or for as long as is necessary to ensure proper curing of the concrete. Rapid cooling of the concrete shall be prevented. Housing, covering, or other protection used in connection with heating shall remain in place and intact at least 24 hours after the artificial heat is discontinued.
- G. Hot-Weather Placing. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 85°F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
  2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Engineer.

### 3.9 FINISH OF FORMED SURFACES

- A. Coordinate finish requirements with surface preparation requirements for concrete to be coated in accordance with Section 09 91 00, Painting, if applicable.
- B. Provide rough form finish for formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material, with tie holes and defective areas repaired and patched and fins and other projections exceeding ¼-inch in height rubbed down or chipped off.
- C. Provide smooth form finish for formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- D. Grout-Cleaned Finish. Provide grout-cleaned finish as follows to concrete surfaces that have received smooth form finish treatment not to be coated with paint, waterproofing, dampproofing, or other similar system.
  1. Combine one part portland cement to 1½ parts fine sand by volume, and a 50:50 mixture of acrylic-based bonding admixture and water to consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
  2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces. At tops of walls, horizontal offsets, and similar unformed surfaces occurring 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.

### 3.10 MONOLITHIC SLAB FINISHES

- A. Coordinate finish requirements with surface preparation requirements for concrete to be coated in accordance with these specifications.
- B. Float Finish. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance of plus or minus ¼-inch as measured from a 10-foot straight edge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish. Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
- D. Trowel and Fine Broom Finish. Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- E. Nonslip Broom Finish. Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

### 3.11 CONCRETE CURING AND PROTECTION

- A. General. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Initial Curing. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
- C. Curing Methods. Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified. Select curing method appropriate for subsequent coating and finishing requirements.
1. Provide moisture curing by either of the following methods or combination thereof, maintaining concrete surface moisture for seven days:
    - a. Keep concrete surface continuously wet by covering with water.
    - b. Use continuous water-fog spray.
    - c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.



2. **Moisture-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Maintain concrete surface moisture for seven days.
3. **Curing and sealing compound, when utilized, shall be applied as follows:**
  - a. **Flatwork:** Apply curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within two hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
  - c. **Formed Surfaces:** Apply curing and sealing compound upon removal of form work.
4. **Curing Formed Surfaces:** Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
5. **Curing Unformed Surfaces:** Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
  - a. Cure concrete surfaces to receive liquid floor hardener or other finish by use of moisture-retaining cover, unless otherwise directed.

### 3.12 REMOVAL OF FORMS

- A. **General.** Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 72 hours after placing concrete, provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beams, soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

### 3.13 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Engineer.

### 3.14 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs. Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations. Provide machine and equipment bases and foundations, as shown on Drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. Reinforced Masonry. Provide concrete grout for reinforced masonry lintels and bond beams where indicated on Drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.
- E. Concrete Embedment and Encasement of Pipe. Install concrete for embedment and encasement where indicated on the Drawings and at such locations where installation conditions require such pipe support as determined by the Engineer. Embedment and encasement of pipe shall be preceded by the following preliminary steps:
  - 1. Remove all loose material from the trench prior to placing concrete. All concrete shall have a continuous contact with undisturbed soil on sides and bottom of trench.
  - 2. Accurately place a base course of concrete to such grade and elevation that the pipe will be at specified grade when pipe bells are supported on, and in contact with, the top surface of the base course.
  - 3. Restrain each length of pipe to maintain alignment and prevent floatation in a manner acceptable to the Engineer.

### 3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas. Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer.

1. Cut out honeycomb, rock pockets, voids over ¼-inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1-inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
  2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- C. Repair of Unformed Surfaces. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01-inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
  2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
  3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete.
  4. Repair defective areas, except random cracks and single holes not exceeding 1-inch-diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least ¾-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.



Total Size of Pour (CY)	Number of Samples	Number of Cylinders
1 - 100	1	6
101 - 200	2	12
201 - 300	3	18
Over 300	1/100 CY	6/100 CY

3. Test cylinders will normally be laboratory-cured. However, the Engineer may require tests on field-cured specimens to check the adequacy of curing operations.
  4. A slump test and an air content test will be performed on each sample of concrete tested for compressive strength.
  5. Cement and aggregate will be subject to inspection, sampling, and field testing at the batching plant. Concrete will be subject to inspection, sampling, and field testing at the place of concrete placement.
  6. All field sampling, field testing, making and curing of field test cylinders, and laboratory testing performed during concreting operations for the purpose of determining if the requirements of this specification section are being satisfied shall be conducted by an independent testing laboratory selected by the Owner and paid for directly by the Owner and not as a part of this Contract.
  7. Furnish the testing laboratory representative satisfactory samples of cement, aggregate, and concrete for inspection and testing purposes. The Contractor shall furnish any barrows, shovels, mixing boards, shaded area for preparing test cylinders, and similar equipment required by the testing laboratory representative for securing samples, making test cylinders, and conducting field tests.
- C. Test results will be reported in writing to Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- D. Nondestructive Testing. Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- E. Additional Tests. The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for any and all such tests.

### 3.17 LOADS APPLIED TO NEW CONCRETE

- A. Loads including, but not limited to, earth loads, loads exerted from bracing or shoring, wind loads, hydrostatic or hydraulic loads, equipment or vehicle loads, or loads exerted by stacked materials, shall not be applied to fresh concrete until the concrete has reached its specified 28-day strength.
- B. Concrete which has cracked due to overloading, loading before required strength has developed, or otherwise damaged shall be repaired or replaced as determined by the Engineer.

### 3.18 INSTALLATION OF EPOXY ANCHORS AND DOWELS

- A. Verify number, size, depth, and location of anchors or dowels to be installed.
- B. Drill holes in concrete to the depth specified on the Drawings using methods as instructed by the epoxy manufacturer. The diameter of holes shall be as instructed by the epoxy manufacturer for the anchor or dowel being installed. Clean holes as instructed by the epoxy manufacturer.
- C. Install epoxy in strict accordance with the manufacturer's instructions using guns with self-mixing nozzles provided by the manufacturer. Verify epoxy is mixed prior to placement into the hole using methods per manufacturer's instructions. Insert dowel or anchor into the hole and hold steady as instructed by the manufacturer.

END OF SECTION

## SECTION 03 30 40

### CONCRETE SIDEWALKS AND DRIVEWAYS

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. This work shall consist of constructing sidewalks and driveways, exclusive of sidewalks and driveways that are integrally a part of structures, of portland cement concrete on a prepared subgrade, in accordance with these Specifications and in reasonably close conformity with the lines, grades, and typical cross-sections shown on the Plans or established by the Engineer. It shall, also, include removal of existing sidewalks and driveways as directed by the Engineer.

##### 1.2 MATERIALS

- A. Materials shall meet the requirements of:
  - 1. Section 31 20 00, Earthwork
  - 2. Section 32 10 00, New and Replacement Paving
  - 3. Section 03 30 00, Cast-in-Place Concrete
  - 4. Section 07 92 00, Joint Sealants
- B. Concrete for sidewalk and driveway pavement shall be Class A Concrete, unless specified otherwise on the Drawings, meeting all the requirements prescribed in Section 03 30 00, Cast-In-Place Concrete.

##### 1.3 EQUIPMENT

- A. Forms. Forms shall be of wood, metal, or other suitable material and shall extend for the full depth of the concrete. All forms shall be true to line, free from warp, and of sufficient strength to resist the pressure of the concrete without springing. Curved forms of proper radius shall be used on all radial sections and shall be of a design acceptable to the Engineer. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.
- B. Mixing, Finishing and Transportation
  - 1. Mixers and transportation of equipment shall meet the requirements of Section 03 30 00, Cast-In-Place Concrete.
  - 2. Satisfactory floats, trowels, templates, straightedges, edgers, spades, and tamps shall be furnished. Compaction of subgrade shall be accomplished by any type of tamping or rolling equipment that will produce the desired results.

##### 1.4 CONSTRUCTION REQUIREMENTS

- A. Subgrade Preparation. Subgrade preparation for sidewalks and driveways shall be made to the required depth and to a width that will permit the installation and bracing of the forms. The subgrade shall be shaped and compacted to a firm, even surface in

reasonably close conformity with the grade and section on the Drawings. All soft and yielding material shall be removed and replaced with acceptable material, which shall then be compacted as directed. The prepared subgrade shall then be brought to true line and grade with a minimum depth of 2 inches of mineral aggregate base, unless specified otherwise on the Drawings, meeting the requirements of Section 32 10 00, New and Replacement Paving.

B. Expansion Joints

1. Unless otherwise indicated on the Drawings or directed by the Engineer, premolded expansion joint filler,  $\frac{3}{4}$ -inch in thickness, shall be placed at the locations and in line with expansion joints in the adjoining pavement, gutter or curb. When expansion joints are not required or have not been installed in the adjoining pavement or gutter, unless otherwise indicated on the Plans, a  $\frac{3}{4}$ -inch premolded expansion joint filler shall be placed at intervals of not over 40 feet). All premolded expansion joint filler shall be cut to full width or length of the proposed construction and shall extend to within  $\frac{1}{2}$ -inch of the top or finished surface. All longitudinal expansion joints shall be placed as indicated on the Drawings or as directed by the Engineer. All expansion joints shall be true, even, and present a satisfactory appearance.
2. Construction joints shall be formed around all appurtenances, such as manholes, utility poles, etc., extending into and through the sidewalk. Premolded expansion joint filler,  $\frac{1}{4}$ -inch thick, shall be installed in these joints. Expansion joint filler of the thickness indicated shall be installed between concrete sidewalks and any fixed structure, such as a building or bridge. A  $\frac{1}{4}$  inch-thick expansion joint filler shall be installed between concrete curb and sidewalk. This expansion joint material shall extend for the full depth of the walk.

C. Limitations of Mixing. Limitations on the mixing of concrete shall be as prescribed in Section 03 30 00, Cast-In-Place Concrete.

D. Mixing and Placing Concrete. Concrete shall be mixed in accordance with the provisions of Section 03 30 00, Cast-In-Place Concrete. Immediately before placing the concrete, the subgrade shall be thoroughly wetted, and the forms given a coating of form release compound. Where removed and used again, the forms shall be thoroughly cleaned and oiled each time before using.

E. Finishing

1. The concrete shall be struck-off with a transverse template resting upon the side forms. After the concrete has been struck-off to the required cross-section, it shall be finished with floats, trowels, and straightedges until the surface requirements have been obtained.
2. When the surface of the concrete is free from water and just before the concrete obtains its initial set, it shall be gone over and finished with a float and swept lightly with a broom in order to produce a sandy texture. The longitudinal surface variations shall be not more than  $\frac{1}{4}$  inch under a 12-foot straightedge, nor more than  $\frac{1}{8}$  inch on a 5-foot transverse section. The surface of the concrete shall be so finished as to drain completely at all times. The edges of the sidewalks and



driveways shall be carefully finished and rounded with an edging tool having a radius of ½ inch.

3. The surface of sidewalks shall be divided into blocks by use of a grooving tool. Grooves shall be so placed as to cause expansion joints to be placed at a groove line. The grooves shall be spaced approximately 5 feet apart, and the blocks shall be rectangular unless otherwise ordered by the Engineer. The grooves shall be cut to a depth of not less than ½ inch and not more than 1 inch. The edges of the grooves shall be edged with an edging tool having a radius of ¼ inch.
4. The edges of the concrete at expansion joints shall be rounded with an edging tool having a radius of ¼ inch. All marks caused by the edging shall be removed with a wetted brush or float. The top and ends of expansion joint material shall be cleaned of all concrete, and the expansion joint material shall be so trimmed as to be slightly below the surface of the concrete.

F. Protection and Curing

1. Forms may be removed at any time that removal will not damage the concrete. No pressure shall be exerted upon the concrete in removing forms.
2. Curing and protection during cold weather shall be performed as provided for under Section 03 30 00, Cast-In-Place Concrete.
3. Pedestrians will not be allowed upon concrete sidewalks or driveways until 72 hours after finishing concrete, and no vehicles or loads shall be permitted on any sidewalk or driveway until the Engineer has determined that the concrete has attained sufficient strength for such loads.
4. The Contractor shall construct and place such barricades and protection devices as are necessary to keep pedestrians and other traffic off the sidewalk or driveway.
5. Any sidewalk or driveway damaged prior to final acceptance of the project shall be repaired, at the Contractor's expense, by removing concrete within groove limits and replacing it with concrete of the type and finish in the original construction.

- G. Backfilling. Immediately after removing the side forms, the spaces along the edges of sidewalk or driveway shall be filled with suitable material. This material shall be placed in layers not exceeding 4 inches in loose thickness, and compacted until firm and stable.

END OF SECTION



## SECTION 03 30 50

### CONCRETE CURB, GUTTER, OR COMBINED CURB AND GUTTER

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. This work shall consist of curb, gutter, or combined curb and gutter constructed of Portland Cement Concrete in accordance with these Specifications, at the locations and in reasonably close conformity with the lines, grades and dimensions shown on the Plans, or established by the Engineer. It shall also include removal of existing curb and gutter as directed.

##### 1.2 MATERIAL

- A. Materials shall meet the applicable requirements of:

- 1. Section 31 20 00, Earthwork
- 2. Section 32 10 00, New and Replacement Paving
- 3. Section 03 30 00, Cast-In-Place Concrete
- 4. Section 07 92 00, Joint Sealants

Concrete for curb, gutter, and combined curb and gutter shall be Class A concrete, meeting all of the requirements prescribed in Section 03 30 00, Cast-In-Place Concrete, with the modification specified hereinafter.

- B. When the use of an approved curb machine is authorized, the following combination of materials shall be used:

- |  |                       |
|--|-----------------------|
| 1. Water:  | 4.0 Gallons (Maximum) |
| 2. Cement:   | 94.0 Pounds           |
| 3. Coarse Aggregate - Size No. 78, conforming to the requirements of ASTM C33: | 260.0 Pounds          |
| 4. Clean Sand:   | 245.0 Pounds          |

- C. Fine aggregate shall conform to ASTM C33.
- D. Entrained air will not be required in curb concrete made with the aforementioned combination.
- E. The water and percentages of fine and coarse aggregate may be adjusted within the above limits to permit satisfactory placement.
- F. Compressive test specimens shall be made by vibratory method in accordance with AASHTO T 23, "Standard Method for Making and Curing Concrete, Compression and Flexural Strength Test Specimens in the Field," or other approved methods.
- G. Forms. Forms, except the templates between 10-foot sections, may be either wood or metal meeting the requirements prescribed in Section 03 30 00, Cast-In-Place Concrete. The templates shall be 1/8-inch-thick metal, of the same width as that of the

curb, gutter, or combination curb and gutter, and not less than ½ inch more in depth than the respective depth of the type curb and gutter being constructed. The templates shall have lugs, or other devices to hold them in position during placing of the concrete and shall be of such design as to permit strike-off template of the form, and shape of the gutter shall be used to shape the top surface of the gutter.

- H. Compaction Equipment. Compaction of subgrade shall be accomplished by any type of tamping or rolling equipment that will produce the desired results.
- I. Mixing and Finishing Equipment
  - 1. Mixers shall meet the requirements of Section 03 30 00, Cast-In-Place Concrete, except that the stipulation requiring the use of a broom and bucket will be waived.
  - 2. Any extruding type curb machine may be used when approved by the Engineer.
  - 3. Finishing equipment shall include satisfactory floats, trowels, edgers, spades and tamps.

### 1.3 SUBGRADE PREPARATION

- A. Subgrade preparation for curb, gutter, and combined curb and gutter shall be made to the required depth, and to a width that will permit the installation and bracing of the forms. The subgrade shall be shaped and compacted to a firm, even surface, in reasonably close conformity with the grade and section shown on the Plans. All soft and yielding material shall be removed and replaced with acceptable material, which shall then be compacted as directed. The subgrade shall be finished and brought to true line and grade with a minimum 2-inch compacted layer of mineral aggregate base (GAB) meeting the requirements of Section 32 10 00, New and Replacement Paving.

### 1.4 EXPANSION JOINTS

- A. Expansion joints shall be formed at the intervals and locations shown on the Drawings, using preformed filler ¼ -inch thick, unless otherwise specified. They shall be placed in line with corresponding expansion joints in adjoining pavement or other construction. Joint filler shall be cut to the full cross-section of the curb, gutter, or combined curb and gutter.

### 1.5 MIXING, PLACING, AND FINISHING CONCRETE

- A. Concrete shall be mixed in accordance with requirements of Section 03 30 00, Cast-In-Place Concrete.
- B. Immediately before placing the concrete, the subgrade shall be thoroughly wetted, and the forms given a coating of light oil. Where removed and used again, the forms shall be thoroughly cleaned and oiled each time before using. Placing concrete shall be performed as provided for under Section 03 30 00, Cast-In-Place Concrete.
- C. The concrete shall be placed immediately after mixing. The edges, sides, or faces, shall be thoroughly spaded and vibrated sufficiently to consolidate the concrete thoroughly and bring the mortar to the surface, after which the surface shall be finished smooth and even by means of a float.

- D. Concrete curb, gutter, or combined curb and gutter, shall be constructed reasonably true to line, grade and cross-section and, unless otherwise specified on the Plans, in sections having uniform lengths of 10 feet. The length of these sections may be reduced where necessary for closures, but no section less than 6 feet will be permitted. The templates shall be set carefully before the placing of the concrete and allowed to remain in-place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in-place. The forms on the face of all curbs shall be removed as soon as the concrete will hold shape and the surface then floated with a float to a smooth and even finish. No plastering will be permitted. Unless otherwise specified, the top edges of the curb and the edge of the gutter shall be rounded to a radius of 3/4 inch, and the edges on each side of templates and expansion joint material shall be finished with an edging tool with a radius of not over 1/4 inch, and then all lines or marks shall be removed with a wet brush. Any exposed surface or surfaces against which some rigid type of construction is to be made shall be left smooth and uniform so as to permit free movement of the curb, gutter or combined curb and gutter.
- E. All tool marks shall be removed with a wetted brush or float, and the finished surface shall present a uniform and pleasing appearance.
- F. Extruding type curb machines may be used at the option of the Contractor and with approval of the Engineer where feasible, provided the mix meets requirements of Paragraph 1.2, Materials, of this section.
- G. When the use of extruding type curb machines is permitted, finishing shall be performed as specified above.
- H. Weep holes or drainage openings shall be placed through curbs as indicated on the Plans or as directed by the Engineer, but when so placed, unless otherwise indicated or directed, there shall be placed at least 1/2 cubic foot of coarse aggregate behind each opening.

#### 1.6 PROTECTION AND CURING

- A. Immediately after finishing the concrete, protection and curing shall be performed in accordance with the provisions of Section 03 30 00, Cast-In-Place Concrete.
- B. The Contractor shall protect the curb, gutter, and combined curb and gutter until finally accepted. Any concrete that is damaged during that period shall be repaired by removing and reconstructing each 10-foot section that has been damaged. This reconstruction shall be at the Contractor's expense.

#### 1.7 BACKFILLING

- A. Immediately after the concrete has set sufficiently and the forms have been removed, the space back of the curb or combined curb and gutter shall be filled with suitable material. This material shall be placed in layers not exceeding 4 inches in loose thickness, and compacted until firm and stable.

END OF SECTION



**DIVISION 05**  
**METALS**





**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. This section includes the following metal fabrications:

1. Ladders.
2. Ladder safety cages.
3. Loose bearing and leveling plates.
4. Loose steel lintels.
5. Miscellaneous structural steel framing and supports.
  - a. Applications where framing and supports are not specified in other sections.
6. Miscellaneous steel trim.
7. Metal bar gratings.
8. Floor plate and supports.
9. Pipe railings.
10. Metal stairs.
11. Pipe bollards.
12. Anchorage to hardened concrete.

**1.2 RELATED DOCUMENTS**

A. Drawings and general provisions of Contract, including General and Supplemental Conditions or General Provisions and Division 1 Specification sections, apply to work of this section.

**1.3 DEFINITIONS**

A. Definitions in ASTM E 985 for railing-related terms apply to this section.

**1.4 SYSTEM PERFORMANCE REQUIREMENTS**

A. Structural Performance. Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

1. Top Rail of Handrail Systems: Capable of withstanding the following loads applied as indicated:

- a. Concentrated load of 200 pounds applied at any point nonconcurrently, vertically downward, or horizontally.
  - b. Uniform load of 100 pounds per linear foot applied vertically and concurrently with a uniform load of 50 lbs/ft applied horizontally.
  - c. Concentrated and uniform loads above need not be assumed to act concurrently.
2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
- a. Concentrated load of 200 pounds applied at any point nonconcurrently, vertically downward, or horizontally.
  - b. Uniform load of 50 pounds per linear foot applied nonconcurrently, vertically downward, or horizontally.
  - c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Stair Treads: Capable of withstanding a uniform load of 100 pounds per square foot or a concentrated load of 300 pounds on an area of 4 square inches located in the center of the tread, whichever produces the greater stress.
4. Stair Platforms: Capable of withstanding a uniform load of 100 pounds per square foot.
5. Floor Gratings: Capable of withstanding a uniform load of 250 pounds per square foot or a concentrated load of 300 pounds per foot of grating width, whichever produces the greater stress. No grating shall be installed which deflects more than  $\frac{1}{4}$  inch under a uniform load of 100 pounds per square foot.

## 1.5 SUBMITTALS

- A. General. Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data for products used in miscellaneous metal fabrications, including paint products and grout.
- C. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.
  1. Where installed metal fabrications are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation.
- D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications. Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the work.
- B. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code -Sheet Steel," and D1.2 "Structural Welding Code - Aluminum."
  - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- C. Engineer Qualifications. Professional engineer licensed to practice in jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this Project.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements. Where possible, check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
  - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

## 1.8 SEQUENCING AND SCHEDULING

- A. Sequence and coordinate installation of wall handrails as follows:
  - 1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

## PART 2 - PRODUCTS

### 2.1 FERROUS METALS

- A. Metal Surfaces, General. For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- B. Steel Shapes
  - 1. W Shapes. ASTM A 992.
  - 2. C and S Shapes. ASTM A 36.
  - 3. CEE and ZEE (purlins and girts). ASTM A 570 Grade 33 (min).

- C. Steel Plates, Angles, and Bars. ASTM A 36.
- D. Rolled Steel Floor Plates. ASTM A 786.
- E. Steel Bars for Gratings. ASTM A 569 or ASTM A 36.
- F. Wire Rod for Grating Cross Bars. ASTM A 510.
- G. Cold-Formed Steel Tubing. ASTM A 500; Grade B, unless otherwise indicated or required for design loading.
- H. Galvanized Steel Sheet. ASTM A 653; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.
- I. Steel Pipe. ASTM A 53; finish, type, and weight class as follows:
  - 1. Galvanized finish for exterior installations and where indicated.
  - 2. Type S, Grade B, standard weight (Schedule 40), unless otherwise indicated, or another weight required by structural loads.
- J. Gray Iron Castings. ASTM A 48, Class 25 or better.
- K. Welding Rods and Bare Electrodes. Select in accordance with AWS specifications for the metal alloy to be welded.

## 2.2 STAINLESS STEEL

- A. Bar Stock and Shapes. ASTM A 276, Type 304 or 316.
- B. Plate. ASTM A 240, Type 304 or 316.
- C. Bolts and Nuts. ASTM F 593 and ASTM F 594, Type 304 or 316.

## 2.3 ALUMINUM

- A. Extruded Bars and Shapes. ASTM B 221, alloys as follows:
  - 1. 6061-T6 or 6063-T6 for bearing bars of gratings and shapes.
  - 2. 6061-T1 for grating cross bars.
- B. Aluminum-Alloy Floor (Tread) Plate. ASTM B 632, Alloy 6061-T6.
- C. Aluminum Sheet. ASTM B 209, Alloy 6061-T6.
- D. Fasteners for Aluminum Gratings. Use fasteners made of same basic metal as fastened metal or stainless steel fasteners. Do not use metals that are corrosive or incompatible with metals joined.
- E. Rolled Sections. ASTM B 308, Alloy 6061-T6.
- F. Pipe. ASTM B 429, Alloy 6061-T6 or 6063-T6.
- G. Castings. ASTM B 26 or B 85.
- H. Handrail. ASTM B 221, Alloy 6105-T5.

## 2.4 GROUT

- A. Nonshrink Nonmetallic Grout. Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- B. Available Products. Subject to compliance with requirements, non-shrink nonmetallic grouts that may be incorporated in the work include but are not limited to the following:
  - 1. "Bonsal Construction Grout," W. R. Bonsal Co.
  - 2. "Diamond-Crete Grout," Concrete Service Materials Co.
  - 3. "Euco N-S Grout," Euclid Chemical Co.
  - 4. "Kemset," Chem-Masters Corp.
  - 5. "Crystex," L&M Construction Chemicals, Inc.
  - 6. "Masterflow 713," Master Builders.
  - 7. "Sealtight 588 Grout," W. R. Meadows, Inc.
  - 8. "SonogROUT," Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
  - 9. "Stonecrete NM1"; Stonhard, Inc.
  - 10. "Five Star Grout," U. S. Grout Corp.
  - 11. "Vibropruf #11," Lambert Corp.

## 2.5 FASTENERS

- A. General. Provide zinc-coated steel fasteners unless otherwise indicated. Select fasteners for the type, grade, and class required.
- B. Connectors and Accessories
  - 1. High Strength Bolts: ASTM A 325.
  - 2. Unfinished Bolts: ASTM A 307, Grade B, cadmium plated.
  - 3. Self-Locking Nuts: Prevailing torque type; IFI-100, Grade A.
  - 4. Flat Washers: ANSI B 27.2.
  - 5. Lock Washers: Spring type, ANSI B 27.1.
  - 6. Beveled Washers: Table 1 of "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts," AISC Steel Construction Manual.
- C. Connection Requirements
  - 1. Make connections not specifically detailed on Drawings using Tables I and III, Framed Beam Connections, in the latest edition of the AISC manual. The shop fabricated portion of structural connections may be bolted, welded, or riveted. Except for connections detailed on the Drawings or specified otherwise, make all field connections with ASTM A 325 high-strength bolts.
  - 2. Connections for miscellaneous metal work not included in the AISC definition of structural steel may be made with unfinished bolts. All unfinished bolts shall be equipped with self-locking nuts or lock washers.
  - 3. Install high-strength bolts using turn-of-nut tightening as described in "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts" as set forth in the AISC manual. Beveled washers shall be used when the bearing faces of bolted parts have a slope of 1:20 or greater with respect to a plane

perpendicular to the bolt axis. Provide a platform or other means of access at each field connection until the connection has been inspected by the Engineer.

4. Field welded connections will not be acceptable for structural steel unless shown on the Drawings or specifically permitted by the Engineer. Where structural or miscellaneous steel connections are welded, all butt and miter welds shall be continuous and where exposed to view shall be ground smooth. In addition, intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

- D. OSHA Standards. Connections shown on the Drawing or as specified in this or related sections indicate the details pertinent to performance of the structure or assembly. When erection means and methods dictate installation of additional temporary bolts or additional temporary bracing in order to adhere to OSHA regulations, the additional bolts and bracing shall be at the expense of the Contractor. Additional bolts and bracing shall be removed when permissible in the erection process and damaged areas repaired unless permitted by the Engineer to remain in place.

## 2.6 PAINT AND GALVANIZING

- A. Shop surface preparation and painting of elements not shown to be galvanized shall comply with applicable requirements of Section 09 91 00, Painting.

- B. Steel members, fabrications, and assemblies shown to be galvanized after fabrication shall be treated as follows:

1. Hot dip galvanize in accordance with ASTM A 123.
2. Zinc used for galvanizing shall conform with ASTM B 6.
3. Weight of zinc coating to conform to requirements specified under "Weight of Coating" in ASTM A 123.
4. Safeguard against steel embrittlement in conformance with ASTM A 143.
5. Safeguard against warpage or distortion of steel members in conformance with ASTM A 384. Notify Engineer of potential warpage problems which may require modification in design before proceeding with fabrication or treating.
6. Finish and uniformity of zinc coating and adherence of coating to comply with ASTM A 123.
7. Give a passivating treatment to galvanized elements which are not to be further coated or which may be stored in open, exterior locations for long periods prior to erection. Do not use chromate passivation on items to be painted after erection.
8. Do not treat galvanized or passivated surfaces which are to be painted with oils or other chemicals which might interfere with coating adhesion.

- C. Protection of Aluminum in Contact with Other Materials

1. Coat aluminum surfaces to be placed in contact with other metals, except stainless steel, or concrete with two coats of a high-build coal tar coating.

2. Coating to be Themec "46-465 H.B. Themecol," Corchem Corporation "Corchem 146 High Build Coal Tar," or approved equal.
3. Solvent clean and otherwise prepare all surfaces in accordance with the coating manufacturer's recommendations prior to application.
4. Each coat to provide a dry film thickness of at least 10 mils.

## 2.7 LADDERS

- A. General. Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.
- B. Side Rails. Continuous channel or similar extruded shape, with eased edges, spaced 18 inches apart unless a specific spacing is shown on the Drawings.
- C. Bar Rungs. Round solid bars or tubes,  $\frac{3}{4}$ -inch diameter, spaced 12 inches on center.
- D. Fit rungs in centerline of side rails, weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and at intermediate points, spaced not more than 12' 0" on center, or as shown on Drawings.
  1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
  2. Extend side rails and rungs at least 42 inches above top access level. Where "step-through" access is indicated, extend side rail 42 inches. Goose-neck the extended rails back to the structure to provide secure ladder access.
- F. Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a "flat top" rung with an abrasive top surface.

## 2.8 LADDER SAFETY CAGES

- A. General. For ladders more than 20 feet in height, fabricate ladder safety cages to comply with ANSI A14.3; assemble by welding or riveting.
- B. Primary Hoops. Aluminum bars,  $\frac{5}{16}$  inch x 4 inches, for top, bottom, and for cages longer than 20 feet, intermediate hoops spaced not more than 20' 0" on center.
- C. Secondary Intermediate Hoops. Aluminum bars,  $\frac{5}{16}$  inch x 2 inches, hoops spaced not more than 4'0" on center between primary hoops.
- D. Vertical Bars. Aluminum bars,  $\frac{5}{16}$  inch x 2 inches, secured to each hoop, spaced approximately 9 inches on center.
- E. Fasten assembled safety cage to ladder rails and adjacent construction as indicated.

## 2.9 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

## 2.10 LOOSE STEEL LINTELS

- A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.

## 2.11 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General. Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
    - a. Except as otherwise indicated, space anchors 24 inches on center and provide minimum anchor units in the form of steel straps 1¼ inches wide x ¼ inch x 8 inches long.

## 2.12 METAL BAR GRATINGS

- A. General. Produce metal bar gratings of description indicated per metal bar grating standard "Standard Specifications for Metal Bar Grating and Metal Bar Grating Treads" published in ANSI/NAAMM A202.1 "Metal Bar Grating Manual."
- B. Fabricate welded steel and stainless steel gratings to comply with requirements indicated below:
  - 1. Mark/Size: Unless otherwise indicated on the Drawings, W-19-4 (welded with bearing bars 1 3/16 inch on center and cross bars 4 inches on center).
- C. Fabricate pressure-locked rectangular bar aluminum gratings to comply with requirements indicated below:
  - 1. Mark/Size: Unless otherwise indicated on the Drawings, P-19-4 (pressure-locked with bearing bars 1-3/16 inch on center and cross bars 4 inches on center)/ rectangular bearing bar sizes as indicated.
- D. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz. per sq. ft. of coated surface.
- E. Aluminum Finish: Mill.
- F. Fabricate removable grating sections with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated, or if not indicated, as recommended by manufacturer, for attachment to supports.



- G. Fabricate cutouts in grating sections for penetrations indicated. Arrange layout of cutouts to permit grating removal without disturbing items penetrating gratings.
  - 1. Edge band openings in grating that interrupt two or more bearing bars with bars of same size and material as bearing bars.
  - 2. Do not notch bearing bars at supports to maintain elevation.
- H. Available Manufacturers. Subject to compliance with requirements, manufacturers offering metal bar gratings that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Alabama Metal Industries Corp.
  - 2. Barnett/Bates Corp.
  - 3. Blaw-Knox Grating Div., Blaw-Knox Corp.
  - 4. IKG Industries.
  - 5. Klemp Corp.
  - 6. Ohio Gratings, Inc.
  - 7. Reliance Steel Products, Inc.
  - 8. Seidelhuber Metal Products, Inc.
  - 9. Truweld, Inc.

#### 2.13 PREFABRICATED GRATING TREADS

- A. Fabricate from 1½ inch aluminum I-bar grating to provide a tread width as shown on the Drawings within a tolerance of ±¼ inch.
- B. Tread length to be as shown on the Drawings.
- C. Tread to incorporate a slip resistant nosing.
- D. Mount treads to stringers with stainless steel bolts sized in accordance with the tread manufacturer's recommendations.

#### 2.14 STEEL FLOOR PLATE

- A. Fabricate raised pattern steel floor plates from rolled steel plate ¼-inch in thickness and in pattern as indicated; if not indicated, as selected from manufacturer's standard patterns.
- B. Include steel angle stiffeners and fixed and removable sections as indicated.
  - 1. Provide two steel bar drop handles for lifting plates, one at each end of each removable section.

#### 2.15 ALUMINUM FLOOR (TREAD) PLATE

- A. Fabricate raised pattern tread plates from aluminum-alloy rolled tread plate in pattern 1 of ¼-inch thickness.
- B. Include aluminum angle stiffeners and fixed and removable sections as indicated.
  - 1. Provide two aluminum bar drop handles for lifting plates, one at each end of each removable section.

## 2.16 ALUMINUM PIPE RAILINGS AND HANDRAILS

- A. General. Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.
- B. Aluminum Finish. Class I clear anodized finish, unless otherwise indicated.
- C. Interconnect railing and handrail members by butt-welding, welding with internal connectors, or assembling with flush type fittings using concealed or non-projecting pins and fasteners, at fabricator's option, unless otherwise indicated.
- D. Provide slip joints to facilitate removal of pipe railing at all intersections, changes in direction, or at intervals not to exceed 25 feet in straight runs of railing. The slip joint shall be designed and constructed to provide strength equivalent to a straight section of pipe.
- E. Form changes in direction of railing members as follows:
  - 1. By insertion of prefabricated elbow fittings.
  - 2. By mitering at elbow bends.
  - 3. By bending.
  - 4. By any method indicated above, applicable to change of direction involved.
- F. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- G. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- H. Close exposed ends of pipe by welding 3/16-inch-thick aluminum plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is ¼ inch or less.
- I. Toe Boards. Toe plate shall conform to OSHA standards. Toe plate shall be a minimum of 4 inches high and shall be an extrusion that attaches to the posts with clamps that will allow for expansion and contraction between posts. Toe plates shall be set ¼-inch above the walking surface. Toe plates shall be provided on handrails as required by OSHA and/or as shown on Drawings. Toe plates shall be shipped loose in stock lengths for field installation.
- J. Brackets, Flanges, Fittings, and Anchors. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
  - 1. For railing posts set in concrete, fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than ½ inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.
  - 2. For surface mounted railing posts, provide prefabricated aluminum mounting brackets with stainless steel anchors. Coat aluminum surfaces in contact with concrete with bituminous coating.

3. For removable railing posts, fabricate slip-fit sockets from aluminum pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement. Coat exterior surfaces of sleeves with bituminous coating.
- K. Provide guard chains across all pipe railing openings where shown, specified, or required. Chain links shall be ¼-inch stainless steel of welded construction, 12 links to the foot. One end shall be connected to a ¼-inch stainless steel eye bolt in the stanchion and the other end shall be connected by means of a heavy, stainless steel swivel eye, snap hook to a similar eye bolt in the opposite stanchion.

## 2.17 STEEL FRAMED STAIRS

- A. General. Construct stairs to conform to sizes and arrangements indicated. Join pieces together by bolting, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.
  1. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.
- B. Stair Framing. Fabricate stringers of structural steel channels as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers, newels, and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.
- C. Floor Grating Treads and Platforms. Provide patterns, spacing, and bar sizes indicated; fabricate to comply with NAAMM "Metal Bar Grating Manual."
- D. Fabricate grating treads with nosing on one edge and with angle or plate carrier at each end for stringer connections. Secure treads to stringers with stainless steel bolts.
- E. Fabricate grating platforms with nosing matching that on grating treads at all landings. Provide toe plates at open-sided edges of grating platform. Secure grating to platform frame with stainless steel clips and bolts.
- F. Stair Railings and Handrails. Comply with applicable requirements specified elsewhere in this section for pipe railings and handrails.

## 2.18 ALTERNATING TREAD ALUMINUM STAIRS

- A. Cast aluminum treads, landings, and mounting base shall be shielded metal arc welded to a single extruded box-like stringer.
- B. Guards and handrails shall be contoured for body guidance and underarm support, and shall have inclined hand side portions for free sliding of the hands unimpeded by the handrail supports.
- C. Acceptable Manufacturer (or approved equal):
  1. Lapeyre Stair, Inc., 5117 Toler Street, Harahan, LA 70123.

## 2.19 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 40 steel pipe. Cap bollards with ¼-inch minimum thickness steel base plate.
- B. Fabricate sleeves for bollard anchorage from steel pipe with ¼-inch-thick steel plate welded to bottom of sleeve.
- C. Fill bollards with Class A concrete as specified in Section 03 30 00, Cast-In-Place Concrete.

## 2.20 ANCHORAGE TO HARDENED CONCRETE

- A. Dowels or anchors placed in existing or hardened concrete shall be stainless steel Type 316, ASTM F 593 and ASTM F 594, threaded rod with hex nuts, unless shown otherwise.
- B. Epoxy Adhesive
  - 1. Two component, 100% solid (containing no solvents), non-sag paste, insensitive to moisture, grey in color.
  - 2. NSF Standard 61 for use in conjunction with drinking water systems.
  - 3. ASTM C 881-90; Type IV; Grade 3; Class A, B, and C with the exception of gel time.
  - 4. Maximum shrinkage during cure per ASTM D 2566 of 0.00051 in./in.
  - 5. Compressive strength, ASTM D 695: 10,300 psi minimum.
  - 6. Shelf life: 3 years minimum.
  - 7. Water solubility: None.
  - 8. Heat deflection temperature, ASTM D648: 140°F minimum.
  - 9. Epoxy adhesive shall be Epcon C-6, manufactured by ITW Ramset.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.
- B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.
- C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

### 3.2 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
  - 1. Temperature Change (Range): 100°F (55.5°C).
- D. Shear and punch metals cleanly and accurately. Remove burrs.
- E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Remove sharp or rough areas on exposed traffic surfaces.
- G. Weld corners and seams continuously to comply with AWS recommendations and the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- K. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

### 3.3 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction;

include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

- B. Cutting, Fitting, and Placement. Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld or bolt, as indicated, connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding. Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- F. Corrosion Protection. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- G. Epoxy Anchors
  - 1. Verify number, size, depth, and location of anchors or dowels to be installed.
  - 2. Comply with temperature and moisture limitation as recommended by the manufacturer.
  - 3. Drill holes in concrete to the depth specified on the Drawings using methods as instructed by the epoxy manufacturer. The diameter of holes shall be as instructed by the epoxy manufacturer for the anchor or dowel being installed. Clean holes as instructed by the epoxy manufacturer.
  - 4. Install epoxy in strict accordance with the manufacturer's instructions using guns with self-mixing nozzles provided by the manufacturer. Verify epoxy is mixed prior to placement into the hole using methods per manufacturer's instructions. Insert dowel or anchor into the hole and hold steady as instructed by the manufacturer.

### 3.4 SETTING LOOSE PLATES

- A. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- B. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
  - 1. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.5 INSTALLATION OF METAL BAR GRATINGS

- A. General. Install gratings to comply with recommendations of NAAMM grating standard referenced under Part 2 that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Secure units to supporting members with type and size of clips and fasteners indicated, or if not indicated as recommended by grating manufacturer for type of installation conditions shown.

### 3.6 INSTALLATION OF PIPE RAILINGS AND HANDRAILS

- A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
  - 1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-reactive setting cement, mixed and placed to comply with anchoring material manufacturer's directions.
  - 2. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.
- B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1½-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:
  - 1. Use type of bracket with pre-drilled hole for exposed bolt anchorage.
  - 2. For concrete and masonry anchorage, use stainless steel epoxy set anchors.

### 3.7 INSTALLATION OF BOLLARDS

- A. Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.

### 3.8 ADJUSTING AND CLEANING

- A. Touch-Up Painting. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and recoat exposed areas in accordance with these specifications, if included, or in accordance with Engineer's instructions.

END OF SECTION





**DIVISION 07**

**THERMAL AND MOISTURE PROTECTION**



## SECTION 07 92 00

### JOINT SEALANTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section includes joint sealants for the following locations:
  - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
    - a. Control, isolation, and expansion joints in cast-in-place and precast concrete.
    - b. Joints between different materials listed above.
    - c. Perimeter joints between materials listed above and frames of doors and other items embedded in growth.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 Specification sections, apply to this section.

##### 1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

##### 1.4 SUBMITTALS

- A. General. Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data from manufacturers for each joint sealant product required.
- C. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- D. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

##### 1.5 QUALITY ASSURANCE

- A. Single Source Responsibility for Joint Sealant Materials. Obtain joint sealant materials from a single manufacturer for each different product required.

- B. Product Testing. Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Engineer.
1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
- C. Preconstruction Field Testing. Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Engineer.
  2. Conduct field tests for each application indicated below:
    - a. Each type of elastomeric sealant and joint substrate indicated.
    - b. Each type of non-elastomeric sealant and joint substrate indicated.
  3. Notify Resident Project Representative one week in advance of the dates and times when mock-ups will be erected.
  4. Test joint sealants by hand pull method described below:
    - a. Install joint sealants in 5-foot joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed work. Allow sealants to cure fully before testing.
    - b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2-inch cuts. Place a mark 1 inch from top of 2-inch piece.
    - c. Use fingers to grasp 2-inch piece of sealant just above 1-inch mark; pull firmly down at a 90-degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
    - d. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
    - e. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

## 1.6 DELIVERY, STORAGE, AND HANDLING

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

## 1.7 PROJECT CONDITIONS

- A. Environmental Conditions. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
  - 2. When joint substrates are wet.
- B. Joint Width Conditions. Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions. Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility. Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors. Provide color of exposed joint sealants to comply with selections made by the Engineer from the manufacturer's full range of standard colors.

### 2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard. Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Schedule at the end of this section, including those requirements referencing ASTM C 920 classifications for type, grade, class, and uses.
  - 1. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the

joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

- B. Available Products. Subject to compliance with requirements, elastomeric sealants that may be incorporated in the work include, but are not limited to, the products specified in the Elastomeric Joint Sealant Schedule of this section.

## 2.3 JOINT SEALANT BACKING

- A. General. Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers. Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  - 1. Open-cell polyurethane foam.
  - 2. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
  - 3. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 gms/cc per ASTM C 1083.
  - 4. Any materials indicated above.
- C. Elastomeric Tubing Joint Fillers. Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26°F (-32°C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

## 2.4 MISCELLANEOUS MATERIALS

- A. Primer. Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces. Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape. Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Surface Cleaning of Joints. Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming. Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape. Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

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

- B. Sealant Installation Standard. Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings. Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
    - a. Do not leave gaps between ends of joint fillers.
    - b. Do not stretch, twist, puncture, or tear joint fillers.
    - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
- D. Installation of Sealants. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
  - 2. Provide flush joint configuration per Figure 5B in ASTM C 1193, where indicated.
    - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

### 3.4 CLEANING

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

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that installations with repaired areas are indistinguishable from original work.



### 3.6 ELASTOMERIC JOINT SEALANT SCHEDULE

Use	Base Polymer	Type	Grade	Class	Use Exposure	Use Substrate	Product
Exterior General Building/ Architectural Sealant and Nontraffic Concrete Joints (Non- Immersion), Masonry Control Joints	Polyurethane	M	NS	25	NT	M,G,A	Pecora Dynatrol II
Concrete Joints Immersed or Potable Water/Wastewater Contact	Polysulfide	M	NS	25	NT	I	Pecora Synthacalk GC-2 Plus
Interior General Building/ Architectural Sealant	Polyurethane	M	NS	12½	NT	M,G,A	Pecora Dynaflex
Traffic Concrete Joints	Polyurethane	S	NS	25	T	M,G,A	Pecora Urexpam NR-201

END OF SECTION



**DIVISION 31**  
**EARTHWORK**



## SECTION 31 14 00

### REMOVAL OF STRUCTURES AND OBSTRUCTIONS

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. The work shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned pipe lines, and any other obstructions which are not designated or permitted to remain, except for the obstructions to be removed and disposed of under other items in the Contract. It shall also include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits. When the proposal does not include pay items for removal of structures and obstructions as set out in this Section, such work shall be performed, and the costs thereof shall be included in the prices bid for other items of construction.

#### PART 2 - EQUIPMENT

##### 2.1 EQUIPMENT

- A. All equipment necessary for the satisfactory performance of this work shall be on the project and approved before the work will be permitted to begin.

#### PART 3 - EXECUTION

##### 3.1 GENERAL

- A. The Contractor shall raze, remove, and dispose of all buildings and foundations, structures, fences and other obstruction, any portions of which are on the rights-of-way, except utilities, and those for which other provisions have been made for removal. All material from such work designated to become the property of the Owner shall be removed without unnecessary damage, in sections or pieces which may be readily transported, and shall be stored and protected by the Contractor at specified places within the project limits, and all material not so designated will become the property of the Contractor and shall be disposed of outside the limits view from the project. If the material is disposed of on private property, the Contractor shall secure written permission from the **property owner**. A copy of each agreement with **property owners** is to be furnished to the Owner.
- B. The Owner reserves the right to dispose of buildings on any tract prior to their being torn down or removed by the Contractor.
- C. Buildings and other structures, which are indicated on the Drawings to be removed or disposed of by other agencies, will not be held as a charge or responsibility of the Contractor except that the Contractor waives any and all claims for interference, delay or damage due to their removal or non-removal.

- D. Foundations of buildings and structures shall be removed to a depth of not less than one foot below natural ground, except that within construction limits, removal shall be to a depth of not less than 2 feet below subgrade elevation. Basement floors shall be broken up to prevent holding of water. Basements or cavities left by structure removal shall be filled to the level of the surrounding ground and within the prism of construction and below subgrade elevation shall be compacted in accordance with the provisions of Section 31 20 00, Earthwork.

### 3.2 REMOVAL OF BRIDGES, CULVERTS, AND OTHER DRAINAGE STRUCTURES

- A. Bridges, culverts and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic.
- B. Substructure of Bridges. Unless otherwise specifically designated or directed, the substructure of bridges shall be razed to the adjacent ground level or natural stream bottom for such portions located in a stream, except that such portions of the substructure of a bridge located in a navigable stream shall be subject to the laws of the U. S. Government and requirements set out in the standard permit form of the applicable government agency approving the location and plans and authorizing the construction of the structure. Where such portions of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.
- C. Steel bridges and wood bridges designated to become the property of the Owner shall be carefully dismantled without unnecessary damage. All such material shall be stored in a manner as to prevent damage.
- D. Blasting or other operations necessary for the removal of an existing structure or obstruction, which may damage new construction, shall be completed prior to placing the new work, or adequate precautions shall be taken to prevent such damage.

### 3.3 REMOVAL OF PIPE

- A. Pipe designated to become the property of the Owner shall be carefully removed and every precaution taken to avoid breaking or damaging the pipe. Pipes shall be removed, and stored when necessary, so that there will be no loss or damage. The Contractor will be required to replace sections damaged by negligence or by use of improper methods.

### 3.4 REMOVAL OF PAVEMENT, SIDEWALKS, CURBS, ETC., CONSTRUCTED OF PORTLAND CEMENT CONCRETE

- A. All pavement, base course, sidewalks, curbs, and gutters, etc., constructed of portland cement concrete designated for removal shall be disposed of as directed.
- B. Concrete pavement, parking strip, and base, all with or without bituminous overlay, concrete curb and gutter, sidewalk, driveways, etc., shall be removed and disposed of as follows:
  - 1. Remove and dispose of items below subgrade elevation, but by not more than 2 feet. The cost of this work shall be included in the unit price bid for other items of construction and shall not be paid for directly.

2. If the items are more than 2 feet below subgrade elevation, they shall be broken into size not to exceed 2 feet in maximum dimension and remain in place, unless it interferes with succeeding items of construction. The cost of this work shall be included in the unit price bid for other items of construction and shall not be paid for directly.
3. If the items are above subgrade elevation, the removal and disposal of same shall be paid for as provided in Section 31 20 00, Earthwork.
4. When specified, ballast, gravel, bituminous pavement or other pavement materials shall be removed and stockpiled as in an appropriate manner. Otherwise, such materials shall be disposed of as directed.

END OF SECTION





## SECTION 31 20 00

### EARTHWORK

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. This section includes earthwork and related operations, including but not limited to clearing and grubbing the construction site; dewatering; excavating all classes of material encountered; pumping, draining, and handling of water encountered in the excavations; handling, storage, transportation, and disposal of all excavated and unsuitable material; construction of fills and embankments; backfilling around structures and pipe; backfilling all trenches and pits; compacting; all sheeting, shoring, and bracing; preparation of subgrades; surfacing and grading; and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.
- B. Provide all services, labor, materials, and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing a complete work as shown on the Drawings or specified in these Contract Documents.

##### 1.2 GENERAL

- A. The elevations shown on the Drawings as existing are taken from the best available data and are intended to give reasonable, accurate information about the existing elevations. They are not precise, and the Contractor should satisfy himself as to the exact quantities of excavation and fill required.
- B. Perform earthwork operations in a safe and proper manner taking appropriate precautions against all hazards.
- C. Maintain in good condition at all times all excavated and fill areas for structures, trenches, fills, topsoil areas, embankments, and channels until final acceptance by the Owner. Repair all damage caused by erosion or other construction operations using material of the same type as the damaged materials.
- D. If soil borings are available for the area of this work, they will be on file at the Owner's address where they will be made available for review. This information is made available for such use as Contractor may choose to make of it in the preparation of his bid, but the Owner gives no guarantee, either expressed or implied, that it represents a true or complete cross section of all of the material to be encountered in performing the excavation and earthwork on this project.
- E. Earthwork operations within the rights-of-way of the State Department of Transportation, the County Road Department, and the respective cities shall be conducted in accordance with the requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence over and supersede the provisions of these Specifications.

- F. Control grading to prevent water running into excavations. Obstruction of surface drainage shall be avoided and a means shall be provided whereby storm water can be uninterrupted in existing gutters, other surface drains, or temporary drains. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and kept shaped so as to cause the least possible interference with public travel. Free access must be provided to all fire hydrants, valves, meters, and private drives.
- G. No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof.
- H. Tests for compaction and density shall be conducted by the Engineer or by an independent testing laboratory selected by him. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Owner and not as a part of this contract. Make all necessary excavations and supply any samples of materials necessary for conducting compaction and density tests. Pay the cost of all retests made necessary by the failure of materials to conform to the requirements of these Contract Documents.
- I. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, "Excavations, Trenching, and Shoring," and Subpart O, "Motor Vehicles, Mechanized Equipment, and Marine Operations," and shall be conducted in a manner acceptable to the Engineer.
- J. It is understood and agreed that a thorough investigation by the Contractor has been made of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. Provide all services, labor, equipment, and materials necessary or convenient for completing the work.

## PART 2 - EXECUTION

### 2.1 INITIAL SITE PREPARATION

- A. Preparatory to beginning construction operations, remove from the site all vegetative growth, trees, brush, stumps, roots, debris, and any other objectionable matter, including fences, buildings, and other structures shown on the Drawings in the construction areas which are designated for removal or which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.
- B. Grub and remove stumps and roots to a depth not less than 5 feet below grade. Fill all holes or cavities which extend below the subgrade elevation of the proposed work with compacted layers of crushed rock or earth backfill conforming to the requirements specified here for backfill. Do not incorporate organic material from clearing operations in excavation backfill or embankment material.

- C. Exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, buildings, and other structures located in the construction area but not within designated clearing limits as shown on the Drawings or within the limits of embankments, excavations, or proposed structures. Repair or replace any of the aforementioned items damaged by Contractor's operation or construction activities.
- D. Remove and dispose of any excess material resulting from clearing or site preparation operations. Dispose of such materials in a manner acceptable to the Engineer and at an approved location where such materials can be lawfully placed.

## 2.2 DEWATERING

- A. Provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. Dewatering shall be accomplished by methods which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Methods of dewatering may include sump pumps, well points, deep wells, or other suitable methods which do not damage or weaken structures, foundations, or subgrades. Shallow excavations may be dewatered using open ditches, provided such ditches are kept open and free-draining at all times. The actual dewatering methods used shall be acceptable to the Engineer.
- B. Do not place concrete or mortar in water nor allow water to rise over newly placed concrete or mortar for at least 24 hours after placement, unless specifically authorized by the Engineer. No concrete structure shall be exposed to unequal hydrostatic forces until the concrete has reached its specified 28-day strength. Do not allow water to rise above bedding during pipe-laying operations. Exercise care to prevent damage to pipelines or structures resulting from flotation, undermining, or scour. Dewatering operations shall commence when ground or surface water is first encountered and shall be continuous until water can safely be allowed to rise in accordance with the provisions of this section. Protect excavations from the entrance of surface water to the extent possible by the use of dikes and/or covers.
- C. Standby pumping equipment shall be on the jobsite. A minimum of 1 standby unit (a minimum of 1 for each 10 in the event well points are used) shall be available for immediate installation should any pumping unit fail. The design and installation of well points or deep wells shall be suitable for the accomplishment of the work. Submit drawings or diagrams on proposed well point or deep well dewatering systems to the Engineer for review.
- D. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, excavate and replace the affected areas with crushed rock at no cost to the Owner.
- E. Dispose of the water from the work in a suitable manner without damage to adjacent property. Conveyance of the water shall not interfere with traffic flow or treatment facilities operation. Do not drain water into work built or under construction without prior consent of the Engineer. The Contractor will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

- F. Provide sedimentation and desilting basins as necessary or when directed by the Engineer to prevent the entrance of excessive or injurious amounts of sand and silt from surface runoff or dewatering operations into storm drains or receiving waters. The system used for desanding or desilting the water shall be a baffled structure and shall provide not less than 5 minutes detention time and shall be designed to have a "flow-through" velocity not exceeding 0.2 foot per second at the anticipated peak flow. The method of desanding or desilting and the point of disposal shall be subject to the approval of the Engineer.
- G. Dispose of water safely and in accordance with applicable Environmental Protection Agency, U.S. Army Corps of Engineers, and State Water Quality Control Division standards and permits.

### 2.3 SHEETING, SHORING, AND BRACING

- A. The sides of all excavations shall be sufficiently sheeted, shored, and braced as necessary to prevent slides, cave-ins, settlement, or movement of the banks; to maintain the excavation clear of all obstructions; and to provide safe working conditions. Wood or steel sheeting shall be used in wet, saturated, or flowing ground. All sheeting, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and to maintain shape and position under all circumstances.
- B. Correctly assessing the need for sheeting, analyzing the stresses induced, and maintaining regulatory compliances shall be totally the responsibility of the Contractor. Since the Engineer does not dictate or determine the Contractor's sequence or limits of excavation, the Engineer assumes no responsibility for sheeting and shoring. The Contractor must employ or otherwise provide for adequate professional structural and geotechnical engineering supervision to assess the need for sheeting and shoring and design same. Results of sheeting and shoring analysis and design shall be submitted to the Engineer on request.
- C. Excavations adjacent to existing or proposed buildings and structures, or in paved streets or alleys, shall be sheeted, shored, and braced adequately to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition. Any damage to structures or pavements occurring through settlements, water or earth pressures, slides, caves, or other causes due to failure or lack of sheeting or bracing, or improper bracing or occurring through negligence or fault of the Contractor in any other manner shall be repaired by the Contractor at his own expense.
- D. Sheeting, shoring, or bracing materials shall not be left in place unless otherwise specified or shown on the Drawings or ordered by the Engineer in writing. Such materials shall be removed in such manner that no danger or damage will occur to new or existing structures or property, public or private, and so that cave-ins or slides will not take place. Trench sheeting shall be left in place until backfill has been brought to a level 12 inches above the top of the pipe. It shall then be cut off and the upper portion removed. Sheeting for structures shall be left in place until backfill has been brought to a level 12 inches above the top of the bottom footing. It shall then be cut off and the upper portion removed.

- E. All holes and voids left in the work by the removal of sheeting, shoring, or bracing shall be filled and thoroughly compacted.

## 2.4 EXCAVATION

### A. General

1. Excavation shall include the removal of all material from an area necessary for the construction of a pipeline or structure. Excavations shall provide adequate working space and clearances for the work to be performed therein.
2. All material excavated below the bottom of concrete walls, footings, and foundations shall be replaced, by and at the expense of the Contractor, with Class B concrete to the lines and grades shown on the Drawings, except where otherwise shown on the Drawings, specified herein, or authorized by the Engineer.
3. Where quicksand, soft clay, spongy or swampy earth, or other materials unsuitable for subgrade or foundation purposes are encountered below the excavation limits, they shall be removed and disposed of to the level of suitable material. Areas so excavated shall be backfilled with Class B concrete or with compacted layers of crushed rock, sand, or other approved material conforming to the requirements specified herein for backfill to the lines and grades shown on the Drawings.
4. Place barriers at each end of all excavation and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Place lights along excavations from sunset each day to sunrise of the next day until the excavations are backfilled. Barricade all excavations in such a manner as to prevent persons from falling or walking into any excavation.

### B. Rock Excavation

1. Rock encountered in the process of excavation for structures shall be uncovered and stripped of all loose materials over the entire limits of excavation. Rock encountered for removal in a trench section shall be uncovered for a distance of not less than 50 feet.
2. Excavate rock and large boulders in trenches over the horizontal limits of excavation and to depths as shown on the Drawings.
3. Backfill the space below grade for pipelines to the proper grade with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill. Where pipe sewers are constructed on concrete cradles, excavate rock to the bottom of the cradle as shown on the Drawings.
4. Excavate rock under structures to lines and grades shown on the Drawings. Unless specified otherwise, where rock excavation has been carried below grade, the Contractor shall backfill to grade with Class B concrete at his own expense.
5. Where rock foundation is obtained at grade for over 50 percent of the area of any one structure, the portion of the foundation that is not rock shall be excavated

below grade to reach a satisfactory foundation of rock. The portion below grade shall be backfilled with Class B concrete.

6. Where rock foundation is obtained at grade for less than 50 percent of any one structure and satisfactory rock cannot be found over the remaining area by reasonable additional excavation, the rock shall be removed for a depth of 12 inches below grade and the space below grade shall be backfilled to the proper grade with compacted layers of crushed rock conforming to the requirements specified herein for backfill.
7. Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws, and regulations governing blasting and the use of explosives. Conduct rock excavation near existing pipelines or other structures with the utmost care to avoid damage. Promptly repair injury or damage to other structures and properties to the satisfaction of the Owner by the Contractor at his own expense. The Contractor is advised to hire qualified consultants to perform a "preblast survey" in area where damage could occur due to blasting; all expenses for such survey must be borne by the Contractor, and no separate payment for same will be made.
8. Complete rock excavation for all structures and adjacent trenches under this Contract and any other rock excavation directed by the Engineer before construction of any structure is started in the vicinity.

C. Borrow Excavation

1. Wherever the backfill of excavated areas or the placement of embankments or other fills requires specified material not available at the site or material in excess of suitable material available from the authorized excavations, such materials shall be obtained from other sources. This may require the opening of borrow pits at points not immediately accessible from the work. In such cases make suitable arrangements with the property owner and pay all costs incident to the borrowed material including royalties, if any, for the use of the material. Before a borrow pit is opened, the quality and suitability of the material to be obtained therefrom shall be approved by the Engineer.
2. Borrow pits shall be cleared, grubbed, and finish-graded in accordance with the requirements specified herein.

- D. Roadway Excavation. Roadway excavation shall consist of excavation for roadways and parking areas in conformity with lines, grades, cross sections, and dimensions shown on the Drawings. After shaping to line, grade, and cross section, the subgrade shall be rolled until compacted to a depth of at least 6 inches to 100 percent of the maximum density at optimum water content as determined by AASHTO T99, Method A. This operation shall include any reshaping and wetting required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

## E. Trench Excavation

1. Trench excavation shall consist of the removal of materials necessary for the construction of water, sewer, and other pipelines and all appurtenant facilities including manholes, inlets, outlets, headwalls, collars, concrete saddles, piers, and pipe protection called for on the Drawings.
2. Excavation for pipelines shall be made in open cut unless shown otherwise on the Drawings. Trenches shall be cut true to the lines and grades shown on the Drawings or established by the Engineer on the ground. The banks of trenches shall be cut in vertical, parallel planes equidistant from the pipe centerline. From an elevation 12 inches above the top of the pipe to the bottom of the trench, the horizontal distances between vertical planes for different sizes of pipe shall not exceed those shown on the Drawings. When sheeting is used, the width of the trench shall be considered as the distance between the inside faces of the sheeting. The bottom of the trench shall be cut carefully to the required grade of the pipe except where bedding materials or cradles are shown, in which case the excavation shall extend to the bottom of the bedding or cradles as shown on the Drawings. Minimum pipe cover shall be as shown on the Drawings or specified in these Contract Documents.
3. The use of a motor-powered trenching machine will be permitted, but full responsibility for the preservation, replacement, and/or repair of damage to any existing utility services and private property shall rest with the Contractor.
4. Bell holes for bell and spigot pipe and/or mechanical joint pipe shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper installation of all joints in the pipe. Bell holes shall not be excavated more than 10 joints ahead of pipe laying. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.
5. Excavation for manholes, outlets, collars, saddles, piers, and other pipeline structures shall conform to the additional requirements specified herein for structural excavation.
6. Pipe trenches shall not be excavated more than 400 feet in advance of pipe laying and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic.
7. Wherever pipe trenches are excavated below the elevation shown on the Drawings, the Contractor, at his own expense, shall fill the void thus made at the proper grade with Class B concrete or with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill, unless otherwise specified herein or shown on the Drawings.
8. In all cases where materials are deposited along open trenches, they shall be placed so that no damage will result to the work and/or adjacent property in case of rain or other surface wash.

## F. Structural Excavation

1. Structural excavation shall consist of the removal of all materials necessary for the construction of structures, including tanks, foundations, footings, wet wells, dry wells, box culverts, flumes, channels, buildings, and other miscellaneous structures.
2. The bottoms of structural excavations shall be true to the lines and grades shown on the Drawings. Faces of excavations shall not be undercut for extended footings. Except as provided herein for excavation of unsuitable material or rock, where the excavation is carried below the grade elevation shown on the Drawings, the Contractor shall backfill the void thus made to the proper grade with Class B concrete at his own expense.

## 2.5 BACKFILLING

### A. Materials for backfilling shall conform to the following requirements:

1. Select Earth Backfill: Fine, sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete less than 2 inches in maximum dimension except that the maximum particle size shall be ½ inch when used with PVC or other flexible thermoplastic pipe.
2. Common Earth Backfill: Sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete and pavement less than 6 inches in maximum dimension.
3. Sand: Natural or imported sand conforming to ASTM D 1073.
4. Crushed Rock: Crushed rock conforming to Section 903.22, Size 7 (½-inch to No. 4) of the SSRBC.
5. Class B Concrete: Class B concrete as specified elsewhere in these Specifications or on the Drawings.

### B. General

1. Earth backfill shall be compacted to not less than 90 percent of the maximum density as determined by ASTM D 698 at a moisture content within 3 percentage points, unless otherwise specified herein. Crushed stone and sand shall be compacted to not less than 83 percent of the solid volume density as determined from the bulk specific gravity by AASHTO T-84 and T-85 and the dry weight of the aggregate.
2. Material that is too dry for adequate compaction shall receive a prior admix of sufficient water to secure optimum moisture content. Material having excessive water content shall not be placed at any time.



3. Backfill material required to be compacted shall be placed in horizontal layers not to exceed 6 inches in thickness (before compaction) and compacted in place by ramming, tamping, or rolling, unless otherwise specified herein. Compaction shall be accomplished by power-driven tools and machinery wherever possible. Compaction and consolidation of sand and crushed stone backfill shall be accomplished using vibrating equipment in a manner acceptable to the Engineer.

#### C. Backfilling Trenches

1. The backfilling of sewers, water, and other pipeline trenches shall be started immediately after the construction of same has been inspected and approved by the Engineer. Select backfill or crushed stone as shown on the Drawings shall be placed in the trench under and on each side of the pipe in 6-inch layers for the full width of the trench and thoroughly and uniformly compacted by ramming and/or tamping to a minimum of 90 percent of the maximum density determined as specified herein. Select earth backfilling or crushed stone as shown on the Drawings shall start above the pipe bedding. Sufficient select backfill or crushed stone as shown on the Drawings shall be placed around the pipe and compacted to provide a cover of not less than 12 inches over the top of the pipe. Mechanical compactors or tampers shall not be used within 12 inches of pipe. Compaction in this area shall be accomplished by hand methods. Sand or specified crushed stone bedding material shall be substituted for select earth backfill when the pipe material is other than ductile iron or when crushed stone trench backfill is required. Backfilling shall proceed simultaneously on both sides of the pipe to prevent lateral displacement.
2. Caution shall be used during backfill operations for PVC or other flexible thermoplastic pipe to prevent pipe deformation. PVC or other flexible thermoplastic pipe shall not be subjected to roller or wheel loads until a minimum of 30 inches of backfill has been placed over the top of the pipe. A hydrohammer shall NOT be used until a minimum depth of 48 inches of backfill has been placed over the top of the pipe.
3. Backfilling of PVC pressure pipe or other flexible thermoplastic pipe (water pipe) shall be as described in Paragraph 1 above.
4. In streets and alleys, across sidewalks and driveways, and at any other places subject to vehicular traffic or other superimposed loads, crushed rock backfill shall be placed and compacted in 12-inch layers from the bottom of the trench upward for the full depth of the trench. Crushed rock backfill shall be compacted by use of a hydrohammer or approved vibratory compactor. The top 6 inches of the finished subgrade shall be equal to not less than 100 percent of the maximum density as determined by ASTM D 698 at a moisture content of within 3 percentage points of optimum. When field tests show failure to meet the density requirement, the subgrade shall be loosened by disking, harrowing, or other approved methods to a depth of not less than 6 inches, then reshaped and recompacted as indicated in this paragraph.
5. Trenches under concrete slabs and footings of structures shall be completely backfilled with compacted sand or crushed rock or filled with Class B concrete as shown on the Drawings.

6. All backfilling shall be done in such a manner that the pipe or structure over or against which it is being placed will not be disturbed or injured. Any pipe or structure injured, damaged, or moved from its proper line or grade during backfilling operations shall be removed and repaired to the satisfaction of the Engineer and then rebackfilled.

#### D. Backfilling Around Structures

1. Backfilling around structures shall consist of common earth backfill placed in 6-inch layers and compacted by tamping to a minimum of 90 percent of the maximum density determined as specified herein for the full depth of the excavation from the bottom to the finished grade. No backfill shall be placed against concrete structures until the concrete has reached its specified 28-day compressive strength. Where practical, compaction of structural backfill shall be accomplished by power-driven tamping equipment.
2. Where crushed rock mats under slabs and foundations are called for on the Drawings, excavate below grade to the depth of the crushed rock mat as shown on the Drawings and install a compacted crushed rock bed. This shall be finished to a true line or plane and even with the subgrade of the concrete foundations, piers, footings, or slabs. Before placing any crushed stone, remove all loose earth or debris. This crushed rock mat shall extend 12 inches beyond all slabs and foundations or to edges of sheet piling.
3. Crushed rock mats 12 inches or less in thickness shall be constructed of compacted layers of crushed rock conforming to Section 903.23, Size 7 (½-inch to No. 4), of the SSRBC.
4. Crushed rock mats of thickness greater than 12 inches shall have the top 12 inches constructed of compacted layers of crushed rock as specified above. That portion below the top 12 inches shall be constructed of compacted layers of crushed rock conforming to Section 903.05, Class A, with a modified gradation of 6 inches to dust as received from the crusher.
5. The use of earth backfill to support footings, foundations, and structures shall not be permitted, unless otherwise shown on the Drawings.

#### 2.6 FILLS AND EMBANKMENTS

- A. Fills and embankments shall consist of all earth fills except backfills in trenches or around structures. Unless special material is specified or shown on the Drawings, material for fills and embankments shall consist of excavated material from structures or of a mixture of such excavated materials and materials borrowed from other sources by the Contractor. All material used for fills and embankments shall be free from wood, vegetable matter, debris, soft or spongy earth or clay, large rock, or other objectionable material and shall be acceptable to the Engineer.
- B. Materials shall be placed in the fill or embankment in successive layers 8 inches or less in thickness before compaction, each layer being approximately horizontal and extending to the full limit of the required cross section, and shall be compacted over the entire surface to not less than 95 percent of the maximum density as determined by ASTM D 698 at a moisture content of within 3 percentage points of optimum. The

process shall be repeated for each layer of material until the fill or embankment conforms to the plan lines, grades, and cross sections. The degree of compaction and moisture content required, the method of tamping, and the equipment used shall be approved by the Engineer.

- C. The area over which the fill or embankment is to be constructed shall first be cleared of all vegetation, debris, and other objectionable material and, if the ground is in a loose, uncompacted condition, it shall be compacted to a minimum 95 percent of maximum density determined as specified herein.
- D. No material shall be placed beyond the sloping lines of embankment unless so ordered by the Engineer. Material allowed to be placed beyond the lines of embankment shown on the Drawings will be compacted as required above unless otherwise authorized by the Engineer.
- E. Material for embankments or roadway fills shall be placed in 6-inch maximum lifts and shall be compacted by rolling with power rollers weighing not less than 10 tons, with sheepsfoot rollers, with vibrating rollers, or with pneumatic tire rollers, as required to accomplish the work. While and as each layer is deposited, water shall be applied in sufficient amount to ensure optimum moisture to secure the compaction specified.
- F. The use of trucks, carryalls, scrapers, tractors, or other heavy hauling equipment shall not be considered as rolling in lieu of rollers, but the traffic of such hauling equipment shall be distributed over the fill in such a manner as to make the use of the compaction afforded thereby as an addition to compaction by the use of rollers.
- G. Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed as compacted to an elevation 12 inches above the top of the pipe before the trench is excavated.
- H. Subgrades for all roadbeds shall meet the requirements of Subsection 2.5 C.4.

## 2.7 DISPOSAL OF WASTE AND UNSUITABLE MATERIALS

- A. All materials removed by excavation which are suitable for the purpose shall be used to the extent possible for backfilling pipe trenches, foundations, and footings and for making embankment fills or for such other purposes as may be shown on the Drawings. All materials not used for such purposes shall be considered as waste materials and the disposal thereof shall be made in a manner and at locations approved by the Engineer.
- B. Waste materials shall be spread in uniform layers and neatly leveled and shaped. Spoil banks shall be provided with sufficient and adequate openings to permit surface drainage of adjacent lands.
- C. Unsuitable materials, consisting of wood, vegetable matter, debris, soft or spongy clay, peat, and other objectionable material so designated by the Engineer, shall be removed from the work site and disposed of in a manner and at a location approved by the Engineer.

- D. No unsuitable or waste material shall be dumped on private property unless written permission is furnished by the owner of the property and unless a dumping permit is issued from the local jurisdiction.
- E. The Contractor is responsible for any and all permits and other requirements, such as sediment runoff control necessitated by the disposal of waste material.

## 2.8 FINAL GRADING

- A. After other earthwork operations have been completed, the sites of all structures, roads, and embankments shall be graded within the limits and to the elevations shown on the Drawings. Grading operations shall be so conducted that materials shall not be removed or loosened beyond the required limits. The finished surfaces shall be left in smooth and uniform planes such as are normally obtainable from the use of hand tools. If Contractor is able to obtain the required degree of evenness by means of mechanical equipment, the use of hand labor methods will not be required. Neatly trim and finish slopes and ditches to slopes shown on the Drawings unless otherwise approved by the Engineer.
- B. Grade and dress all finished ground surfaces to present a surface varying not more than plus or minus 0.10 foot as regards local humps or depressions, unless otherwise specified or shown on the Drawings, and shall be acceptable to the Engineer.

## 2.9 TOPSOIL

- A. All areas to be planted with trees or shrubs, or with sprigged grass as shown on the plans, shall be prepared by grading to a smooth, even surface to a level 4 inches below the elevation of the finished grade shown on the Drawings. It shall then be brought to a neat and finished grade by the addition of 4 inches of approved topsoil.
- B. Topsoil removed from the construction area may be stockpiled and reused or topsoil may be obtained from approved borrow areas. If obtained from borrow areas, make suitable arrangements with the property owner and pay all costs incident to the borrowed material including royalties.

## 2.10 SETTLEMENT

- A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within 1 year after final acceptance of the work by the Owner.
- B. Make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

## 2.11 DUST CONTROL

- A. The Contractor shall use all means necessary to control dust on and near the work and all off-site borrow areas.
- B. The Contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of work on the site.

END OF SECTION

## SECTION 31 25 00

### SLOPE PROTECTION AND EROSION CONTROL

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. This section shall consist of temporary control measures as shown in the plans or directed by the Engineer during the life of the Contract to control erosion and water pollution through the use of berms, dikes, dams, sediment basins, fiber mats, netting, mulches, grasses, slope drains, temporary silt fences, and other control devices.
- B. The temporary pollution control provisions contained herein shall be coordinated with the permanent erosion control features to assure economical, effective, and continuous erosion control throughout the construction and post-construction periods.
- C. All designs will conform to and all work will be performed in accordance with the standards and specifications of the publication entitled "Manual for Erosion and Sediment Control in Georgia."
- D. Implementation and Maintenance. Contractor shall designate one individual to be responsible for implementation and maintenance of erosion and sedimentation controls on 24-hour, everyday basis. Contractor shall furnish the individual's name, address, and 24-hour telephone number. Contractor shall update contact information as necessary.

#### PART 2 - PRODUCTS

##### 2.1 TEMPORARY BERMS

- A. A temporary berm is constructed of compacted soil, with or without a shallow ditch, at the top of fill slopes or transverse to centerline on fills.
- B. These berms are used temporarily at the top of newly constructed slopes to prevent excessive erosion until permanent controls are installed or slopes stabilized.

##### 2.2 TEMPORARY SLOPE DRAINS

- A. A temporary slope drain is a facility consisting of stone gutters, fiber mats, plastic sheets, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe, sod, or other material acceptable to the Engineer that may be used to carry water down slopes to reduce erosion.

##### 2.3 SEDIMENT STRUCTURES

- A. Sediment basins, ponds, and traps are prepared storage areas constructed to trap and store sediment from erodible areas in order to protect properties and stream channels below the construction areas from excessive siltation.

## 2.4 CHECK DAMS

- A. Check dams are barriers composed of logs and poles, large stones, sand bags, or other materials placed across a natural or constructed drainway.
- B. Stone check dams shall not be utilized where the drainage area exceeds 50 acres. Log and pole structures shall not be used where the drainage area exceeds five acres.

## 2.5 TEMPORARY SEEDING AND MULCHING

- A. Temporary seeding and mulching are measures consisting of seeding, mulching, fertilizing, and matting utilized to reduce erosion. All cut and fill slopes, including waste sites and borrow pits, shall be seeded when and where necessary to eliminate erosion.

## 2.6 BRUSH BARRIERS

- A. Brush barriers shall consist of brush, tree trimmings, shrubs, plants, and other approved refuse from the clearing and grubbing operation.
- B. Brush barriers are placed on natural ground at the bottom of fill slopes, where the most likely erodible areas are located, to restrain sedimentation particles.

## 2.7 BALED HAY OR STRAW CHECKS

- A. Baled hay or straw erosion checks are temporary measures to control erosion and prevent siltation. Bales shall be either hay or straw containing 5 cubic feet or more of material.
- B. Baled hay or straw checks shall be used where the existing ground slopes toward or away from the embankment along the toe of slopes, in ditches, or other areas where siltation, erosion, or water run-off is a problem.

## 2.8 TEMPORARY SILT FENCES

- A. Silt fences shall be Type C utilizing woven wire reinforcement attached to posts with filter cloth composed of plastic filter fabric attached to the upstream side of the fence to retain the suspended silt particles in the run-off water. Fence and fabric shall meet the minimum standards set forth in the Department of Transportation, State of Georgia, Standard Specification, current edition.

## PART 3 - EXECUTION

### 3.1 PRECONSTRUCTION CONFERENCE

- A. At the Preconstruction Conference, submit for acceptance the schedule for accomplishment of temporary and permanent erosion control work as applicable for clearing and grubbing, grading, bridges and other structures at watercourses, construction, and paving. Also submit for acceptance the proposed method of erosion control on haul roads and borrow pits and the plan for disposal of waste materials. No work shall be started until the erosion control schedules and methods of operation have been accepted by the Engineer.

### 3.2 CONSTRUCTION REQUIREMENTS

- A. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, and the surface of erodible earth material exposed by excavation, borrow, and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other water impoundment. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, or slope drains, and the use of temporary mulches, mats, seeding, or other control devices or methods as necessary to control erosion. Cut and fill slopes shall be seeded and mulched as the excavation proceeds to the extent directed by the Engineer.
- B. Incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the accepted schedule. Temporary pollution control measures shall be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent pollution control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.
- C. Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, erosion control measures may be required between successive construction stages. Preconstruction vegetation ground cover shall not be destroyed, removed, or disturbed more than 20 calendar days prior to grading or earth moving unless approval is granted otherwise.
- D. The Engineer will limit the area of excavation, borrow, and embankment operations in progress commensurate with the Contractor's capability and progress to keep the finish grading, mulching, seeding, and other such permanent pollution control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.
- E. Under no conditions shall the amount of surface area or erodible earth material exposed at one time by excavation or fill within the project area exceed 50,000 square feet without prior approval by the Engineer.
- F. The Engineer may increase or decrease the amount of surface area of erodible earth material to be exposed at one time by clearing and grubbing, excavation, and borrow and fill operations as determined by his analysis of project conditions.
- G. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

### 3.3 CONSTRUCTION MANAGEMENT TECHNIQUES

- A. Clearing and grubbing must be held to the minimum necessary for grading and equipment operation.

- B. Construction must be sequenced to minimize the exposure time of cleared surface area.
- C. Construction must be staged or phased for large projects. Areas of one phase must be stabilized before another phase can be initiated. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and runoff.
- D. Erosion and sediment control measures must be in place and functional before earth moving operations begin, and must be constructed and maintained throughout the construction period. Temporary measures may be removed at the beginning of the work day, but must be replaced at the end of the work day.
- E. All control measures shall be checked, and repaired as necessary, weekly in dry periods and within 24 hours after any rainfall of 0.5 inch within a 24-hour period. During prolonged rainfall, daily checking and repairing is necessary. The Contractor shall maintain records of checks and repairs.
- F. A specific individual shall be designated to be responsible for erosion and sediment controls on each project site.

### 3.4 CONSTRUCTION OF STRUCTURES

- A. Temporary Berms. A temporary berm shall be constructed of compacted soil, with a minimum width of 24 inches at the top and a minimum height of 12 inches with or without a shallow ditch, constructed at the top of fill slopes or transverse to centerline on fills. Temporary berms shall be graded so as to drain to a compacted outlet at a slope drain. The area adjacent to the temporary berm in the vicinity of the slope drain must be properly graded to enable this inlet to function efficiently and with minimum ponding in this area. All transverse berms required on the downstream side of a slope drain shall extend across the grade to the highest point at approximately a 10 degree angle with a perpendicular to centerline. The top width of these berms may be wider and the side slope flatter on transverse berms to allow equipment to pass over these berms with minimum disruptions. When practical and until final roadway elevations are approached, embankments should be constructed with a gradual slope to one side of the embankment to permit the placement of temporary berms and slope drains on only one side of the embankment.
- B. Temporary Slope Drains
  - 1. Temporary slope drains shall consist of stone gutters, fiber mats, plastic sheets, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe, flexible rubber, or other materials which can be used as temporary measures to carry water accumulating in the cuts and on the fills down the slopes prior to installation of permanent facilities or growth of adequate ground cover on the slopes.
  - 2. Fiber matting and plastic sheeting shall not be used on slopes steeper than 4:1 except for short distances of 20 feet or less.
  - 3. All temporary slope drains shall be adequately anchored to the slope to prevent disruption by the force of the water flowing in the drains. The base for temporary slope drains shall be compacted and concavely formed to channel the water or



hold the slope drain in place. The inlet end shall be properly constructed to channel water into the temporary slope drain. Energy dissipaters, sediment basins, or other approved devices shall be constructed at the outlet end of the slope drains to reduce erosion downstream. An ideal dissipater would be dumped rock or a small sediment basin which would slow the water as well as pick up some sediment. All temporary slope drains shall be removed when no longer necessary and the site restored to match the surroundings.

C. Sediment Structures

1. Sediment structures shall be utilized to control sediment at the foot of embankments where slope drains outlet, at the bottom as well as in the ditchlines atop waste sites, and in the ditchlines or borrow pits. Sediment structures may be used in most drainage situations to prevent excessive siltation of pipe structures. All sediment structures shall be at least twice as long as they are wide.
2. When use of temporary sediment structures is to be discontinued, all sediment accumulation shall be removed, and all excavation backfilled and properly compacted. The existing ground shall be restored to its natural or intended condition.

D. Check Dam

1. Utilize check dams to retard stream flow and catch small sediment loads. Materials utilized to construct check dams are varied and should be clearly illustrated or explained in the Contractor's erosion control plan.
2. Key all check dams into the sides and bottom of the channel a minimum depth of 2 feet. A design is not needed for check dams but some typical designs are shown in the standard plans.
3. Do not use stone check dams where the drainage area exceeds 50 acres. Log and pole structures should generally not be used where the drainage area exceeds five acres.

E. Temporary Seeding and Mulching. Perform seeding and mulching in accordance with Section 32 92 19, Seeding.

F. Brush Barriers. Brush barriers shall consist of brush, tree trimmings, shrubs, plants, and other approved refuse from the clearing and grubbing operation. The brush barriers shall be constructed approximately parallel to original ground contour. Each brush barrier shall be compressed to an approximate height of 3 to 5 feet and approximate width of 5 to 10 feet. The embankment shall not be supported by the construction of brush barriers.

G. Baled Hay or Straw Erosion Checks. Hay or straw shall be embedded in the ground 4 to 6 inches to prevent water flowing underneath. The bales shall also be anchored securely to the ground by wooden stakes driven through the bales into the ground. Bales can remain in place until they rot, or be removed after they have served their purpose, as determined by the Engineer. Keep the checks in good condition by replacing broken or damaged bales immediately after damage occurs. Normal debris clean-out will be considered routine maintenance.

## H. Temporary Silt Fences

1. Temporary silt fences shall be placed on the natural ground, at the bottom of fill slopes, in ditches, or other areas where siltation is a problem. Silt fences are constructed of wire mesh fence with a covering of burlap or some other suitable material on the upper grade side of the fence and anchored into the soil.
2. Maintain the silt fence in a satisfactory condition for the duration of the project or until its removal is requested by the Engineer. The silt accumulation at the fence may be left in place and seeded, removed, etc., as directed by the Engineer. The silt fence becomes the property of the Contractor whenever the fence is removed.

### 3.5 MAINTENANCE

- A. The temporary erosion control features installed by the Contractor shall be acceptably maintained by the Contractor until no longer needed or permanent erosion control methods are installed. Any materials removed shall become the property of the Contractor.
- B. In the event that temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of work as scheduled, and are ordered by the Engineer, such work shall be performed by the Contractor at his own expense.
- C. Where the work to be performed is not attributed to the Contractor's negligence, carelessness, or failure to install permanent controls and falls within the specifications for a work item that has a contract price, the units of work shall be paid for at the proper contract prices.

### 3.6 EROSION CONTROL OUTSIDE PROJECT AREA

- A. Temporary erosion control shall include construction work outside the project area where such work is necessary as a result of construction such as borrow pit operations, haul roads, and equipment storage sites. Bid price in such cases shall include all necessary clearing and grubbing, construction incidentals, maintenance, and site restoration when no longer needed.

END OF SECTION

**DIVISION 32**  
**EXTERIOR IMPROVEMENTS**



## SECTION 32 10 00

### NEW AND REPLACEMENT PAVING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section includes provisions for hot-mixed asphalt paving and mineral aggregate subbase over prepared subgrade for trench width, full pavement width paving, and other areas as shown on the Drawings.
- B. Prepared subgrade is specified in Section 31 20 00, Earthwork.
- C. Proof rolling of prepared subgrade is included in this section.
- D. Saw-cutting of edges of existing pavement is required to minimize subsidence of the pavement into the trench and to minimize the width of pavement replacement.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 Specification sections, apply to this section.

##### 1.3 SUBMITTALS

- A. General. Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Material certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.
- C. Pavement marking plan indicating lane separations and defined parking spaces. Note dedicated handicapped spaces with international graphics symbol.

##### 1.4 SITE CONDITIONS

- A. Weather Limitations. Apply prime and tack coats when ambient temperature is above 50°F (10°C) and when temperature has not been below 35°F (1°C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40°F (4°C) and when base is dry. Base course may be placed when air temperature is above 30°F (-1°C) and rising.
- C. Grade Control. Establish and maintain required lines and elevations.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General. Use locally available materials and gradations that exhibit a satisfactory record of previous installations.
- B. Coarse Aggregate. Sound, angular crushed stone, crushed gravel, or properly cured crushed blast furnace slag, complying with ASTM D 692-00.
- C. Fine Aggregate. Sharp-edged natural sand or sand prepared from stone, properly cured blast furnace slag, gravel, or combinations thereof, complying with ASTM D 1073-99.
- D. Mineral Filler. Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.
- E. Asphalt Cement. ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- F. Prime Coat. Cut-back asphalt type, ASTM D 2027; MC-30, MC-70, or MC-250.
- G. Tack Coat. Emulsified asphalt; ASTM D 977.
- H. Graded Aggregate Subbase (GAB). GAB per Georgia Department of Transportation (GDOT) standard specifications.
- I. Geotextile Fabric. 6 oz/sy, woven, polypropylene fabric; Mirafi, Inc., Type 600x, or equal.
- J. Lane Marking Paint. Alkyd-resin type, ready-mixed complying with AASHTO M 248, Type I.
  - 1. Color: White.
  - 2. Color: Yellow.

### 2.2 TYPES OF PAVEMENT

- A. Replace all existing pavement in streets, driveways, or parking areas which is removed, destroyed, or damaged by construction of sewage or water works as specified below, **as shown on the Drawings**, or as called for in the Bid Schedule. Unless otherwise shown or specified, all paved surfaces shall be replaced using the applicable pavement replacement Type 1 through 5 as shown on the Drawings. Pavement shown or specified to be replaced for the full width of the street shall be Type 6, 7, or 8 as applicable and as shown on the Drawings. Materials, equipment, and construction methods used for paving work shall conform to the Specifications applicable to the particular type required for replacement, repair, or new pavements.
  - 1. Type 1 asphaltic concrete pavement for heavy-duty use shall have a minimum thickness of 3 inches placed in two equal layers. Type 1 pavement shall be composed of plant mix, asphaltic concrete E Mix (12.5 mm) conforming to "Hot Mix Asphaltic Concrete Construction," Section 400 of the GDOT specifications.

2. Type 2 asphaltic concrete pavement for light-duty use shall have a minimum thickness of 2 inches of H Mix (9.5 mm Type I) over 6 inches of compacted GAB to 100 percent of Standard Proctor placed in one layer. Type 2 pavements shall be composed of asphaltic concrete pavement, H mix (9.5mm Type 1), conforming to Section 400, "Hot Mix Asphaltic Concrete Construction," GDOT specifications.
3. Type 3 pavement replacement shall consist of 2 inches of asphaltic concrete over a portland cement concrete base and shall be constructed according to the detail shown on the Drawings.
  - a. Replace portland cement concrete base courses with Class "A" concrete in accordance with Section 03 30 00, Cast-In-Place Concrete. The surface of the replaced concrete base course shall be left rough. The slab shall be of depth equivalent to the existing concrete base course, but in no case less than 7 inches thick. Replace expansion joints removed. Concrete base courses shall be reinforced and conform to details shown on the Drawings and applicable specifications of Section 326, "Portland Cement Concrete Subbase," GDOT specifications.
  - b. Asphaltic concrete shall be constructed on one layer and shall be the same as described for Type 2 paving above or Type 8 paving below.
4. Type 4 bituminous penetration pavement shall be a minimum of 1 inch in thickness and shall conform to Section 424, "Bituminous Surface Treatment," GDOT specifications.
5. Type 5 portland cement concrete pavement shall be Class "A" concrete conforming to Section 03 30 00, Cast-In-Place Concrete. The surface finish of the concrete pavement replaced shall conform to that of the existing pavement. The slab shall be of depth equivalent to the existing concrete pavement, but in no case less than 7 inches thick. Replace expansion joints removed. Concrete pavements shall be reinforced and shall conform to details shown on the Drawings and applicable specifications of Section 430, "Portland Cement Concrete Pavement," GDOT specifications.
6. Type 6 asphaltic concrete pavement for heavy-duty use for full street width replacement shall consist of one 2-inch layer of bituminous plant mix base (hot mix), B Mix (19 mm), conforming to Section 400, "Hot Mix Asphaltic Concrete Construction," GDOT specifications; and one 1-inch layer of asphaltic concrete pavement, F Mix (9.5 mm Type II), 100 percent limestone conforming to Section 400, "Hot Mix Asphaltic Concrete Construction," GDOT specifications.
7. Type 7 asphaltic concrete pavement for light-duty use where designated by Engineer for full street width replacement shall consist of one 2-inch layer of E Mix (12.5 mm) conforming to Section 400, "Hot Mix Asphaltic Concrete Construction," GDOT specifications.
8. Type 8 asphaltic concrete pavement for light-duty use where designated by Engineer for full-width replacement shall consist of one 2-inch layer of asphaltic concrete pavement, H Mix (9.5 mm Type I), conforming to Section 400, "Hot Mix Asphaltic Concrete Construction," GDOT specifications.

9. Where sewerage or water lines and appurtenances are constructed in or across unpaved, chert, or crushed stone surfaced streets, roadways, driveways, or parking areas, repair or replace the surface removed or damaged with a minimum of 6 inches of crushed stone in accordance with Section 310, "Graded Aggregate Construction," GDOT specifications.
  10. Temporary paving shall consist of a single application of bituminous surface treatment. The bituminous surface treatment pavement shall conform to Section 424, "Bituminous Surface Treatment," GDOT specifications.
- B. In no case shall paving repair be commenced without prior approval of the Engineer of the type of pavement, the equipment to be used, and the method or procedure to be used. The designation of "light-duty" or "heavy-duty" use as applied to Type 1, Type 2, Type 6, Type 7, or Type 8 pavement replacement shall be determined by the Engineer.
- C. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry, and the tack coat has been applied.

## PART 3 - EXECUTION

### 3.1 SURFACE PREPARATION

- A. General. Remove loose material from compacted subgrade surface immediately before applying subbase.
- B. Roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction.
- C. Do not begin paving work until deficient subgrade areas have been corrected and are ready to receive subbase.
- D. Place mineral aggregate subbase and compact in accordance with the applicable GDOT specifications to provide a minimum of 6 inches or as shown on Drawings. Subbase thickness greater than 8 inches shall be placed in two or more layers.
- E. Roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.
- F. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.
- G. Prime Coat. Apply at rate of 0.20 to 0.50 gallon per square yard over compacted subbase. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile components.
- H. Tack Coat. Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gallon per square yard of surface.
- I. Allow to dry until at proper condition to receive paving.



- J. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

### 3.2 PLACING MIX

- A. General. Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225°F (107°C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
- B. Paver Placing. Place in strips not less than 10 feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- C. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
- D. Joints. Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.
- E. Curbs. Construct curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust.
- F. Place curb materials to cross-section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms as soon as material has cooled.

### 3.3 ROLLING

- A. General. Begin rolling when mixture will bear roller weight without excessive displacement.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling. Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
- D. Second Rolling. Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
- E. Finish Rolling. Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.
- F. Patching. Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
- G. Protection. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.4 TRAFFIC AND LANE MARKINGS

- A. General. Provide traffic and lane markings in all areas where markings have been damaged due to trench width pavement. On full width pavement, provide markings in all areas where markings were present at beginning of project or where markings are designated to be provided on the Drawings.
- B. Cleaning. Sweep and clean surface to eliminate loose material and dust.
- C. Striping. Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and nonbleeding.
- D. Do not apply traffic and lane marking paint until layout and placement have been verified with Engineer.
- E. Apply paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.

### 3.5 WHEEL STOPS

- A. General. Secure wheel stops to hot-mixed asphalt surface with not less than two ¾-inch-diameter galvanized steel dowels embedded in precast concrete at 1/3 points. Size length of dowel to penetrate at least 1/2 hot-mixed asphalt depth.

### 3.6 FIELD QUALITY CONTROL

- A. General. Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by Owner's testing laboratory. Repair or remove and replace unacceptable paving as directed by Engineer.
- B. Thickness. In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
  - 1. Base Course: Plus or minus ½-inch.
  - 2. Surface Course: Plus or minus ¼-inch.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
  - 1. Base Course Surface: ¼-inch.
  - 2. Wearing Course Surface: 3/16-inch.
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is ¼-inch.
- D. Check surface areas at intervals as directed by Engineer.

END OF SECTION

## SECTION 32 92 19

### SEEDING

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. The work covered by this section consists of furnishing all labor, equipment, and material required to place topsoil, seed, commercial fertilizer, agricultural limestone, and mulch material, including seedbed preparation, harrowing, compacting, and other placement operations on graded earthen areas as described herein and/or shown on the Drawings. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement, or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.
- B. Temporary Seeding and Erosion Control
  - 1. This practice is applicable on areas subject to erosion for up to 12 months or until establishment of finished grade or permanent vegetative cover. Temporary vegetative measures shall be coordinated with permanent measures to assure economical and effective stabilization.
  - 2. Temporary seeding shall be applied to exposed soil surfaces which are not to be fine-graded for periods from 15 days to one year. Such areas include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, temporary roadbanks, backfilled and rough graded utility line trenches, and disturbed areas along utility lines, etc.
  - 3. Temporary seeding shall be in accordance with the temporary seeding schedule and shall meet the same requirements for seed bed preparation and mulching with the exception that lime and fertilizer need not be applied unless the soil is very low fertility and low pH.

##### 1.2 QUALITY ASSURANCE

- A. Prior to seeding operations, furnish to the Engineer labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this section.
- B. Prior to topsoil operations, obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Services or other certified testing laboratory.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Place a minimum of 4 inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the Engineer prior to disturbance.
- B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2 inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and perennial weed seeds, and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements, or vegetable debris undesirable or harmful to plant life.
- C. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam, or a combination thereof. The pH shall range from 5.5 to 7.0. Topsoil shall contain not less than 5 percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of samples oven-dried to 65°C.

2.2 SEED

- A. Deliver seed in new bag or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.
- B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.
- C. Seed shall bear the grower's analysis testing to 98 percent for purity and minimum 85 percent for germination. At the discretion of the Engineer, samples of seed may be taken for check against the grower's analysis.
- D. Species, rate of seeding, fertilization, and other requirements are shown in the Seeding Requirements Table.

2.3 FERTILIZER AND LIMING MATERIALS

- A. Fertilizer and liming materials shall comply with applicable state, local, and federal laws concerned with their production and use.

TEMPORARY SEEDING REQUIREMENTS TABLE
"Refer to Seed Tables in the Drawings."

PERMANENT SEEDING REQUIREMENTS TABLE
"Refer to Seed Tables in the Drawings."

- B. Commercial fertilizer shall be a ready-mixed material and shall be equivalent to the grade or grades specified in the Seeding Requirements Table. Container bags shall be labeled with the name and address of the manufacturer, brand name, net weight, and chemical composition.
- C. Agricultural limestone shall be a pulverized limestone with a calcium carbonate content not less than 85 percent by weight. Agricultural limestone shall be crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

#### 2.4 MULCH MATERIAL

- A. All mulch materials shall be air-dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.
- B. Mulch shall be composed of wood fiber, straw, or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch-blowing equipment.
- C. Wood fiber mulch shall be as manufactured by Conwed Corporation, or equal.
- D. Straw mulch shall be partially decomposed stalks of wheat, rye, oats, or other approved grain crops.
- E. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum, or other approved standing field crops.

#### 2.5 MULCH BINDER

- A. Mulch on slopes exceeding a 3 to 1 ratio shall be held in place by the use of an approved erosion control fabric, such as Curlex I as manufactured by American Excelsior Company, or approved equal. Fabric shall consist of strips of biodegradable paper interwoven with yarn that is subject to degradation by ultraviolet light.

#### 2.6 INOCULANTS FOR LEGUMES

- A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

#### 2.7 WATER

- A. Water shall be clean, clear, and free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

### PART 3 - EXECUTION

#### 3.1 SECURING AND PLACING TOPSOIL

- A. Topsoil shall be secured from areas where topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Engineer.

- B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage, and other characteristics as to offer assurance that when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.
- C. All areas from which topsoil is to be secured shall be cleaned of all sticks, boards, stones, lime, cement, ashes, cinders, slag, concrete, bitumen or its residue, and any other refuse which will hinder or prevent growth.
- D. When securing topsoil from a designated pit or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Engineer, the pit shall be abandoned.
- E. Before placing or depositing topsoil upon any area, all improvements within the area shall be completed, unless otherwise approved by the Engineer.
- F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

### 3.2 SEEDBED PREPARATION

- A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line free from unsightly variations, bumps, ridges, and depressions, and all detrimental material, roots, and stones larger than 3 inches in any dimension shall be removed from the soil.
- B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 2 inches with a weighted disc, tiller, pulvimixer, or other equipment, until the surface is smooth and in a condition acceptable to the Engineer.
- C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.
- D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

### 3.3 FERTILIZATION AND LIMING

- A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in the Seeding Requirements Table.
- B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1/2 inch.
- C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

- D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates in the Seeding Requirements Table. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.

### 3.4 SEEDING

- A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in the Seeding Requirements Table unless otherwise approved by the Engineer. Seed mixtures may be sown together, provided they are kept in a thoroughly mixed condition during the seeding operation.
- B. Seeds shall be uniformly sown by any approved mechanical method to suit the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power-drawn seed drills. Hydroseeding and hydromulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder to the proper rate before seeding operations are started and to maintain the adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.
- C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8 inch by a cultipacker or suitable roller.
- D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

### 3.5 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and air to circulate, and at the same time shade the ground, reduce erosion, and conserve soil moisture. Approximately 25 percent of the ground shall be visible through the mulch blanket.
- B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:
  - 1. Wood Fiber                      1,400 lbs/acre
  - 2. Straw                              4,000 lbs/acre
  - 3. Stalks                              4,000 lbs/acre

These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

- C. Mulch on slopes greater than a 3 to 1 ratio shall be held in place by the use of an approved erosion control fabric. Fabric shall be installed immediately after seeding and fertilizing area (mulch shall not be used under fabric).

- D. Erosion control fabric shall be installed and applied in accordance with the manufacturer's recommendations. Any fabric which becomes torn, broken loose from securing staples, or undermined shall be immediately and satisfactorily repaired. Areas where seed is washed out before germination shall be fertilized, reseeded, and restored. Any required restoration work shall be performed without additional compensation.

### 3.6 WATERING

- A. Maintain the proper moisture content of the soil to ensure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.
- B. Watering shall be accomplished by hoses, tank truck, or sprinklers in such a way to prevent erosion, excessive runoff, and overwatered spots.

### 3.7 MAINTENANCE

- A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris, and excess material, and the premises shall be left in a neat and orderly condition.
- B. Maintain all seeded areas without additional payment until final acceptance of the work by the Owner. Regrading, refertilizing, reliming, reseeding, or remulching shall be done at Contractor's expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is achieved. Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by filling with topsoil, compacting, and repeating the seeding work. Grass areas will be considered acceptable when a viable stand of grass covers at least 98% of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion.

END OF SECTION



## SECTION 32 92 31

### TOPSOIL

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. Topsoil for planting shall consist of a rich friable soil conforming to the requirements and provisions set out in these Specifications or as approved by the Engineer, and obtained from locations indicated on the Drawings or as approved by the Engineer. Topsoil shall be placed at the locations indicated on the Plans set out in the Specifications or as directed by the Engineer, and in conformity with the provisions and requirements set out in the Specifications or as required by the Engineer.

##### 1.2 MATERIAL

- A. Topsoil for planting shall be a rich friable loam containing a large amount of humus and shall be original surface sandy loam, topsoil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than ½ inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and perennial wood seeds, and shall not contain objectional plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life. Bermuda grass roots in topsoil will not be accepted, unless otherwise approved by the Engineer.
- B. Topsoil shall be natural topsoil without admixture of subsoil material and shall be classifiable as a loam, silt loam, clay loam, or a combination thereof. Topsoil shall contain not less than five percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of oven-dried samples. The ignition test shall be performed on samples which have been thoroughly oven-dried to constant weight at a temperature of 221°F.
- C. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the Engineer.
- D. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed in commercial quantities, the product will be homogeneous in nature and will conform to the requirements of these Specifications, or as required by the Engineer.
- E. Topsoil may be secured, if approved by the Engineer, from areas which are, or have been, in cultivation within the past five years, and which are producing or have produced fair or good yield of staple farm or truck crops without usual fertilization, or topsoil may be secured from areas supplied with good normal drainage which is arable or suitable for cultivation.

### 1.3 EQUIPMENT

- A. All equipment necessary for the proper removal, transportation, protection, and maintenance of topsoil must be available when required in first class working condition and shall have been approved by the Engineer before construction will be permitted to begin.

### 1.4 REQUIREMENTS

- A. Topsoil, except that reserved within excavation areas on the project, shall not be stored for use but shall be excavated and placed directly into its final position.
- B. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, lime, cement, ashes, cinders, slag, concrete, bitumen, or its residue and any other refuse which will hinder or prevent growth.
- C. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such materials shall be removed from the topsoil, or, if required by the Engineer, the pit shall be abandoned.
- D. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Engineer.
- E. The areas or pits into which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.
- F. The depth to which topsoil is excavated in any pit, shall be subject to the direction of and be approved by the Engineer, and if during the excavation of the pit the Engineer decides to make changes in the depth in order to secure a more satisfactory material, the Contractor shall follow such instructions as may be issued by the Engineer.
- G. Topsoil shall be transported in vehicles which will not lose or scatter the topsoil during transportation.
- H. Topsoil shall be placed upon or incorporated into prepared areas or pits in accordance with the provisions and requirements set out in the sections of these Specifications covering the particular type or kind of planting or seeding with which topsoil is required.

### 1.5 MAINTENANCE

- A. The Contractor shall maintain topsoil, at his own expense, in connection with any seeding or planting, or otherwise, until final completion of the project. Maintenance shall consist of preserving, protecting, replacing, and such other work as may be necessary to keep the project in a satisfactory condition.

### 1.6 FINAL CLEARING UP

- A. Final clearing up shall consist of completely cleaning the area of all equipment, rubbish, excess material, and unused materials which will mar the appearance of the project, and disposing of same satisfactorily.
- B. All pavements and structures shall be swept clean of all dirt or rubbish which may have become deposited upon them during construction.

END OF SECTION