DEPARTMENT OF FINANCE AND PURCHASING

345 South Main Street

Harrisonburg, VA 22801

ISSUE DATE: May 17, 2013	**INVITATION TO BID NUMBER:** 2013008-PR-B	**FOR:** Ramblewood Park Improvements Phase 1
DEPARTMENT: Parks & Recreation	**DATE/TIME OF CLOSING:** June 4, 2013 at 2:00pm local time	**CONTRACT ADMINISTRATOR:** Charlie Honaker

A mandatory Pre-Bid meeting will be held Tuesday May 28, 2013 at 10:30 am local time.

Proposals - In accordance with the following and in compliance with all terms and conditions, unless otherwise noted, the undersigned offers and agrees, if the proposal is accepted, to furnish items or services for which prices are quoted, , delivered or furnished to designated points within the time specified. It is understood and agreed that with respect to all terms and conditions accepted by the City of Harrisonburg the items or services offered and accompanying attachments shall constitute a contract.

NAME AND ADDRESS OF FIRM:

Telephone/Fax No.:

Federal Employer Identification # :

State Corporation Commission #:

E-mail:

Prompt Payment Discount: __% for payment within___days/net___ days

By signing this proposal, Vendor(s) certifies, acknowledges, understands, and agrees to be bound by the conditions set forth in this ITB.

CHECK ONE: ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ CORPORATION ☐ LLC

Vendor's Legally Authorized Signature

Date

Print Name

Title

Sealed proposals, subject to terms and conditions of this Request for Proposal will be received by the Department of Public Works, 320 E. Mosby Road, Harrisonburg, Virginia 22801 until the date/ time specified above for furnishing items or services delivered or furnished to specified destinations within the time specified or stipulated by the vendor(s).

The City does not discriminate against small and minority businesses or faith-based organizations.

This page intentionally blank

PROJECT MANUAL
FOR THE
RAMBLEWOOD PARK
IMPROVEMENTS – PHASE 1

Prepared for:

THE CITY OF HARRISONBURG, VIRGINIA

Prepared by:

Draper Aden Associates
Engineering • Surveying • Environmental Services
8090 Villa Park Drive
Richmond, Virginia 23228

May 10, 2013

DAA JN: 6154-193 & 6154-192CV

COMMONWEALTH OF VIRGINIA
JULIA WALLACE SKARE
Lic. No. 043893
5/10/13
PROFESSIONAL ENGINEER

This page intentionally blank

TABLE OF CONTENTS

BIDDING REQUIREMENTS

Invitation to Bid 00020
Instructions to Bidders 00100
General Terms and Conditions for the City of Harrisonburg, VA 00110
State Corporation Commission Form 00115
City of Harrisonburg Insurance Requirements 00120
Bid Form 00300
Bidder's Qualification Statement.....00310
Bid Bond 00430

CONTRACT DOCUMENTS

Notice of Award.....00510
Agreement Between Owner and Contractor 00520
Notice to Proceed.....00550
Performance Bond 00610
Payment Bond.....00615
Application for Payment 00620
Recommendation of Payment 00621
Certificate of Substantial Completion.....00625
Work Change Directive 00940
Change Order 00941

CONDITIONS OF CONTRACT

EJCDC General Conditions 00700
Supplementary Conditions.....00705

TECHNICAL SPECIFICATIONS

Section 01000 General Construction Standards
Section 01020 Measurement and Payment
Section 01050 Licenses and Permits
Section 01060 Regulatory Requirements
Section 01070 Lines and Grades
Section 01152 Application for Payment
Section 01153 Change Order Procedures
Section 01201 Preconstruction Conference
Section 01202 Progress Meetings
Section 01310 Construction Schedules
Section 01340 Shop Drawings and Product Data
Section 01370 Schedule of Values
Section 01500 Construction Facilities and Temporary Controls

Section 01560 Erosion and Sediment Control
Section 01580 Project Coordination
Section 01700 Contract Closeout
Section 01710 Cleaning
Section 01720 Project Record Documents
Section 02110 Sitework Procedures
Section 02200 Site Preparation
Section 02209 Intermediate and Cap Controlled Fill Layers
Section 02221 Trenching, Backfilling and Compacting
Section 02222 Synthetic Cap Anchor Trench
Section 02300 Earthwork
Section 02420 Surface Runoff Collection Systems
Section 02530 Sanitary Sewerage Systems
Section 02532 Sanitary Sewer Manholes and Cleanouts
Section 02630 Storm Drainage
Section 02702 Pavements
Section 02831 Chain Link Fences and Gates
Section 02920 Lawns and Grasses
Section 03100 Concrete Formwork
Section 03200 Concrete Reinforcement
Section 03300 Cast-In-Place Concrete
Section 13300 Geotextile Fabrics
Section 13302 Geocomposite Drainage Medium
Section 13306 LLDPE Geomembrane Cap
Section 15060 Pipe and Pipe Fittings
Section 15062 Landfill Gas/Condensate System HDPE Piping and Fittings
Section 133420 Maintenance Building
Section 133421 Restroom Building

Division 26 Electrical

260500 Common Work Results for Electrical
260519 Low-Voltage Electrical Power Conductors and Cables
260526 Grounding and Bonding for Electrical Systems
260529 Hangers and Supports for Electrical Systems
260534 Conduit
260537 Boxes
260553 Identification for Electrical Systems
260573 Overcurrent Protective Device Coordination Study
262200 Low-Voltage Transformers
262416 Panelboards
262701 Electrical Service Entrance
264300 Surge Protective Devices
265600 Exterior Lighting
265668 Exterior Athletic Lighting

Attachment Construction Quality Assurance Manual

SECTION 00020
INVITATION TO BID

The City of Harrisonburg, Virginia is soliciting sealed BIDS for the Ramblewood Park Improvements – Phase 1 in Harrisonburg, Virginia. Ramblewood Park is constructed on a closed municipal landfill and the improvements will include a new landfill cap. The work is to be completed as shown on the Contract Drawings and as described in the specifications. The work generally consists of:

1. Placement of on-site soil fill to achieve intermediate grades as shown on the construction drawings. Contractor shall visit the site prior to bid and completely understand the amount of soil required to achieve the intermediate grades;
2. Contractor shall verify that the intermediate grades have been properly achieved, and is required to make any modifications to previously placed fill to achieve the intermediate grades;
3. Installation of landfill gas collection network and vents;
4. Installation of 40-mil LLDPE geomembrane cap and geocomposite drainage material;
5. Supply a portion of required fill and placement of soil fill above geocomposite liner;
6. Grassy vegetation and topsoil to be stockpiled by the contractor. The stockpile shall be located in a safe area and be adequately protected by temporary seeding and mulching;
7. Placement of minimum 2inches of topsoil and up to 6 inches of topsoil;
8. Installation of lighting, fence, retaining wall, stairs, concrete handicap ramp, asphalt walks and parking lot;
9. Conduit and electrical service for lighting;
10. Telephone conduit;
11. Construction of structures: press box with restrooms, dugouts, maintenance building;
12. Water and sanitary sewer service laterals;
13. Erosion and sediment control measures and drainage features;
14. Installation of irrigation system;
15. Seeding and mulching.

Sealed BIDS will be received at the City of Harrisonburg, Public Works Department, 320 East Mosby Road, Harrisonburg, Virginia 22801, Attn: Charles Honaker, (540) 434-5928, in writing, no later than 2:00 p.m. according to the official clock in the Public Works Office, on Tuesday, June 4, 2013, and then opened at said office and read aloud. BIDS received after such time shall be returned unopened.

BIDS must be submitted in a sealed opaque envelope and clearly marked on the outside with the company's name and the notation "Sealed Bid for Ramblewood Park Improvements – Phase 1".

The BIDDING DOCUMENTS may be examined at the following locations:

1. Draper Aden Associates, 8090 Villa Park Drive, Richmond VA 23228

2. City of Harrisonburg, Public Works Department, 320 East Mosby Road, Harrisonburg, Virginia 22801
3. Builders Exchange, 3207 Hermitage Road, Roanoke, VA 23227
4. McGraw Hill/Dodge Reports, 9 North 3rd Street, Richmond, VA 23219
5. www.harrisonburgva.gov/bids-proposals
6. www.eva.virginia.gov.

Copies of the BIDDING DOCUMENTS are available for purchase at DTS Reprographics, 4803 South Valley Pike, Harrisonburg, VA 22901 (540)-433-8373.

Copies of the BIDDING DOCUMENTS may also be obtained from the office of Draper Aden Associates, 8090 Villa Park Drive, Richmond VA 23228 upon payment of a non-refundable fee of $100.00 for each set.

BIDS shall be accompanied by a 5% Bid Security as specified in the Instructions to Bidders. Withdrawal of Bids shall be according to procedure § 2.2-4330 of the Code of Virginia, as amended. BIDDERS must be licensed as a Contractor in the Commonwealth of Virginia and the Bidder's attention is directed to the requirements of Title 54.1, Chapter 11, of the Code of Virginia and to the Harrisonburg Purchasing and Contracting Policy Manual.

A pre-bid conference will be held at the Harrisonburg Public Works Department, 320 East Mosby Road, Harrisonburg, on **Tuesday, May 28, 2013**, at 10:30 a.m.., local time. Attendance for the pre-bid conference is mandatory. BIDDER shall be present for the **entire** pre-bid conference.

The OWNER reserves the right to reject any and all bids, or to contact any Bidder prior to award for explanations or clarifications. The OWNER does not discriminate against any Bidder on any basis.

SECTION 00100
INSTRUCTIONS TO BIDDERS

1. Defined Terms

Terms used in these instructions to Bidders are defined in the EJCDC General Conditions. The term "Bidder" means one who submits a BID directly to OWNER, as distinct from a sub-bidder, who submits a BID to a Bidder. The term "Successful Bidder" means the lowest, responsive, responsible Bidder to whom the OWNER (on the basis of OWNER'S evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

2. Copies of Bidding Documents

2.1 Complete sets of the Bidding Documents may be obtained from ENGINEER.

2.2 Complete sets of Bidding Documents shall be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3 OWNER and ENGINEER in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. Qualification of Bidders

To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five days of OWNER'S request written evidence such as financial data, previous experience, present commitments, information on subcontractors, suppliers or others, and other such data as may be called for in the Supplementary Instructions. Each BID must contain evidence that the CONTRACTOR is licensed to do business in the state where the Project is located.

4. Examination of Contract Documents and Site; Provision of Off-Site Borrow Area

4.1 Before submitting a BID, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress, performance, or furnishing of the Work, (c) review Laws, Ordinances, Rules, and Regulations that may in any manner affect cost, progress, performance, or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify ENGINEER in writing of all conflicts, errors or discrepancies in the Contract Documents.

4.2 Information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site is based upon information and data furnished to the OWNER and ENGINEER by owners of such Underground Facilities or others, and OWNER does not assume responsibility for the accuracy or completeness thereof.

4.3 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Facilities and other physical conditions, and possible changes in the Contract Documents due to differing conditions appear in Paragraphs 4.02 and 4.03 of the EJCDC General Conditions.

4.4 Before submitting a BID, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work which Bidder deems necessary to determine its BID for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.5 The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by CONTRACTOR. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

4.6 The submission of a BID will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the BID is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences, or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

4.7 The OWNER has existing stockpiles located on-site and at various locations throughout the City. The CONTRACTOR shall be responsible for providing equipment at each location to load material, and dump trucks to haul the material from the stock pile locations to the Ramblewood project site. It is anticipated that the material at the various locations will be sufficient to complete, at a minimum, the Phase 1 grading as shown on the construction plans.

Existing known off-site stockpiles are located at James Madison University at 1620 South Main Street and the Waterman Quarry at the intersection of Waterman Drive and West Market Street. Other off-site stockpiles may be added to the project to complete the required fill. These locations are currently unknown; however, they will be located within the City limits. The CONTRACTOR shall account for these additional off-site areas in the bid unit price, as no price adjustment or change order will be granted for these additional off-site areas.

4.8 After award of BID, the CONTRACTOR shall submit tests results to the OWNER to determine if the soil is suitable for fill prior to bidding.

4.9 After award of BID, the CONTRACTOR will be responsible for verifying the intermediate grades have been achieved and shall provide verification by a Surveyor licensed in the State of Virginia to the OWNER for approval prior to placement of membrane cap.

4.10 The project includes modifications to existing landfill gas extraction well heads and gas lateral lines. BIDDER shall review modifications as noted and be prepared to perform work associated with landfill gas extraction.

5. Interpretations and Addenda

5.1. All questions about the meaning or intent of the Contract Documents are to be directed to ENGINEER and OWNER in writing. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda and posted at www.harrisonburgva.gov/bids and www.eva.virginia.gov as having received the Bidding Documents. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by OWNER or ENGINEER.

6. BID Security

6.1 Each BID must be accompanied by BID security made payable to OWNER, in an amount of five percent of the Bidder's maximum BID price and in the form of a certified or bank check or a BID Bond (on form attached, if a form is prescribed) issued by a surety meeting the requirements of paragraph 5.01 of the EJCDC General Conditions.

6.2 The BID Security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required contract security, whereupon it will be returned. If the Successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within 15 days of the Notice of Award, OWNER may annul the Notice of Award and the BID security of that Bidder will be forfeited. The BID Security of other Bidders whom OWNER

believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of the seventh day after the Effective Date of the Agreement or the ninety-first day after the BID opening. BID security with BIDS which are not competitive will be returned within seven days after the BID opening.

7. Contract Time

The number of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment (the Contract Time) are set forth in the Agreement, Section 4.02.

8. Liquidated Damages

Provisions for liquidated damages, if any, are set forth in the Agreement, Section 4.03.

9. Substitute or "Or-Equal" Items

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute "or equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to OWNER and ENGINEER, application for such acceptance will not be considered by OWNER and ENGINEER until after the Effective Date of the Agreement. The procedure for submission of any such application by CONTRACTOR and consideration by OWNER and ENGINEER is set forth in Paragraph 6.05 of the EJCDC General Conditions and may be supplemented in the General Requirements.

10. Subcontractors, Suppliers, and Others

10.1 The bidding documents require the identity of Subcontractors, Suppliers, and other persons and organizations (including those who are to furnish the principle items of material and equipment) to be submitted to OWNER at the time of BID. If OWNER or ENGINEER after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, OWNER or ENGINEER, may, before the Notice of Award is given, request the apparent Successful Bidder to submit an acceptable substitute without an increase in BID price.

10.2 If the apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to the next lowest responsive, responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, or other persons or organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security. Any Subcontractor, Supplier, other person or organization listed and to whom OWNER or ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER, subject to revocation of such

acceptance after the Effective Date of the Agreement as provided in Paragraph 6.8.2 of the EJCDC General Conditions.

10.3 No CONTRACTOR shall be required to employ any Subcontractor, Supplier, other person or organization against whom CONTRACTOR has reasonable objection.

10.4 CONTRACTOR shall be allowed to subcontract no more than 80 percent of the value of the labor required to construct the Project. The balance of the labor must be provided by personnel in CONTRACTOR'S direct employ.

11. Bid Form

11.1 The Bid Form is included in the Bidding Documents.

11.2 All blanks on the Bid Form must be completed in ink or by typewriter.

11.3 BIDS by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporate address and state of incorporation must be shown below the signature.

11.4 BIDS by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

11.5 All names must be typed or printed below the signature.

11.6 The BID shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form) and the return of all signed addenda with the Bid documents.

11.7 The address and telephone number for communications regarding the BID must be shown.

11.8 Contractor's Qualification Statement must be completed in full. Sensitive information regarding finances etc. may be submitted in an envelope marked confidential. Envelope will only be opened if Bidder is low or second low responsible bidder, or deemed competitive in accordance with Section 6.2 of this Instructions to Bidders. Otherwise it will be returned unopened.

11.9 A list of all Subcontractors, suppliers, other persons or organizations (including those who are to furnish the principle items of material and equipment) shall be provided with the BID.

12. Submission of Bids

12.1 BIDS shall be submitted at the time and place indicated in the Advertisement or Invitation to BID and shall be included in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the Bid Security and other required documents. If the BID is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it. Emailed BIDS will not be considered. LATE BIDS WILL NOT BE ACCEPTED.

12.2 BIDDERS are required under Title 54.1, Chapter 11, Code of Virginia to be licensed. The Bidder shall place on the outside of the envelope containing his Bid and in his BID over his signature the following notation: "Registered Virginia Contractor No. _____."

12.3 Prospective BIDDERS are furnished one copy of the Bidding Documents with one separate unbound copy each of the Bid Form and the Bid Bond and a digital copy. The Bidding Documents may be retained by the Bidder. The unbound copy of the Bid Form is to be completed and submitted with the Bid Security, Qualification Statement, information on subcontractors and borrow source as outlined on the Bid Form.

13. Modification and Withdrawal of Bids

13.1 BIDS may be modified or withdrawn by an appropriate document duly executed (in the manner that a BID must be executed) and delivered to the place where BIDS are to be submitted at any time prior to the opening of Bids.

13.2 BIDDERS may withdraw BID in accordance with §2.2-4330 of the Code of Virginia, as amended.

14. Opening of Bids

BIDS will be opened and read aloud publicly at the time stipulated in the Advertisement or Invitation to Bid. BIDS received after the time so indicated will be returned, unopened. An abstract of the amounts of the base BIDS and major alternatives (if any) will be made available to BIDDERS after the opening of Bids.

15. BIDS to Remain Subject to Acceptance

All BIDS shall remain open for ninety (90) days after the day of the BID opening, but OWNER may, in its sole discretion, release any BID and return the Bid Security prior to that date.

16. Award of Contract

16.1 OWNER reserves the right to reject any and all Bids, to waive all informalities, not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming,

nonresponsive, or conditional Bids. Also, OWNER reserves the right to reject the BID of any BIDDER if OWNER believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the BID is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by OWNER. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

16.2 In evaluating Bids, OWNER will consider the qualifications of the BIDDERS, whether or not the BIDS comply with the prescribed requirements, and such alternatives, unit prices, and other data as may be requested in the Bid Forms or prior to the Notice of Award.

16.3 OWNER may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations were submitted with the BID. OWNER also may consider the operating costs, maintenance requirements, performance data and guarantees of materials and equipment proposed for incorporation in the Work when such data are required to be submitted prior to the Notice of Award.

16.4 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any BID and to establish the responsibility, qualifications and financial ability of the BIDDERS, proposed Subcontractors, suppliers and other persons and organizations to perform or furnish the Work in accordance with the Contract Documents to OWNER'S satisfaction within the prescribed time.

16.5 If the contract is to be awarded, it will be awarded to the lowest responsive, responsible Bidder whose evaluation by OWNER indicates to OWNER that the award will be in the best interests of the Project.

16.6 If the contract is to be awarded, OWNER will give the Successful Bidder a Notice of Award within ninety (90) days after the day of the Bid opening.

17. <u>Negotiation with the Lowest Bidder</u>

17.1 Unless all BIDS are cancelled or rejected, the OWNER reserves the right granted by § 2.2-4318 of the Code of Virginia to negotiate with the lowest responsive, responsible bidder to obtain a contract price within the funds available to the OWNER whenever such low bid exceeds the OWNER'S available funds.

17.2 For the purpose of determining when such negotiations may take place, the term "available funds" shall mean those funds which were budgeted by the OWNER for this contract prior to the issuance of the written Invitation for Bids.

17.3 Negotiations with the low bidder may include both modifications of the bid price and the Scope of Work/Specifications to be performed.

17.4 The OWNER shall initiate such negotiations by written notice to the lowest responsive, responsible bidder that its BID exceeds the available funds and that the agency wishes to negotiate a lower contract price. The times, places, and manner of negotiating shall be agreed to by the OWNER and the lowest responsive, responsible bidder.

18. Contract Security

Paragraph 5.01 of the EJCDC General Conditions and the Supplementary Conditions set forth OWNER'S requirements as to performance and payment Bonds. When the Successful Bidder delivers the executed Agreement to OWNER it must be accompanied by the required performance and payment Bonds.

19. Signing of Agreement

When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen (15) days thereafter CONTRACTOR shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER with the required Bonds. Within ten (10) days thereafter OWNER shall deliver one fully signed counterpart is to be accompanied by a complete set of Drawings with the appropriate identification.

20. Miscellaneous Information

20.1 Timing of this project is critical. CONTRACTOR shall familiarize himself with the liquidated damage clauses within the Agreement Between Owner and Contractor, Section 4.03 and under the General and Supplementary Conditions.

SECTION 00110
GENERAL TERMS AND CONDITIONS FOR THE CITY OF HARRISONBURG, VA

PURCHASING AND CONTRACTING MANUAL: This solicitation is subject to the provisions of The Purchasing and Contracting Policy Manual for the City of Harrisonburg (City) and any revisions thereto, which are hereby incorporated into this contract in their entirety. A copy of the manual is available for review at www.Harrisonburgva.gov/bids.

APPLICABLE LAWS AND COURTS: This solicitation and any resulting contract shall be governed in all respects by the laws of the Commonwealth of Virginia and any litigation with respect thereto shall be brought in the courts of the Commonwealth. The contractor shall comply with all applicable federal, state and local laws, rules and regulations.

ANTI-DISCRIMINATION: By submitting their (bids/proposals), (bidders/offerors) certify to the City that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and 2.2-4311 of the *Virginia Public Procurement Act*.

In every contract over $10,000 the provisions below apply:

1. During the performance of this contract, the contractor agrees as follows:

   a. The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

   b. The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.

   c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting these requirements.

   The contractor will include the provisions of 1. above in every subcontract or purchase order over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

2. The City does not discriminate against small and minority businesses or faith based organizations.

ETHICS IN PUBLIC CONTRACTING: By submitting their (bids/proposals), (bidders/offerors) certify that their (bids/proposals) are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other (bidder/offeror), supplier, manufacturer or subcontractor in connection with their (bid/proposal), and that they have not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.

IMMIGRATION REFORM AND CONTROL ACT OF 1986: By submitting their (bids/proposals), (bidders/offerors) certify that they do not and will not during the performance of this contract employ illegal alien workers or otherwise violate the provisions of the federal Immigration Reform and Control Act of 1986.

DEBARMENT STATUS: By submitting their (bids/proposals), (bidders/offerors) certify that they are not currently debarred by the Commonwealth of Virginia from submitting bids or proposals on contracts for the type of goods and/or services covered by this solicitation, nor are they an agent of any person or entity that is currently so debarred.

ANTITRUST: By entering into a contract, the contractor conveys, sells, assigns, and transfers to the City all rights, title and interest in and to all causes of action it may now have or hereafter acquire under the antitrust laws of the United States and the Commonwealth of Virginia, relating to the particular goods or services purchased or acquired by the City under said contract.

MANDATORY USE OF CITY FORM AND TERMS AND CONDITIONS FOR IFBs AND RFPs

1. (For Invitation For Bids(ITB):) Failure to submit a bid on the form provided, (if provided) shall be a cause for rejection of the bid. Modification of or additions to any portion of the Invitation for Bids may be cause for rejection of the bid; however, the City reserves the right to decide, on a case by case basis, in its sole discretion, whether to reject such a bid as nonresponsive. As a precondition to its acceptance, the City may, in its sole discretion, request that the bidder withdraw or modify nonresponsive portions of a bid which do not affect quality, quantity, price, or delivery. No modification of or addition to the provisions of the contract shall be effective unless reduced to writing and signed by the parties.

2. (For Request For Proposals (RFP):) Failure to submit a proposal on the form provided, (if provided) shall be a cause for rejection of the bid. Modification of or additions to the General Terms and Conditions of the solicitation may be cause for rejection of the proposal; however, the City reserves the right to decide, on a case by case basis, in its sole discretion, whether to reject such a proposal.

REVISIONS TO THE OFFICIAL ITB/RFP: No offeror shall modify, revise, edit or make any unauthorized change(s) to the original Official Invitation to Bid (ITB) or Official Request for

Proposal (RFP). The Official solicitation document and the Addenda(s) are the documents posted on the City of Harrisonburg's web site and/or authorized by the City of Harrisonburg's Purchasing Agent. Any such violation as stated above may result in rejection of the ITB/RFP response. In addition, violations may result in the debarment of the offeror by the City of Harrisonburg.

CLARIFICATION OF TERMS: If any prospective (bidder/offeror) has questions about the specifications or other solicitation documents, the prospective (bidder/offeror) should contact the person whose name appears on the face of the solicitation no later than five working days before the due date. Any revisions to the solicitation will be made only by addendum issued by the buyer.

PAYMENT:

1. To Prime Contractor:

   a. Invoices for items ordered, delivered and accepted shall be submitted by the contractor directly to the payment address shown on the purchase order/contract. All invoices shall show the purchase order number; social security number (for individual contractors) or the federal employer identification number (for proprietorships, partnerships, and corporations).

   b. Any payment terms requiring payment in less than 30 days will be regarded as requiring payment 30 days after invoice or delivery, whichever occurs last. This shall not affect offers of discounts for payment in less than 30 days, however.

   c. All goods or services provided under this contract or purchase order, that are to be paid for with public funds, shall be billed by the contractor at the contract price.

   d. The following shall be deemed to be the date of payment: the date of postmark in all cases where payment is made by mail, or the date of offset when offset proceedings have been instituted as authorized under the Virginia Debt Collection Act.

   e. Individual contractors shall provide their social security numbers, and proprietors , partnerships, and corporations shall provide the City with a federal employer identification number, prior to receiving any payment from the City.

   f. **Unreasonable Charges**. Under certain emergency procurements and for most time and material purchases, final job costs cannot be accurately determined at the time orders are placed. In such cases, contractors should be put on notice that final payment in full is contingent on a determination of reasonableness with respect to all invoiced charges. Charges which appear to be unreasonable will be researched and challenged, and that portion of the invoice held in abeyance until a settlement can be reached. Upon determining that invoiced as to those charges which it considers unreasonable and the basis for the determination. A contractor may not institute legal action unless a settlement cannot be reached within thirty (30) days of notification.

The provisions of this section do not relieve the City of its prompt payment obligations with respect to those charges which are not in dispute (*Code of Virginia*, 2.2.4363.

2. To Subcontractors:

   a. A contractor awarded a contract under this solicitation is hereby obligated:

      (1) To pay the subcontractor(s) within seven (7) days of the contractor's receipt of payment from the City for the proportionate share of the payment received for work performed by the subcontractor(s) under the contract; or

      (2) To notify the City and the subcontractor(s), in writing, of the contractor's intention to withhold payment and the reason.

   b. The contractor is obligated to pay the subcontractor(s) interest at the rate of one percent per month (unless otherwise provided under the terms of the contract) on all amounts owed by the contractor that remain unpaid seven (7) days following receipt of payment from the City, except for amounts withheld as stated in (2) above. The date of mailing of any payment by U. S. Mail is deemed to be payment to the addressee. These provisions apply to each sub-tier contractor performing under the primary contract. A contractor's obligation to pay an interest charge to a subcontractor may not be construed to be an obligation of the City.

PRECEDENCE OF TERMS: General Terms and Conditions shall apply in all instances. In the event there is a conflict between any of the other General Terms and Conditions and any Special Terms and Conditions in this solicitation, the Special Terms and Conditions shall apply.

QUALIFICATIONS OF (BIDDERS/OFFERORS): The City may make such reasonable investigations as deemed proper and necessary to determine the ability of the (bidder/offeror) to perform the services/furnish the goods and the (bidder/offeror) shall furnish to the City all such information and data for this purpose as may be requested. The City reserves the right to inspect (bidder's/offeror's) physical facilities prior to award to satisfy questions regarding the (bidder's/offeror's) capabilities. The City further reserves the right to reject any (bid/ proposal) if the evidence submitted by, or investigations of, such (bidder/offeror) fails to satisfy the City that such (bidder/offeror) is properly qualified to carry out the obligations of the contract and to provide the services and/or furnish the goods contemplated therein.

TESTING AND INSPECTION: The City reserves the right to conduct any test/inspection it may deem advisable to assure goods and services conform to the specifications.

ASSIGNMENT OF CONTRACT: A contract shall not be assignable by the contractor in whole or in part without the written consent of the City.

CHANGES TO THE CONTRACT: Changes can be made to the contract in any of the following ways:

1. The parties may agree in writing to modify the scope of the contract. An increase or decrease in the price of the contract resulting from such modification shall be agreed to by the parties as a part of their written agreement to modify the scope of the contract.
2. The Purchasing Agent or City delegated agent may order changes within the general scope of the contract at any time by written notice to the contractor. Changes within the scope of the contract include, but are not limited to, things such as services to be performed, the method of packing or shipment, and the place of delivery or installation. The contractor shall comply with the notice upon receipt. The contractor shall be compensated for any additional costs incurred as the result of such order and shall give the City a credit for any savings.

DEFAULT: In case of failure to deliver goods or services in accordance with the contract terms and conditions, the City, after due oral or written notice, may procure them from other sources and hold the contractor responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies, which the City may have.

CANCELLATION OF THE CONTRACT: The City may terminate any agreement resulting from this solicitation at any time, for any reason or for no reason, upon thirty days advance written notice to the Contractor. In the event of such termination the Contractor shall be compensated for services and work performed prior to termination.

TAXES: Sales to the City of Harrisonburg are normally exempt from State sales tax. State sales and use tax certificates of exemption, Form ST-12, will be issued upon request.
(NOT NORMALLY REQUIRED FOR SERVICE CONTRACTS)

USE OF BRAND NAMES: Unless otherwise provided in this solicitation, the name of a certain brand, make or manufacturer does not restrict (bidders/offerors) to the specific brand, make or manufacturer named, but conveys the general style, type, character, and quality of the article desired. Any article which the public body, in its sole discretion, determines to be the equal of that specified, considering quality, workmanship, economy of operation, and suitability for the purpose intended, shall be accepted. The (bidder/offeror) is responsible to clearly and specifically identify the product being offered and to provide sufficient descriptive literature, catalog cuts and technical detail to enable the City to determine if the product offered meets the requirements of the solicitation. This is required even if offering the exact brand, make or manufacturer specified. Normally in competitive sealed bidding only the information furnished with the bid will be considered in the evaluation. Failure to furnish adequate data for evaluation purposes may result in declaring a bid nonresponsive. Unless the (bidder/offeror) clearly indicates in its (bid/proposal) that the product offered is an "equal" product, such (bid/proposal) will be considered to offer the brand name product referenced in the solicitation.**(NOT NORMALLY REQUIRED FOR SERVICE CONTRACTS)**

TRANSPORTATION AND PACKAGING: By submitting their (bids/proposals), all (bidders/offerors) certify and warrant that the price offered for FOB destination includes only the actual freight rate costs at the lowest and best rate and is based upon the actual weight of the goods to be shipped. Except as otherwise specified herein, standard commercial packaging,

packing and shipping containers shall be used. All shipping containers shall be legibly marked or labeled on the outside with purchase order number, commodity description, and quantity.**(NOT NORMALLY REQUIRED FOR SERVICE CONTRACTS)**

INSURANCE: By signing and submitting a bid or proposal under this solicitation, the bidder or offeror certifies that if awarded the contract, it will have insurance coverages per the solicitation document at the time the contract is awarded. For construction contracts, if any subcontractors are involved, the subcontractor will have workers' compensation insurance in accordance with 2.2-4332 and 65.2-800 et seq. of the *Code of Virginia*. The bidder or offeror further certifies that the contractor and any subcontractors will maintain these insurance coverages during the entire term of the contract and that all insurance coverages will be provided by insurance companies authorized to sell insurance in Virginia by the Virginia State Corporation Commission. **(NOT NORMALLY REQUIRED FOR GOODS CONTRACTS. INSURANCE IS REQUIRED WHEN WORK IS TO BE PERFORMED ON CITY OWNED OR LEASED FACILITIES OR PROPERTY.)**

AVAILABILITY OF FUNDS: Agreements are made subject to the appropriation of funds by the Harrisonburg City Council and are null and void in the event of non-appropriation by the City Council. Non-appropriation of funds shall not be deemed a cancellation and shall terminate this agreement without recourse and with no liability on the part of the City.

SELECTION PROCESS/AWARD: Upon the award or the announcement of the decision to award a contract as a result of this solicitation, the department will publicly post such notice for a minimum of ten (10) days, or will notify all responsive bidders/offerors.

BID/PROPOSAL ACCEPTANCE PERIOD: Any bid/proposal resulting from this solicitation shall be valid for (30) days. At the end of the (30) days the bid/proposal may be withdrawn at the written request of the Bidder/Offeror. If the bid or proposal is not withdrawn at that time it remains in effect until an award is made or the solicitation is canceled.

EXCUSABLE DELAY: The City shall not be in default of any failure in performance of this agreement in accordance with its terms if such failure arises out of causes beyond its reasonable control and without the fault of or negligence of the City. Such causes may include, but are not restricted to acts of God or the public enemy, fires, flood, epidemics, quarantine restrictions, strikes, freight embargoes, and usually severe weather, but in every case the failure to perform must be beyond the reasonable control and without the fault or negligence of the City.

DRUG-FREE WORKPLACE: During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in

every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

SAFETY and OSHA STANDARDS: All parties performing services for the City shall comply with all Occupational Safety and Health Administration (OSHA), State Occupational Health Standards, and any other applicable rules and regulations. All parties shall be held responsible for the training, supervision, and safety of their employees. Any unsafe acts or hazardous conditions that may cause injury or damage to any persons or property within and around the work site areas under this contract shall be remedied per the regulatory agency's guidelines.

PERMITS AND FEES: All proposals submitted shall have included in price the cost of any business or professional licenses, permits or fees required by the City of Harrisonburg or the Commonwealth of Virginia. The offeror must have all necessary licenses to perform the services in Virginia and, if practicing as a corporation, be authorized to do business in the Commonwealth of VA.

COOPERATIVE PROCUREMENT: This procurement is being conducted on behalf of other public bodies, in accordance with 2.2-4304 (A) of the Code of VA. The successful bidder has the option to provide these same items (services), except architectural and engineering services, at the same prices, awarded as a result of this solicitation to any public body within the Commonwealth of Virginia. If any other Public body decides to use the final contract, the contractor(s) must deal directly with that public body concerning the placement of orders, issuance of the purchase orders, contractual disputes, invoicing and payment. Failure to extend a contract to any public body will have no effect on consideration of your bid.

STATE CORPORATION COMMISSION IDENTIFICATION NUMBER: Pursuant to Code of VA 2.2-4311.2 subsection B, a bidder or offeror organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 is required to include in its bid or proposal the identification number issued to it by the State Corporation Commission (SCC). Any bidder or offeror that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law is required to include in its bid or proposal a statement describing why the bidder or offeror is not required to be so authorized. Link to the SCC site is http://www.scc.virginia.gov.

This Page Intentionally Blank

SECTION 00115

Attachment _____

State Corporation Commission Form

<u>Virginia State Corporation Commission ("SCC") registration information</u>: The undersigned Offeror:

☐ is a corporation or other business entity with the following SCC identification number: _____ **-OR-**

☐ is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust **-OR-**

☐ is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the Offeror in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from bidder's out-of-state location) **-OR-**

☐ is an out-of-state business entity that is including with this bid an opinion of legal counsel which accurately and completely discloses the undersigned Offeror's current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the Code of Virginia.

****NOTE**** >> Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for proposals (the Commonwealth reserves the right to determine in its sole discretion whether to allow such waiver):

Signature: _____ Date: _____

Name: _____
Print

Title: _____

Name of Firm: _____

This page intentionally blank

SECTION 00120
CITY OF HARRISONBURG
INSURANCE REQUIREMENTS

1.) The contractor will maintain a general liability policy with $5,000,000 combined single limit or a $1,000,000 per occurrence with a $4,000,000 excess policy. Coverage is to be on an occurrence basis with an insurer licensed to conduct business in the Commonwealth of Virginia. The insurer must have an A. M. Best rating of A- or better. The insurer must list the member locality as an additional insured. The endorsement must be issued by the insurance company. A notation on the certificate of insurance is not sufficient.

2.) The contractor will maintain workers' compensation coverage in compliance with the laws of the Commonwealth of Virginia. The coverage must have statutory limits and be with an insurer licensed to conduct business in the Commonwealth of Virginia. The insurer must have an A. M. Best rating of A- or better. As an alternative, it is acceptable for the contractor to be insured by a group self-insurance association that is licensed by the Virginia Bureau of Insurance. The contractor will also carry employers liability insurance with a limit of at least $1,000,000 bodily injury by accident/$1,000,000 bodily injury by disease policy limit/$1,000,000 bodily injury by disease each employee.

3.) The contractor will maintain automobile liability insurance with limits of at least $1,000,000. The coverage is to be written with a symbol "1". The insurer must be licensed to conduct business in the Commonwealth of Virginia. The insurer must have an A. M. Best rating of A- or better.

4.) The contractor will maintain a surety bond in an amount not less than the total amount payable to the contractor for the terms of this contract. The bond will be issued by a company licensed to issue surety bonds in the Commonwealth of Virginia and has an A. M, Best rating of A- or better.

With all policies listed above, the insurer or agent of the insurer must issue a certificate of insurance to show evidence of coverage and proved a copy of the actual endorsement.

This page intentionally blank

SECTION 00300
BID FORM

PROJECT: Ramblewood Park Improvements – Phase 1

THIS BID IS SUBMITTED TO: City of Harrisonburg, Public Works Department
320 East Mosby Road
Harrisonburg, Virginia 22801

THIS BID IS SUBMITTED BY: _____(Company Name)

_____(Address)

_____(City, State Zip Code)

_____(Phone Number)

1 The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2 BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This BID will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that BIDDER may agree to in writing upon request of OWNER.

3 In submitting this BID, BIDDER represents, as more fully set forth in the Agreement, that:

a) BIDDER has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

ADDENDUM NO.	DATE
_____	_____
_____	_____
_____	_____
_____	_____

(receipt of all of which is hereby acknowledged) and also copies of the Advertisement or Invitation to Bid and the Instructions of Bidders;

b) BIDDER has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

c) BIDDER is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work;

d) BIDDER has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site;

e) BIDDER has considered the information known to BIDDER; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

f) Based on the information and observations referred to in Paragraph 3.01.E above, BIDDER does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this BID for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

g) BIDDER is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

h) BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.

i) The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this BID is submitted.

4 BIDDER certifies that:

a) This BID is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

b) Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

c) Bidder has not solicited or induced any individual or entity to refrain from bidding; and

d) Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

i. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

ii. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of OWNER, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive OWNER of the benefits of free and open competition;

iii. "collusive practice" means a scheme or arrangement between two or more BIDDERS, with or without the knowledge of OWNER, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

iv. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

5 BIDDER will complete the Work for the following price. Subtotal costs must add up to the Base Bid.

RAMBLEWOOD PARK IMPROVEMENTS – PHASE 1

BID FORM

Item No.	Item	Description	Quantity (incl. units)	Unit Cost	Total Amount
1	Mobilization	Mobilization of all labor, equipment, and materials provided by BIDDER necessary to complete the Scope of Work.	1	Lump sum	
2	On-Site Fill Material Placement and Compaction	Work includes hauling from on-site stockpiles, placement, and compaction of fill to achieve the lines and grades shown on the drawings.	25,000 cubic yards (estimated quantity)	_____ per cy	
3	Off-Site Fill Material Hauling, Placement, and Compaction	Work includes hauling from off-site stockpiles, placement, and compaction of fill to achieve the lines and grades shown on the drawings.	140,000 cubic yards – estimated quantity, final determination from aerial surveys	_____ per cy	
4	On-Site Topsoil Material Placement and Compaction	Work includes hauling from off-site stockpiles and, placement of topsoil to achieve the lines and grades shown on the drawings.	36,000 cubic yards (estimate quantity)	_____ per cy	

Item No.	Item	Description	Quantity (incl. units)	Unit Cost	Total Amount
5	Off-Site Topsoil Material Hauling, Placement, and Compaction	Work includes hauling from on-site stockpiles and placement of topsoil to achieve the lines and grades shown on the drawings.	6,600 cubic yards estimated quantity, final determination from aerial	_____ per cy	
6	Erosion and Sediment Control Measures	Construction and installation of erosion and sediment control items as indicated on the drawings including but not limited to basin improvements, piping, diversions, and E&S measures. .	1	Lump sum	
7	40 Mil Cap and Geocomposite Drainage Layer	Supply and installation of the textured, 40-mil. LLDPE cap and the geocomposite drainage layer in accordance with project specifications. Includes but not limited to boots/penetrations, QC testing, and ancillary items.	1	Lump sum	
8	Gas Venting Trenches, Gas Vents, and Perimeter Toe Drain	Construction and installation of gas trenches, gas vents, and perimeter toe drains as shown on the project drawings including but not limited to grading, piping, stone, and ancillary items.	1	Lump sum	
9	Site Improvement Items	Construction and installation of all site improvement items not listed above as shown on the project drawings or described in the project specifications.	1	Lump sum	
10	Off-Site Construction Road Stabilization	Road maintenance associated with off-site stock piles per VESCH Standard & Spec 3.03, Construction Road Stabilization	200 tons	_____ per ton	
11	Finish grade, seed and mulch off site stock piles areas	Smooth grade disturbed areas, apply permanent seeding and mulching per project specifications	5 acres	_____ per acre	
	TOTAL BASE BID	Includes all subtotal costs which will form the BASE BID below.			

Note: This Bid includes only the items needed to achieve the Phase 1 conditions as shown on the approved construction drawings. Phase 2 is not funded at this time and is shown only for future reference.

6. (a) BIDDER agrees that the Work will be substantially complete and will be completed and ready for final payment on or before the dates or within the number of calendar days indicated in Section 4.02 of the Agreement.

(b) BIDDER accepts the provisions of Section 4.03 of the Agreement as to liquidated damages.

7. The following documents are attached to and made a condition of this Bid:

a) Required Bid Security;
b) List of Proposed Subcontractors;
c) List of Proposed Suppliers;
d) List of Project References;
e) Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
f) Contractor's License No.: _____;
g) Required Bidders Qualification Statement with supporting data. Note: Sensitive information regarding finances etc. may be submitted in envelope, marked confidential. Envelope will only be opened if Bidder is low or second low responsible Bidder. Otherwise it will be returned or destroyed unopened;
h) Signed cover sheet;
i) State Corporation Commission Form.

8. Bidder accepts the provisions of the Agreement as to progress payments.

9. Communications concerning this BID shall be addressed to:

Mr. Tom Hartman,

320 E. Mosby Road,

Harrisonburg, VA 22801

Tom.Hartman@harrisonburgva.gov
540-434-5928

10. The terms used in this BID with initial capital letters have the meanings stated in the Instructions to Bidders, the General Terms and Conditions for the City of Harrisonburg, the EJCDC General Conditions, and the Supplementary Conditions.

SUBMITTED on _____, 2013.

Virginia Contractor License Number _____

State Corporation Commission Identification Number _____

By _____
(Name of Corporation, Partnership, or Individual)

doing business as _____
(Insert "a corporation", "a partnership", or "an individual")

_____
(Signature)

_____
(Name of Person Authorized to Sign)

_____
(Title)

Business Address:_____

_____

_____

(SEAL)

Attest (if corporation)_____
(Secretary)

SECTION 00310
BIDDER'S QUALIFICATION STATEMENT

1. Name of Contractor _____

2. Years in Business _____

3. List three (3) recent projects of this nature that you have completed and give the name, address and telephone number of a reference from each. For each project include the acreage of the project. Also give the completed cost of each project listed. Additional information can be attached to this statement if insufficient room exists below.

   a. _____

   _____

   _____

   b) _____

   _____

   _____

   c) _____

   _____

   _____

4. Have you ever failed to complete work awarded to you? If so, state where and why.

   _____

   _____

   _____

5. Do you plan to subcontract any part of this work? If so, give details. List the company name, address, specialty and years of experience.

   _____

   _____

   _____

6. Have you ever performed similar work under the direction of a Consulting Engineer or Registered Architect? If so, list three such firms, giving the name of the firm, its address,

telephone number and the name of the project. List your most recent projects including acreage.

a. _____

_____

_____

b) _____

_____

_____

c) _____

_____

_____

7. List three material suppliers, including an individual's name and telephone number.

a. _____

b) _____

c) _____

8. List bank references. Include an individual's name and telephone number.

_____

_____

_____

9. Bonding reference, name, address, and telephone.

_____

10. Are you on any list of debarred contractors maintained by the U.S. Department of Labor, the U.S. Department of Housing and Urban Development or the Virginia Department of Transportation?

Yes _____ No _____

11. The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by Draper Aden Associates in verification of the recitals comprising this statement of contractor's qualifications.

12. State the true, exact, correct and complete name of the partnership, corporation or trade name under which you do business, and the address of the place of business. (If a corporation, state the name of the President and Secretary. If a partnership, state the names of all partners. If a trade name, state the names of the individuals who do business under the trade name.) It is absolutely necessary that this information be furnished.

_____

Correct Name of Bidder

a) The Business is a _____

b) The address of principal place of business is:

_____

c) Phone number _____

d) The name of the corporate officers, or partners, or individuals doing business under a trade name, are as follows:

_____

_____

13. Dated at _____ this __

Day of _____, 20_____.

_____

_____

By _____

Attest _____

This page intentionally blank

SECTION 00430
BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):
City of Harrisonburg
ATTN: James Baker
Harrisonburg Public Works Department
320 East Mosby Road
Harrisonburg, Virginia 22801

BID
Bid Due Date: _____, 2013
Project: Ramblewood Park Improvements – Phase 1
Ramblewood Road
Harrisonburg, VA 22801

BOND
Bond Number:
Date (Not later than Bid due date):
Penal sum _____ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

   3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

   3.2 All Bids are rejected by Owner, or

   3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Notice of Award

Date: _____

Project: Ramblewood Park Improvements – Phase 1	
Owner: City of Harrisonburg	Owner's Contract No.:
Contract: Ramblewood Park Improvements- Phase 1	Engineer's Project No.:
Bidder:	
Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*	

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for Ramblewood Park Improvements - Phase 1

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars ($_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within 15 days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph 17.08 and 17.09).
3. Other conditions precedent:

   _____

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

_____
Owner

By:_____
Authorized Signature

_____
Title

Copy to Engineer

This page intentionally blank

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT

THIS AGREEMENT is by and between The City of Harrisonburg ("Owner") and

_____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Ramblewood Park Improvements - Phase 1

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Ramblewood Park – Improvements

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Draper Aden Associates (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Substantial Completion and Final Payment*

A. Work will be considered substantially complete upon the seeding of the ball fields, scheduled for April 30, 2014. The scheduled date for final project completion is August 31, 2014.

4.03 *Liquidated Damages*

For each calendar day that any work remains incomplete after the contract time limit specified for the completion of the work, the Owner will assess liquidated damages against the Contractor. Liquidated damages will be assessed at the rate applicable to the Contract in accordance with the Schedule of Liquidated Damages, Table I-1, or as otherwise specified in the contract provisions. Liquidated damages will be deducted from any monies due the Contractor for each calendar day of additional time consumed until final completion and acceptance of the work, not as a penalty, but as liquidated damages. The Contractor waives any defense as to the validity of any liquidated damages stated in the Contract, the Contract Documents, or these Specifications and assessed by the Owner against the Contractor on the grounds that such liquidated damages are void as penalties or are not reasonably related to actual damages. The following Schedule of Liquidated Damages, representing the cost of administration, engineering, supervision, inspection and other expenses, will be charged against the Contractor for each calendar day beyond the fixed contract time that the Contract remains in an incomplete state:

TABLE I-1

Schedule of Liquidated Damages

Original Contract Amount in Dollars	Daily Charge in Dollars
0 – 500,000.00	350
500,000.01 – 2,000,000.00	600
2,000,000.01-8,000,000.00	1,350
8,000,000.01- 15,000,000.00	2,500

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

15,000,000.01- Plus 3,100

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work, a lump sum of:

_____
(words)
($_____)
(numerals)

All specific cash allowances are included in the above price in accordance with Paragraph 11.02 of the General Conditions.

B. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02; and

a. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 0.00_____ percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site.

E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 5, inclusive).

2. Performance bond.

3. Payment bond.

4. Notice of Award

5. General Conditions (pages 1 to 42, inclusive).

6. Supplementary Conditions (pages 1 to 5, inclusive).

7. Specifications as listed in the table of contents of the Project Manual bearing the title: Ramblewood Park Improvements - Phase 1.

8. Drawings consisting of 27 sheets with each sheet bearing the following general title: Ramblewood Park Improvements - Phase 1.

9. Signed Addenda (numbers _____ to _____, inclusive).

10. Signed Cover Sheet

11. State Corporation Commission Form

12. Exhibits to this Agreement (enumerated as follows):

a. Contractor's Bid.

b. Bidder's Qualification Statement

c. Documentation submitted by Contractor prior to Notice of Award (pages _____ to _____, inclusive).

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

13. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

    a. Notice to Proceed.

    b. Work Change Directives.

    c. Change Orders.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

    1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;

    2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

    3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

    4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

10.06 *Other Provisions*

NONE

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER:

_____

By: _____

Title: _____

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

CONTRACTOR

_____

By: _____

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

License No.: _____

(Where applicable)

Agent for service of process:

_____

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

This page intentionally blank

Notice to Proceed

Date: _____

Project: Ramblewood Park Improvements - Phase 1	
Owner: City of Harrisonburg	Owner's Contract No.:
Contract: Ramblewood Park Improvements - Phase 1	Engineer's Project No.:
Contractor:	
Contractor's Address: *[send Certified Mail, Return Receipt Requested]*	

You are notified that the Contract Times under the above Contract will commence to run on_____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is_____, and the date of readiness for final payment is _____ [(or) the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ *[add other requirements]*.

City of Harrisonburg

_____
Owner

Given by:

_____
Authorized Signature

_____
Title

_____
Date

Copy to Engineer

This page intentionally blank

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER :
City of Harrisonburg, Department of Public Works
320 East Mosby Road
Harrisonburg, Virginia 22801,

CONTRACT
Effective Date of Agreement:
Amount:
Description (*Name and Location)*:
Ramblewood Park Improvements - Phase 1

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

_____ (Seal)
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature (Attach Power of Attorney)

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.

2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and

2.3 Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract; or
2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.

3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:

3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or

3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
2. Deny liability in whole or in part and notify Owner citing reasons therefor.

4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;

5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and

5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.

11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other party*):

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER :
City of Harrisonburg, Department of Public Works
320 East Mosby Road
Harrisonburg, Virginia

CONTRACT
Effective Date of
Agreement:
Amount:
Description *(Name and Location)*:
Ramblewood Park Improvements - Phase 1

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond
Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ (Seal)	_____ (Seal)
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to Owner, this obligation shall be null and void if Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.

6. Reserved.

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

15.4

FOR INFORMATION ONLY – (*Name, Address and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other party*):

APPLICATION FOR PAYMENT NO. _____

To: City of Harrisonburg (OWNER)
From: _____ (CONTRACTOR)
Contract: Ramblewood Park Improvements - Phase 1
Project: Ramblewood Park Improvements - Phase 1
OWNER's Contract No. _____ ENGINEER's Project No. _____
For Work accomplished through the date of _____

1.	Original Contract Price:		$
2.	Net change by Change Orders and Written Amendments (+ or -)		$
3.	Current Contact Price (1 plus 2)		$
4.	Total completed and stored to date		$
5.	Retainage (per Agreement):		
	____% of completed Work:	$	
	____% of stored material:	$	
	Total Retainage:		$
6.	Total completed and stored to date less retainage (4 minus 5)		$
7.	Less previous Application for Payments:		$
8.	**DUE THIS APPLICATION (6 MINUS 7):**		$

Accompanying Documentation:

CONTRACTOR'S Certification:

The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by prior Applications for Payment numbered 1 through ____ inclusive; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not defective.

Dated _____ _____
CONTRACTOR
By: _____

State of _____
City of _____
Subscribed and sworn to before me this _____
day of _____
Notary Public
My Commission expires: _____

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated _____ _____
ENGINEER
By: _____

Dated _____ _____
OWNER
By: _____

Dated _____ _____
FIELD REPRESENTATIVE
By: _____

APPLICATION FOR PAYMENT

INSTRUCTIONS

A. GENERAL INFORMATION

The sample for of Schedule of Values is intended as a guide only. Many projects require a more extensive from with space for numerous items, descriptions of Change Orders, identification of variable quantity adjustments, summary of materials and equipment stored at the site and other information. It is expected that a separate form will be developed by ENGINEER and Contractor at the time contractor's Schedule of Values if finalized. Note also that the format for retainage must be changed if the Contract permits (or the law provides), and the Contractor elects to deposit securities in lieu of retainage. Refer to Article 14 of the EJCDC General Conditions for provisions concerning payments to the Contractor.

B. COMPLETING THE FORM

The Schedule of Values, submitted and approved as provided in paragraphs 2.05.A.3 and 2.07 of the EJCDC General Conditions should be reproduced as appropriate in the space indicated on the Application for Payment form. Note that the cost of materials and equipment is often listed separately from the cost of installation. Also, note that each Unit Price is deemed to included Contractor's overhead and profit.

All Change Orders affecting the Contract Price should be identified and included in the Schedule of Values as required for progress payments.

The form is suitable for use in the Final Application for Payment as well as for Progress Payments; however, the required accompanying documentation is usually more extensive for final payment. All accompanying documentation should be identified in the space provided on the form.

C. LEGAL REVIEW

All accompanying documentation of a legal nature, such a Lien waivers, should be reviewed by an attorney, and ENGINEER should so advise Owner.

Application No.: _____ Date: _____

ITEM	UNIT PRICE	ESTIMATED QUANTITY	SCHEDULE OF VALUES AMOUNT	QUANTITY COMPLETED	AMOUNT	%	MATERIAL STORED	AMOUNT COMPLETED AND STORED
1.	$		$		$		$	$
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								
29.								
30.								
TOTAL								

This Page Intentionally Blank

RECOMMENDATION OF PAYMENT

No. _____

PROJECT: Ramblewood Park Improvements - Phase 1 PROJECT NO._____

CONTRACTOR: _____

Application Date: _____ Application Amount: _____

For Period _____, 20____ to _____, 20____

To City of Harrisonburg
OWNER

Attached hereto is the CONTRACTOR's Application for Payment for Work accomplished under the Contract through the date indicated above. In accordance with the Contract the undersigned recommends payment to the CONTRACTOR IN the amount due as shown below.

ENGINEER

Dated _____, 20_____ By _____

STATEMENT OF WORK

Original Contract Price	$_____	Work to Date	$_____
Net Change Orders	$_____	Amount Retained	$_____
Current Contract Price	$_____	Subtotal	$_____
		Previous Payments Recommended	$_____
		Amount Due This Payment	$_____

cc: Contractor
Owner
File

This page intentionally blank

Certificate of Substantial Completion

Project: Ramblewood Park Improvements - Phase 1

Owner: City of Harrisonburg	Owner's Contract No.:
Contract:	Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

☐ All Work under the Contract Documents: ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer — Date

Accepted by Contractor — Date

Accepted by Owner — Date

This page intentionally blank

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project: Ramblewood Park Improvements - Phase 1	Owner: City of Harrisonburg	Owner's Contract No.:
Contract: Ramblewood Park Improvements - Phase 1		Date of Contract:
Contractor:		Engineer's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

_____

_____

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

☐ Nonagreement on pricing of proposed change.

☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price $ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

This page intentionally blank

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project: Ramblewood Park Improvements - Phase 1	Owner: City of Harrisonburg	Owner's Contract No.:
Contract: Ramblewood Park Improvements - Phase 1		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price:	Original Contract Times: ☐ Working days ☐ Calendar
$_____	Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:
$_____	Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order:	Contract Times prior to this Change Order:
$_____	Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order:	[Increase] [Decrease] of this Change Order:
$_____	Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order:	Contract Times with all approved Change Orders:
$_____	Substantial completion (days or date): _____ Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____

Change Order
Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

ENGINEER normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once ENGINEER has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. ENGINEER should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by

CONSTRUCTION SPECIFICATIONS INSTITUTE

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

Copyright © 2007 National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

The copyright for this EJCDC document is owned jointly by the four
EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page

Article 1 – Definitions and Terminology 1
1.01 Defined Terms 1
1.02 Terminology 5

Article 2 – Preliminary Matters 6
2.01 Delivery of Bonds and Evidence of Insurance 6
2.02 Copies of Documents 6
2.03 Commencement of Contract Times; Notice to Proceed 6
2.04 Starting the Work 6
2.05 Before Starting Construction 7
2.06 Preconstruction Conference; Designation of Authorized Representatives 7
2.07 Initial Acceptance of Schedules 7

Article 3 – Contract Documents: Intent, Amending, Reuse 8
3.01 Intent 8
3.02 Reference Standards 8
3.03 Reporting and Resolving Discrepancies 8
3.04 Amending and Supplementing Contract Documents 9
3.05 Reuse of Documents 9
3.06 Electronic Data 10

Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points 10
4.01 Availability of Lands 10
4.02 Subsurface and Physical Conditions 11
4.03 Differing Subsurface or Physical Conditions 11
4.04 Underground Facilities 13
4.05 Reference Points 14
4.06 Hazardous Environmental Condition at Site 14

Article 5 – Bonds and Insurance 16
5.01 Performance, Payment, and Other Bonds 16
5.02 Licensed Sureties and Insurers 16
5.03 Certificates of Insurance 16
5.04 Contractor's Insurance 17
5.05 Owner's Liability Insurance 18
5.06 Property Insurance 18
5.07 Waiver of Rights 20
5.08 Receipt and Application of Insurance Proceeds 21
5.09 Acceptance of Bonds and Insurance; Option to Replace 21
5.10 Partial Utilization, Acknowledgment of Property Insurer 21

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

Article 6 – Contractor's Responsibilities 22
6.01 Supervision and Superintendence 22
6.02 Labor; Working Hours 22
6.03 Services, Materials, and Equipment 22
6.04 Progress Schedule 23
6.05 Substitutes and "Or-Equals" 23
6.06 Concerning Subcontractors, Suppliers, and Others 25
6.07 Patent Fees and Royalties 27
6.08 Permits 27
6.09 Laws and Regulations 27
6.10 Taxes 28
6.11 Use of Site and Other Areas 28
6.12 Record Documents 29
6.13 Safety and Protection 29
6.14 Safety Representative 30
6.15 Hazard Communication Programs 30
6.16 Emergencies 30
6.17 Shop Drawings and Samples 31
6.18 Continuing the Work 32
6.19 Contractor's General Warranty and Guarantee 33
6.20 Indemnification 33
6.21 Delegation of Professional Design Services 34

Article 7 – Other Work at the Site 35
7.01 Related Work at Site 35
7.02 Coordination 35
7.03 Legal Relationships 36

Article 8 – Owner's Responsibilities 36
8.01 Communications to Contractor 36
8.02 Replacement of Engineer 36
8.03 Furnish Data 36
8.04 Pay When Due 36
8.05 Lands and Easements; Reports and Tests 36
8.06 Insurance 36
8.07 Change Orders 37
8.08 Inspections, Tests, and Approvals 37
8.09 Limitations on Owner's Responsibilities 37
8.10 Undisclosed Hazardous Environmental Condition 37
8.11 Evidence of Financial Arrangements 37
8.12 Compliance with Safety Program 37

Article 9 – Engineer's Status During Construction 37
9.01 Owner's Representative 37
9.02 Visits to Site 37
9.03 Project Representative 38
9.04 Authorized Variations in Work 38
9.05 Rejecting Defective Work 38
9.06 Shop Drawings, Change Orders and Payments 38
9.07 Determinations for Unit Price Work 39

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

9.08 Decisions on Requirements of Contract Documents and Acceptability of Work 39
9.09 Limitations on Engineer's Authority and Responsibilities 39
9.10 Compliance with Safety Program 40

Article 10 – Changes in the Work; Claims 40
10.01 Authorized Changes in the Work 40
10.02 Unauthorized Changes in the Work 40
10.03 Execution of Change Orders 41
10.04 Notification to Surety 41
10.05 Claims 41

Article 11 – Cost of the Work; Allowances; Unit Price Work 42
11.01 Cost of the Work 42
11.02 Allowances 45
11.03 Unit Price Work 45

Article 12 – Change of Contract Price; Change of Contract Times 46
12.01 Change of Contract Price 46
12.02 Change of Contract Times 47
12.03 Delays 47

Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work 48
13.01 Notice of Defects 48
13.02 Access to Work 48
13.03 Tests and Inspections 48
13.04 Uncovering Work 49
13.05 Owner May Stop the Work 49
13.06 Correction or Removal of Defective Work 50
13.07 Correction Period 50
13.08 Acceptance of Defective Work 51
13.09 Owner May Correct Defective Work 51

Article 14 – Payments to Contractor and Completion 52
14.01 Schedule of Values 52
14.02 Progress Payments 52
14.03 Contractor's Warranty of Title 55
14.04 Substantial Completion 55
14.05 Partial Utilization 55
14.06 Final Inspection 56
14.07 Final Payment 56
14.08 Final Completion Delayed 57
14.09 Waiver of Claims 58

Article 15 – Suspension of Work and Termination 58
15.01 Owner May Suspend Work 58
15.02 Owner May Terminate for Cause 58
15.03 Owner May Terminate For Convenience 59
15.04 Contractor May Stop Work or Terminate 60

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

Article 16 – Dispute Resolution 60
16.01 Methods and Procedures 60

Article 17 – Miscellaneous 61
17.01 Giving Notice 61
17.02 Computation of Times 61
17.03 Cumulative Remedies 61
17.04 Survival of Obligations 61
17.05 Controlling Law 61
17.06 Headings 62

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*—The individual or entity named as such in the Agreement.

20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*—Sections of Division 1 of the Specifications.

22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*—Polychlorinated biphenyls.

31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to five ~~ten~~ printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction. ***(See Supplementary Conditions)***

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. ~~In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.~~ ***(See Supplementary Conditions)***

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer **(and Owner)** any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby. ***(See Supplementary Conditions)***

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

   a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

   b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. ~~Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction~~

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

~~lien against such lands in accordance with applicable Laws and Regulations.~~ ***(See Supplementary Conditions)***

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

then Contractor shall, promptly **(and in any case within seven (7) days)** after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so. ***(See Supplementary Conditions)***

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew **(or reasonably should have known)** of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or ***(See Supplementary Conditions)***

   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

   a. reviewing and checking all such information and data;

   b. locating all Underground Facilities shown or indicated in the Contract Documents;

   c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

   d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. ~~To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.~~ ***(See Supplementary Conditions)***

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver actual endorsement from insurance company listing Owner as additional insured to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members,

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations coverage:

   a. Such insurance shall remain in effect for two years after final payment.

   b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

~~A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:~~

~~1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;~~

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

~~2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.~~

~~3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);~~

~~4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;~~

~~5. allow for partial utilization of the Work by Owner;~~

~~6. include testing and startup; and~~

7. ~~be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.~~ ***(See Supplementary Conditions)***

B. Owner ~~shall~~ **(may)** purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner. ~~, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.~~ ***(See Supplementary Conditions)***

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. ~~Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~ ***(See Supplementary Conditions)***

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights* ***(See Supplementary Conditions)***

~~A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.~~

~~B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:~~

~~1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and~~

~~2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.~~

C. ~~Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.~~

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

5.08 *Receipt and Application of Insurance Proceeds* ***(See Supplementary Conditions)***

~~A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.~~

~~B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.~~

5.09 *Acceptance of Bonds and Insurance; Option to Replace* ***(See Supplementary Conditions)***

~~A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.~~

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and

3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

2. *Substitute Items:* ***(See Supplementary Conditions)***

   a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

   b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

   c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

   d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

      1) shall certify that the proposed substitute item will:

         a) perform adequately the functions and achieve the results called for by the general design,

         b) be similar in substance to that specified, and

         c) be suited to the same use as that specified;

      2) will state:

         a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

         b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

         c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

      3) will identify:

         a) all variations of the proposed substitute item from that specified, and

         b) available engineering, sales, maintenance, repair, and replacement services; and

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. ~~Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.~~ ***(See Supplementary Conditions)***

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

D. ***(See Supplementary Conditions)***

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

B. ***(See Supplementary Conditions)***

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer **(and Owner)** in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work. ***(See Supplementary Conditions)***

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner ~~shall~~ **(may)** issue all communications to Contractor through Engineer. ***(See Supplementary Conditions)***

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer ~~to whom Contractor makes no reasonable objection~~, whose status under the Contract Documents shall be that of the former Engineer. ***(See Supplementary Conditions)***

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements* ***(See Supplementary Conditions)***

~~A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.~~

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on ~~Owner and also on~~ Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05. ***(See Supplementary Conditions)***

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

10.03 *Execution of Change Orders*

A. ~~Owner and~~ Contractor shall execute appropriate Change Orders recommended by Engineer covering: ***(See Supplementary Conditions)***

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims* ***(See Supplementary Conditions)***

~~A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.~~

~~B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).~~

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

~~C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:~~

~~1. deny the Claim in whole or in part;~~

~~2. approve the Claim; or~~

~~3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.~~

~~D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.~~

~~E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.~~

~~F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.~~

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized **(in writing)** by Owner. ***(See Supplementary Conditions)***

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor,

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

    a. the Work has progressed to the point indicated;

    b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

    c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

    a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

    b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work, or

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

    d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or,

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents,

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages **(in accordance with Section 4.03 of the Agreement)**, will become due and will be paid by Owner to Contractor. ***(see Supplementary Conditions)***

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION *(SEE SUPPLEMENTARY CONDITIONS)*

~~16.01 *Methods and Procedures*~~

~~A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.~~

~~B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.~~

~~C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:~~

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

~~1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or~~

~~2. agrees with the other party to submit the Claim to another dispute resolution process; or~~

~~3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.~~

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

B. ***(See Supplementary Conditions)***

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

17.07 through 17.17 - ***See Supplementary Conditions***

Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

SUPPLEMENTARY CONDITIONS
GENERAL ADDENDUM
TO STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT
(EJCDC, 2007 EDITION)

This document amends EJCDC No. C-700 and paragraphs are numbered to correspond with EJCDC No. C-700.

2.02. Substitute "five" for "ten" in the first line.

2.03. Delete the final sentence.

3.03.A.1. Add "and OWNER" after "ENGINEER" in line five.

4.01.B. Delete the entire paragraph.

4.03.A.4. Add "and in any case within seven (7) days," after "promptly" in the first line of the separate paragraph following subsection 4.03.A.4.

4.03.C.2.a. Add "or reasonably should have known," after "knew" in line one.

4.06.G. Delete this paragraph in its entirety.

5.06.A. Delete this paragraph and its subparagraphs entirely and replace them with the following:

CONTRACTOR shall purchase and maintain until final payment property insurance upon the Work at the site to the full insurable value thereof (subject to deductible amounts as may be provided in these Supplementary Conditions or required by Laws or Regulations).

This insurance shall include the interests of OWNER (who shall be listed as insured or additional insured party) shall insure against the perils of fire and extended coverage, shall include "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and such other perils as may be provided in these contract documents, and shall include damages, losses or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals.). If not covered under the "all risk" insurance or otherwise provided in these contract documents, CONTRACTOR shall purchase and maintain similar insurance coverage on portions of the Work stored on and off site or in transit when such portions of the Work are to be included in an Application for payment. The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph shall comply with the requirements of paragraph 17.14 as amended. Request actual endorsement listing City as Additional Insured.

Should CONTRACTOR cause damage to the work or property of any separate Contractor at the site, or should any claim arising out of CONTRACTOR'S performance of the work at the site be made by any separate Contractor against CONTRACTOR, OWNER, ENGINEER, the Construction Coordinator or any other person, CONTRACTOR shall promptly attempt to settle with other Contractor by agreement, or to otherwise resolve the dispute. CONTRACTOR shall indemnify and hold OWNER harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professional and court and arbitration costs) arising directly, indirectly or consequently out of any action, legal or equitable, brought by any separate Contractor against OWNER to the extend based on a claim arising out the CONTRACTOR'S performance of the work. Should a separate Contractor cause damage to the Work or property of CONTRACTOR or should the performance of work by any separate Contractor at the site give rise to any other claim, CONTRACTOR shall not institute any action, legal or equitable, against OWNER or permit any action against them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from OWNER on account of any such damage or claim. If CONTRACTOR is delayed at any time in performing or furnishing Work by any act or neglect of a separate Contractor and OWNER and CONTRACTOR are unable to agree as to the extent of any adjustment in Contract Time attributable thereto, CONTRACTOR may make a claim for an extension of time in accordance with Article 12. An extension of the Contract Time shall be CONTRACTOR'S exclusive remedy with respect to OWNER for any delay, disruption, interference or hindrance caused by any separate Contractor.

5.06.B. Change "shall" to "may" in line one, change the comma after OWNER" in line three to a period, and delete the remainder of the paragraph.

5.06.D. Delete this paragraph in its entirety.

5.07 Delete this paragraph and all subparagraphs entirely.

5.08.A. Delete this paragraph in its entirety.

5.08.B. Delete this paragraph in its entirety.

5.09.A. Delete this paragraph in its entirety.

6.05.A.2 ENGINEER will review substitute items submitted by CONTRACTOR. ENGINEER will provide recommendations to OWNER for acceptance or rejection of substitute items.

6.06.G. Delete the entire paragraph after the first sentence.

6.08.B. Add the following as 6.08.B:

The owner will provide the CONTRACTOR with the initial Stormwater Pollution Prevention Plan (SWPPP). Changes to the SWPPP during construction for the

benefit or use by the CONTRACTOR shall be made by the CONTRACTOR at is expense. Off-site borrow area SWPPP's shall be the responsibility of the CONTRACTOR.

6.09.D. Add the following paragraph as 6.09.D.:

"CONTRACTOR shall at all times permit immediate inspection of the site by Federal, state and local inspectors and/or regulators."

7.01.C. Add "and OWNER" after "ENGINEER" in line three.

8.01.A. Change "shall" in line one to "may".

8.02.A. Delete "to whom CONTRACTOR makes no reasonable objection" in lines one and two.

8.11. Delete this paragraph in its entirety.

9.04.A. Delete "OWNER and also on" from line five.

10.03. Delete "OWNER and" in the first line.

10.05. Delete this paragraph and its subparagraphs in their entirety and replace with the following:

Contractual claims, whether for money or other relief, shall be submitted by the CONTRACTOR in writing no later than sixty days after final payment; however, written notice of the CONTRACTOR'S intention to file such claim shall have been given at the time of the occurrence or beginning of the work upon which the claim is based. The CITY shall consider the claim, and shall make a written determination as to the claim within forty-five days after receipt of the claim. Such decision shall be final and conclusive unless the CONTRACTOR appeals within six months of the date of the final decision by instituting legal action as provided in Section 2.2-4300 of the Code of Virginia.

11.01.A.1. Insert "in writing" between "authorized" and "by" in the last line.

14.07.C.1. Insert "in accordance with section 4.03 of the Agreement" between "damages" and "," in the last line.

Article 16 Delete this Article entirely.

Add the following sections and subsections to Article 17:

17.01.B. Anytime CONTRACTOR is required to give notice to ENGINEER, CONTRACTOR shall provide simultaneous notice to OWNER.

17.07. Should any addendum paragraph(s) stand in conflict with any paragraph(s) of the captioned documents, the addendum paragraph(s) shall govern.

17.08. If the value of this contract exceeds one hundred thousand dollars ($100,000.00), the CONTRACTOR shall obtain and file with the OWNER prior to commencing work, a performance bond in the sum of the contract amount, payable to the OWNER, executed by one or more surety company legally authorized to do business in Virginia, conditioned upon the faithful performance of the contract in strict conformity with the Contract Drawings, specifications and conditions of the contract.

17.09. The CONTRACTOR shall obtain and file with the OWNER prior to commencing work, a payment bond in the sum of the contract amount, payable to the OWNER, executed by one or more surety company legally authorized to do business in Virginia, conditioned upon the prompt payment for all material furnished and labor supplied or performed in the prosecution of the work.

17.10. Any legal action brought by either party to this Contract shall be subject to the exclusive jurisdiction and venue of the Courts of the City of Harrisonburg, Virginia.

17.11. During the performance of the Contract, the CONTRACTOR agrees as follows:

A. The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the CONTRACTOR. The CONTRACTOR agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

B. The CONTRACTOR, in all solicitations or advertisements for employees placed by or on behalf of the CONTRACTOR, will state that such CONTRACTOR is an equal opportunity employer.

C. Notices, advertisements, and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this Section.

The CONTRACTOR will include the provisions of the foregoing Paragraphs A., B., and C. in every Subcontract or Purchase Order of over $10,000.00, so that the provisions will be binding upon each Subcontractor or vendor.

17.12. Notwithstanding any other provision of this Contract to the contrary, the CONTRACTOR shall not be entitled to any compensation for damages or for a claim for an increase in the term of the contract or Contract Sum or to reimbursement for any losses on account of an unreasonable delay in his performance of the Work, unless the OWNER is the cause of said unreasonable delay, and in such event only to the extent of the unreasonable delay caused by the OWNER.

17.13. CONTRACTOR shall obtain a City of Harrisonburg business license as required by law.

17.14. CONTRACTOR shall comply with the state licensing requirements of Section 54.1-1100 et. seq. of the Code of Virginia, as amended.

17.15. Insurance:

17.15.A. The insurance policies specified herein shall be with an insurance company acceptable to the parties hereto and authorized to transact business in the Commonwealth of Virginia. Certificates of insurance shall be submitted to the OWNER at the execution of the Agreement. The CONTRACTOR'S certificate of insurance shall list the City of Harrisonburg, Virginia as additional insured. Request actual endorsement listing City as additional insured.

17.15.B. Insurance Schedule: The CONTRACTOR shall carry public liability insurance in amounts not less than those specified in the below, including the contractual liability assumed by the CONTRACTOR, and shall deliver certificates of insurance from carriers acceptable to the OWNER specifying such limits, with the City of Harrisonburg, Virginia named as an additional insured.

17.16. If the CONTRACTOR knows, or should have known, that an ambiguity, discrepancy, error, omission or conflicting statement exists in the Bidding or Contract Documents, said CONTRACTOR has an obligation to seek a clarification thereof from the OWNER prior to Bid and/or prior to executing the contract documents. The OWNER will welcome such a clarification request, and, if deemed necessary by the OWNER, the OWNER will issue a written addendum clarifying the matter in question. Should the CONTRACTOR fail to seek such a clarification prior to Bid and/or contract signing, CONTRACTOR thereby waives, and agrees to indemnify and hold the OWNER harmless from any claim, suit or cause of action arising out of or related to such ambiguity, discrepancy, error, omission or conflicting statement which the CONTRACTOR knew or should have known existed at the time of Bid and/or contract.

17.17. If action or inaction by the OWNER causes an unreasonable delay in the CONTRACTOR'S performance, the CONTRACTOR shall notify the OWNER in writing within seven days of the delay and of the circumstances involved. Failure to so notify the OWNER shall constitute a waiver by the CONTRACTOR of any and all claims related to the unreasonable delay.

END OF SECTION

This page intentionally blank

TECHNICAL SPECIFICATIONS

INDEX OF SPECIFICATIONS

Section 01000	General Construction Standards
Section 01020	Measurement and Payment
Section 01050	Licenses and Permits
Section 01060	Regulatory Requirements
Section 01070	Lines and Grades
Section 01152	Application for Payment
Section 01153	Change Order Procedures
Section 01201	Preconstruction Conference
Section 01202	Progress Meetings
Section 01310	Construction Schedules
Section 01340	Shop Drawings and Product Data
Section 01370	Schedule of Values
Section 01500	Construction Facilities and Temporary Controls
Section 01560	Erosion and Sediment Control
Section 01580	Project Coordination
Section 01700	Contract Closeout
Section 01710	Cleaning
Section 01720	Project Record Documents
Section 02110	Sitework Procedures
Section 02200	Site Preparation
Section 02209	Intermediate and Cap Controlled Fill Layers
Section 02221	Trenching, Backfilling and Compacting
Section 02222	Synthetic Cap Anchor Trench
Section 02300	Earthwork
Section 02420	Surface Runoff Collection Systems
Section 02530	Sanitary Sewer Systems
Section 02532	Sanitary Sewer Manholes and Cleanouts
Section 02630	Storm Cleanouts Drainage
Section 02702	Pavements
Section 02831	Chain Link Fences and Gates
Section 02920	Lawns and Grasses
Section 03100	Concrete Formwork
Section 03200	Concrete Reinforcement
Section 03300	Cast-In-Place Concrete
Section 13300	Geotextile Fabrics
Section 13302	Geocomposite Drainage Medium
Section 13306	LLDPE Geomembrane Cap
Section 15060	Pipe and Pipe Fittings
Section 15062	Landfill Gas/Condensate System HDPE Piping and Fittings

Division 26 Electrical

260500	Common Work Results for Electrical
260519	Low-Voltage Electrical Power Conductors and Cables
260526	Grounding and Bonding for Electrical Systems
260529	Hangers and Supports for Electrical Systems
260534	Conduit
260537	Boxes
260553	Identification for Electrical Systems
260573	Overcurrent Protective Device Coordination Study
262200	Low-Voltage Transformers
262416	Panelboards
262701	Electrical Service Entrance
264300	Surge Protective Devices
265600	Exterior Lighting
265668	Exterior Athletic Lighting

Attachment Construction Quality Assurance Manual

SECTION 01000

GENERAL CONSTRUCTION STANDARDS

Part 1 General

1.01 Summary of Work

A. Work covered consists of earthwork and site work associated with placement of soil fill, geosynthetic capping material, landfill gas extraction system modification, structures, fencing, stormdrains, surface drainage features, and ancillary items.

B The CONTRACTOR under this project will provide labor, materials, equipment, tools, and services necessary to complete the work indicated or called for on the Contract Drawings and/or specified in this Project Manual.

C. The CONTRACTOR'S work generally described as follows:

1. Placement of erosion and sediment control measures prior to initial land disturbing activities. Devices and facilities that cannot be installed prior to initial land disturbing activities shall be installed as soon as possible during construction. Continue maintenance of erosion control features throughout construction.

2. Placement of siltation fencing.

3. Construction of diversion dikes, riprap chutes, check dams, and inlet protection.

4. Clearing and grubbing as required, including on-site grinding of wood. Ground wood shall be used as fill material, except within 12 inches of the cap membrane.

5. Earthwork including site preparation, excavation, hauling, and stockpiling of excess soil.

6. Supply and installation of landfill gas collection trench network.

7. Installation of geosynthetic components for cap.

8. Supply and installation of cap toe drain system.

9. Supply and placement of controlled soil fill above the geomembrane cap.

10. Supply and placement of structural fill and topsoil.

11. Surface roughening of final surface, seeding, liming, fertilizing and mulching of disturbed areas.

12. Installation of site lighting.

13. Installation of site utilities.

14. Installation of irrigation system.

15. Construction of structures – press box with restrooms, maintenance building, dugouts.

16. Construction of paved parking lot.

17. Supply and installation of chain link fence.

18. Removal of temporary erosion and sediment control measures, including re-grading permanent seeding and mulching, and installation of final stormwater conveyance channels.

19. Provision of a 1-year warranty on all workmanship and materials provided by CONTRACTOR. (Note: Should faulty workmanship create damage to the site, CONTRACTOR shall be responsible for costs associated with repair).

Part 2 Products

Products incorporated into the work area are to be new, unused, and first quality unless otherwise specifically noted.

Part 3 Execution

3.01 Existing Work

A. Removal and alteration of existing work shall include work necessary to provide final conditions as shown on Contract Drawings. Complete such work carefully to minimize disturbance to adjacent areas.

B. Restore areas disturbed during construction to their original condition, including patching, painting, etc. to the satisfaction of the OWNER and the ENGINEER.

C. If work is not as anticipated or involves structural considerations, notify ENGINEER prior to proceeding.

3.02 Superintendence by CONTRACTOR

A. The CONTRACTOR shall give his personal superintendence to the work or have a competent superintendent, satisfactory to the ENGINEER, on the work at all times during progress, with authority to act for him.

B. The CONTRACTOR shall have posted in a conspicuous spot with his equipment and on the work site a sign or sticker identifying his equipment as to its owner and an emergency twenty-four hour phone number.

C. The CONTRACTOR shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents.

3.03 Specifications and Contract Drawings

A. The CONTRACTOR shall keep at the work site a copy of the Contract Drawings and specifications including authorized change orders and shall at all times give the ENGINEER access thereto. Anything mentioned in the specifications and not shown on the Contract Drawings, or shown on the Contract Drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between the Contract Documents, the Contract Drawings shall take precedence over the specifications. In case of discrepancy either in the figures, or in the Contract Drawings or specifications, the matter shall be promptly submitted to the ENGINEER who shall promptly make a determination. Any adjustment by the CONTRACTOR without such a determination shall be at his own risk and expense. The ENGINEER shall furnish from time to time such detail drawings and other information, as he may consider necessary, unless otherwise provided.

B. Discrepancies and Errors: Should the CONTRACTOR discover any discrepancies between the Contract Drawings and specifications and the site conditions or any error or omission in the Contract Drawings or specifications, he shall at once report them to the ENGINEER, but he shall not be responsible for their existence or discovery. However, if the CONTRACTOR proceeds with any work that may be affected by such discrepancies, errors or omissions, after their discovery but before their correction, such work shall be at the CONTRACTOR'S own risk.

3.04 Materials and Equipment

A. Quality: Material and Equipment Incorporated into the Work shall be new and unused and shall:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type, and quality selected, or as specifically approved in writing by the OWNER.

3. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

4. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation. Maintain one set of complete instructions at the job site during installation and until completion. Handle, install, connect, clean, condition, and adjust products in accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the OWNER for further instructions. Do not proceed with work without clear instructions. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

B. Transportation and Handling

1. Verify prior to bidding that specified items will be available in time for installation during orderly and timely progress of the Work. In the event specified items will not be available, notify the ENGINEER prior to submission of Bids. Costs of delays because of non-availability of specified items, when not identified by the CONTRACTOR prior to submission of BIDS shall not be borne by the OWNER.

2. Arrange deliveries of products in accordance with construction schedules. Coordinate to avoid conflict with work and conditions at the site. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Immediately on delivery, inspect shipments to confirm compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

3. Provide equipment and personnel to handle products by methods to reduce soiling or damage to products or packaging.

C. Storage and Protection

1. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store products subject to damage by the elements in watertight enclosures. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

2. Exterior Storage: Store fabricated products above the ground, on blocking or skids; prevent soiling or staining; cover products that are subject to deterioration with impervious sheet coverings; and provide adequate ventilation to avoid condensation.

3. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to confirm that products are maintained under specified conditions and free from damage or deterioration.

D. Project Substitutions

1. Trade names, brand names and/or manufacturer's information used in these specifications are for the purposes of establishing quality. BIDS on products or other qualified manufacturers are acceptable provided request is made in writing not less than ten (10) consecutive calendar days prior to scheduled receipt of Bids, and, if approved:

a. No major changes in the construction, design intent, or to any services or modifications to other equipment of the project would be required. Changes required to accommodate substituted items or the cost to repair and damage resulting from effecting such changes or modifications made necessary or caused by substitution shall be made by the CONTRACTOR at no additional cost or time delay.

b. Features of quality, capacity, construction, performance, appearance, size, arrangement, and general utility including economy of operation of substitutes offered, either parallel or exceed those of specified products.

c. The provisions of Article 6.05 of the EJCDC General Conditions and any other guarantees, if required by the specification sections, shall apply in full force and effect to the performance of such substitute products, approved for incorporation into the work.

2. Technical data covering the proposed substitution shall be furnished with the request.

3.05 Utilities and Monitoring Points

A. Existing utilities, landfill gas monitoring probes, and groundwater monitoring wells shall be located, protected, and rerouted as necessary during construction. Utilities affected by construction shall be relocated or replaced in a workmanlike manner. Locations of underground utilities shown on the Contract Drawings are approximate.

B. Groundwater monitoring wells and landfill gas monitoring probes shall be located and protected during construction. Should the CONTRACTOR damage a well or probe, the OWNER or ENGINEER shall be contacted immediately. CONTRACTOR shall be responsible for repairs or replacement caused by the damage. CONTRACTOR shall be responsible for additional sampling necessary to comply with State regulations for new wells.

C. It is not the intent of these specifications to identify each existing utility, but the responsibility of the CONTRACTOR to maintain, repair, or restore utilities. CONTRACTOR shall be responsible for the cost of any damages to utilities or monitoring points caused by the construction.

3.06 Site Security

Caution shall be maintained by the CONTRACTOR to verify the site is secured at all times. Security measures shall be coordinated with the OWNER.

END OF SECTION

SECTION 01020

MEASUREMENT AND PAYMENT

Part 1 General

1.01 Measurement

A. The CONTRACTOR shall be solely responsible for measurement and determination of quantities as necessary.

B. The terms “Lump Sum” and “Each”, when used as an item of payment will mean complete functioning item for the Work described in the plans and specifications and will be construed to include all necessary installation, fittings, accessories, and appurtenances.

1.02 Payment Requirements

A. Contract shall be paid on a unit price or lump sum basis based on percentage complete of those items listed on the bid form or an approved schedule of values.

B. All items not specifically listed in the Bid Form, for which there are no instructions as to where the price shall be included, shall be covered by distributing the price within the listed items. No additional payment will be allowed.

C. Mobilization shall be compensated as indicated on schedule of values. Mobilization shall consist of the performance of construction preparatory operations, including the movement of personnel and equipment to the project site, placement of project identification signs, payment of applicable fees and cost of insurance, payment of performance and payment bond and other insurance premiums and for the establishment of the field offices, and other facilities necessary to begin work on a substantial phase of the contract. Mobilization shall be paid for at the contract lump sum price, which price shall be full compensation for performing the work specified and the furnishing of all materials, labor, tools, equipment and incidentals necessary to mobilize and subsequently demobilize the construction preparatory operations. The basis of payment shall be as follows:

Total Original Contract Amount, Including Mobilization		Total Limit for Mobilization
More Than	To & Including	
$0	$100,000	10% of total contract amount
$100,000	$500,00	$10,000 plus 3% of total contract over $100,000
$500,000	$1,500,000	$22,000 plus 2% of total contract over $500,000
$1,500,000	More	$42,500 plus 1% of total contract over $1,500,000

Partial payments shall be as follows:

1. One-third of the amount established above as the total limit for partial payment, or one-third (1/3) of the amount bid for mobilization, whichever is less, will be released to the CONTRACTOR at the first estimate, payable not less than 30 days after the start of work at the project site.

2. Remaining two-thirds (2/3) to be divided over remaining months in contract and shall be billed monthly.

No deductions will be made, nor will any increase be made, in the lump sum mobilization item amount regardless of decreases or increases in the final total contract amount or for any other cause.

D. Soil Quantities

1. OWNER will provide aerial topographic mapping of the site to establish the base condition for soil fill quantities.

2. Following completion of project, OWNER will provide aerial topographic mapping to develop post-construction conditions. The final off-site fill material quantity will be determined from the difference between the pre-construction and post-construction aerial mappings, plus a settlement factor determined as described below.

3. CONTRACTOR shall install two settlement plates in the locations shown on the drawings. The plates are to be installed after the geomembrane cap, geocomposite drainage layer, and two feet of soil are placed on the cap. OWNER will survey elevations of the settlement plates at installation and following completion of fill placement. A settlement quantity will be

calculated by multiplying the determined vertical settlement times the area of soil placement.

4. Addition of soil for landfill settlement will not be considered in the areas that only receive the geomembrane cap system and two feet of cover soil.

5. Prior to determination of final quantity, CONTRACTOR shall maintain load counts of fill material placed on a daily basis. The load counts will be used for partial payment requests.

6. OWNER will provide electronic information to CONTRACTOR for use to verify calculations. CONTRACTOR, at its own expense, pay independently to survey the site to determine fill quantities. Survey shall be signed, sealed by licensed Virginia Land Surveyor.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

Page Intentionally Blank

SECTION 01050

LICENSES AND PERMITS

Part 1 General

1.01 Prior to beginning construction, the CONTRACTOR shall obtain and display City and State licenses required by law in the operation of his business and obtain and pay for permits required to complete the work.

1.02 The OWNER shall provide the CONTRACTOR with the initial Stormwater Pollution Prevention Plan (SWPPP) and the DCR construction stormwater permit. Changes to the SWPPP during construction for the benefit or use by the CONTRACTOR shall be made by the CONTRACTOR at is expense. Off-site borrow area E&SC permits, DCR construction permits, and SWPPP's shall be the responsibility of the CONTRACTOR.

1.03 The OWNER shall obtain the land disturbance permit.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01060

REGULATORY REQUIREMENTS

Part 1 General

1.01 Regulatory Compliance

It is consistent with the intent of these Specifications to describe those performance standards, often broad and general in nature, as per the requirements of the referenced standards. It shall be the responsibility of the CONTRACTOR to familiarize himself fully regarding the detailed needs and requirements of the regulatory agencies having jurisdiction over this work. These detailed needs and requirements should be accommodated, as part of the work, in every manner just as if they were prescribed in these Specifications.

1.02 Requirement Included

Provide required personnel, equipment, and materials to construct the project according to applicable codes.

1.03 Application and Standards

As a minimum standard of quality and workmanship, construction is to comply with the latest edition of the following codes and standards, insofar as they are applicable:

A. Virginia Solid Waste Management Regulations
B. Virginia Erosion and Sediment Control Handbook, 1992.
C. American Society for Testing Materials (ASTM).
D. Virginia Department of Transportation, “Road and Bridge Specifications”, 2002.
E. Occupational Safety and Health Administration (OSHA).
F. Harrisonburg DCSM and Stormwater Management Handbook

The above codes and standards are hereinafter referred to as "Reference Specifications".

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01070

LINES AND GRADES

Part 1 General

1.01 Elevations indicated or specified refer to USGS datum. Control benchmarks are at the elevation and in the location as shown on the Contract Drawings.

1.02 Layout of Work

A. The ENGINEER will establish control points and benchmarks, and will establish other pertinent monuments at the site of the work. From these established lines and bench marks, the CONTRACTOR shall run lines and levels, furnish, set, and drive grade stakes, and do other work necessary to lay out the work in accordance with the dimensions and elevations shown on the Contract Drawings.

B. The CONTRACTOR shall, at his expense, provide necessary survey services and shall provide and maintain accurate, detailed survey field notes and daily progress reports.

C. CONTRACTOR shall verify dimensions and elevations at the site prior to proceeding with the work. The CONTRACTOR shall also verify existing utility locations prior to purchasing materials affected by these locations.

D. The CONTRACTOR shall locate and inform the ENGINEER as to any existing or conflicting utilities, prior to construction.

E. Earthwork shall be graded to $\pm$ 0.2 feet of required grades.

F. Piping shall be graded to $\pm$ 0.1' provided required slopes are maintained.

1.03 The CONTRACTOR will be held responsible for the preservation of stakes and marks established by the ENGINEER, and if any of the stakes and marks are disturbed, the cost of replacing them shall be charged against the CONTRACTOR.

1.04 Approximate alignment and location of the lines are as indicated on the Contract Drawings. The CONTRACTOR shall furnish necessary personnel and equipment to establish the line, grade, and elevations for the specified work

1.05 Coordinates indicated refer to State Plane coordinate system.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

SECTION 01152

APPLICATION FOR PAYMENT

Part 1 General

1.01 CONTRACTOR shall submit Applications for Payment to the ENGINEER no more than once per month. Applications will be made on standard forms provided by the ENGINEER. Applications must show complete schedule of values and percentage of work completed to date.

1.02 Applications for Payment will not be processed without the following:

A. Supporting data for percent completion; i.e. submittals and reports up to date.

B. Establishment and maintenance of erosion and sediment control measures in accordance with these specifications.

C. An approved schedule of values.

D. An updated progress schedule.

Part 2 Products

Not Used

Part 3 Execution

3.01 Retainage shall be 5% of gross amount due until Final Completion unless otherwise specified in the Agreement.

3.02 Information shall be type written quality.

3.03 Execute certification by signature of authorized officer.

3.04 Use data on accepted Schedule of Values. Provide dollar value in each column for each line for portion of Work performed and for stored materials.

3.05 List each authorized Change Order, listing Change Order Number and dollar amount as for an original item of work.

3.06 Submit an original and two copies of each Application for Payment to ENGINEER at the end of each month, unless otherwise stipulated. Submittal shall include a letter of transmittal.

END OF SECTION

SECTION 01153

CHANGE ORDER PROCEDURES

Part 1 General

1.01 Requirement Included

Promptly implement change order procedures and provide full written data required to evaluate changes to OWNER and ENGINEER.

1.02 Preliminary Procedures

A. OWNER or ENGINEER may initiate changes by submitting a Proposal Request to CONTRACTOR. Request will include:

1. Detailed description of the Change, Products, and location of the Change in the Project.
2. Supplementary or revised Drawings and Specifications.
3. The projected time span for making the change.
4. A specific period of time during which the requested price will be considered valid.
5. Such request is for information only, and is not an instruction to execute the changes, nor to stop work in progress.

B. CONTRACTOR may initiate changes by submitting a written notice to ENGINEER, containing:

1. Description of the proposed changes.
2. Statement of the reason for making the changes.
3. Statement of the effect on the Contract Sum and the Contract Time.
4. Statements of the effect on the Work of separate Contractors.
5. Documentation supporting changes in Contract Sum or Contract Time, as appropriate.

1.03 Construction Change Authorization

A. In lieu of Proposal Request, ENGINEER may issue a Construction Change Authorization for CONTRACTOR to proceed with a change for subsequent inclusion in a Change Order.

B. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining change in the Contract Sum and change in Contract Time.

C. OWNER and ENGINEER will sign and date the Construction Change Authorization as authorization for the CONTRACTOR to proceed with the changes.

D. CONTRACTOR may sign and date the Construction Change Authorization to indicate agreement with the terms therein.

1.04 Documentation of Proposals and Claims

A. Support each quotation for a lump-sum price with sufficient substantiating data to allow ENGINEER to evaluate the quotation.

B. On request provide additional data to support time and cost computation:

1. Labor required.
2. Equipment required.
3. Products required; both the recommended source of purchase and unit cost, and the quantities required.
4. Taxes, insurance, and bonds.
5. Credit for work deleted from Contract, similarly documented.
6. Overhead and profit.
7. Justification for change in Contract Time.

1.05 Preparation of Change Orders

A. ENGINEER will prepare each Change Order.

B. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.06 Lump-Sum/Fixed Price Change Order

A. Content of Change Orders will be based on, either:

1. ENGINEER'S Proposal Request and CONTRACTOR'S responsive proposal as mutually agreed between OWNER and CONTRACTOR.
2. CONTRACTOR'S proposal for a change, as recommended by ENGINEER.

B. OWNER and ENGINEER will sign and date the Change Order as authorization for the CONTRACTOR to proceed with the changes.

C. CONTRACTOR will sign and date the Change Order to indicate agreement with the terms therein.

1.07 Correlation with CONTRACTOR'S Submittals

A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub-schedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01201

PRECONSTRUCTION CONFERENCE

Part 1 General

1.01 The Construction Quality Assurance (CQA) Engineer shall arrange a Preconstruction Conference after the effective date of the Agreement. The Preconstruction Conference will be held prior to the CONTRACTOR'S mobilization to the site. At a minimum, attendees shall include the CONTRACTOR, OWNER, ENGINEER, and the CQA Officer.

1.02 Items of discussion shall include, but not be limited to the following:

A. Tentative construction schedule
B. Work sequencing
C. Designation of responsible personnel
D. Use of the premises
E. Office, work, and storage areas
F. Equipment/material deliveries and priorities
G. Security and working hours
H. Housekeeping

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01202

PROGRESS MEETINGS

Part 1 General

1.01 Progress meetings will be held every two weeks, or at an alternate frequency as determined by the OWNER, to discuss project progress, problems that may be encountered, quality of workmanship, and other aspects of concern. Date, time, and location of progress meetings will be established at a later date.

1.02 Unless a progress meeting is deemed unnecessary by the OWNER or CQA OFFICER, the CONTRACTOR'S superintendent and the CQA OFFICER shall attend progress meetings. The OWNER and DESIGN ENGINEER may attend the progress meetings.

1.03 The CQA OFFICER shall record meeting minutes and distribute copies to attendees, DESIGN ENGINEER, and OWNER.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01310

CONSTRUCTION SCHEDULES

Part 1 General

1.01 Requirements Included

A. Prior to construction, the CONTRACTOR shall submit to the CQA OFFICER a proposed construction schedule.

B. Construction schedule shall be in a form that will clearly show the proposed degree of completeness of each aspect of the construction throughout the life of the contract. Gantt graphs and/or PERT diagrams are acceptable forms.

C. Items shown in the Construction schedule shall be identified in the Schedule of Values developed by the CONTRACTOR.

D. The progress schedule shall be updated monthly. Three (3) copies of the updated progress schedule shall be submitted with each Application for Payment.

Part 2 Products

Not Used

Part 3 Execution

3.01 Weather Impacts

A. Normal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperature and/or precipitation to ensure completion of all work within the Contract Time. The Contractor shall anticipate the potential loss of the number of workdays listed below for each calendar month. Workdays are to be considered Monday through Saturday. Sunday and legal holidays shall not be considered.

January	8	July	7
February	8	August	7
March	8	September	5
April	6	October	5
May	7	November	5
June	6	December	6

B. The anticipated days provided above will constitute the base line for monthly weather time evaluations. Throughout the contract, actual weather days are to be recorded and compacted to monthly anticipated days.

C. The adverse weather must have prevented work for at least 50 percent of the work day and delayed work critical to the timely completion of the project. Contractor's request for adverse weather days must be approved by the Owner's or Engineer's Representative within 24 hours of occurrence.

END OF SECTION

SECTION 01340

SHOP DRAWINGS AND PRODUCT DATA

Part 1 General

1.01 The CONTRACTOR shall submit for the approval of the ENGINEER, prior to start of construction, details or shop drawings and manufacturer's specifications of materials and equipment he intends to furnish as part of this project.

1.02 Equipment shall not be fabricated, ordered, or delivered until shop drawings have been approved.

1.03 Shop drawings shall be checked, stamped, signed, and dated by the CONTRACTOR before submission to the ENGINEER. Shop drawings shall be accompanied with a certificate, signed by Supplier and CONTRACTOR, stating that products comply with the requirements of these Specifications and clearly identifying the Specification Section or Sections.

1.04 Each shop drawing submittal shall be accompanied by a cover sheet (attached) that contains the following information:

A. Project Name.
B. CONTRACTOR'S Name.
C. Supplier.
D. Material submitted.
E. Applicable Specifications Section(s).
F. Date of Submittal.
G. Submittal Number.
H. Identify whether submittal is a new submittal or resubmittal.

1.05 CONTRACTOR shall submit three (3) copies more than the number that he wishes to have returned from the ENGINEER.

1.06 The ENGINEER'S approval of the CONTRACTOR'S shop drawings will be general and shall not relieve the CONTRACTOR from the responsibility for adherence to the Contract Document, nor shall it relieve him of the responsibility for any errors that may exist. Where such errors or omissions are discovered later, they shall be made good by the CONTRACTOR irrespective of any approval by the OWNER or ENGINEER.

Part 2 Products

Not Used

Part 3 Execution

3.01 Submittals shall include, but may not be limited to, the following items:

- Project superintendent
- Schedule of values
- Project schedule
- Silt fencing
- Riprap certification
- Chain Link Fence
- Geotextile fabric
- Seeding mixture
- LLDPE Geomembrane material data and certifications
- Geocomposite Drainage material data and certifications
- Erosion control blankets
- Coarse aggregate
- Concrete mixture
- Concrete pipe
- PVC and HDPE pipe, fittings and accessories
- Off-site soil and stone
- Testing results of on-site soils

END OF SECTION

SUBMITTAL FORM

Job Name: Ramblewood Park Improvements - Phase 1

Submittal No. _____

Date: _____

Description: _____

Contractor's Certification

Contract Drawing No.:

Specification No.: _____

This document has been detail-checked for accuracy of content and for compliance with the Contract Drawings and specifications. The information contained herein has been fully coordinated with all involved subcontractors.

Construction Company: _____

Date Submitted: _____

Date: _____

Engineer's Review

Approved ☐
Approved As Corrected ☐
Revise and Resubmit ☐
Not Approved ☐

Approval is only for compliance with the design concept of the project and compliance with the information given in the contract documents. CONTRACTOR is responsible for dimensions to be confirmed and correlated at the job site; for information that pertains solely to the fabrication process or to techniques of construction; and for coordination of the work of all trades.

Draper Aden Associates

By:_____

Date:_____

This page intentionally blank

SECTION 01370

SCHEDULE OF VALUES

Part 1 General

1.01 The CONTRACTOR shall submit a proposed Schedule of Values to the ENGINEER for acceptance before start of construction.

1.02 Schedule of Values shall be broken down into as many items as necessary to properly determine value of work complete at any time.

1.03 An item that CONTRACTOR wishes to be shown on an application for payment must be shown on the Schedule of Values.

1.04. CONTRACTOR'S overhead margin and profit shall be distributed through all items on Schedule of Values and shall not be shown as a separate item.

1.05. Final Schedule of Values for use in applications for payment shall be mutually acceptable to OWNER and CONTRACTOR.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

Part 1 General

1.01 Protection and Safety

A. Do not interfere with use of or access to adjacent properties. Maintain free and safe passage to and from the jobsite.

B. Protect trees, areas to receive planting, and other features remaining as part of the final landscaping.

C. Protect bench marks and existing structures, property corners, roads, sidewalks, paving, and curbs against damage from equipment and vehicular or foot traffic.

D. Cease operations and notify ENGINEER immediately if safety of adjacent structures appears to be endangered. Do not resume operations until safety is restored.

E. Reduce movement, settlement, or collapse of adjacent services, structures, trees, etc. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the OWNER.

F. Notify ENGINEER of unexpected sub-surface conditions and discontinue work in area until ENGINEER provides notification to resume work.

G. Protect bottom of excavations and soil around and beneath foundations from frost.

H. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods, as required to reduce cave-ins or loose dirt from falling into excavations.

I. Verify required environmental protection devices and procedures are in place, properly maintained, and operational.

J. Coordinate work with the City staff.

1.02 Coordination

A. Arrangements for access to the site, workmen's parking locations, sites for storing material, sanitary facilities, utilities during construction, etc., shall be coordinated by the CONTRACTOR with the OWNER. The OWNER agrees to make the site accessible to the CONTRACTOR during normal working hours (Monday through Saturday 7:00 a.m. to 4:00 p.m). To arrange for access at these or any other times

permitted by the OWNER, the CONTRACTOR shall be accompanied by OWNER personnel for unlocking or locking the facility when leaving. No keys will be furnished for the CONTRACTOR's use.

B. Contact OWNER to coordinate site access.

1.03 Telephone Services

CONTRACTOR shall provide telephone service for its personnel. The CONTRACTOR, workmen, subcontractors, etc., shall not be allowed to use the OWNER'S telephone service for normal business.

1.04 Field Office

The CONTRACTOR, at his option, shall provide and maintain a suitable temporary field office at the project for his own use. The CONTRACTOR shall be responsible for necessary permits to install the temporary office and utilities. The location of the field office shall not interfere with city operations.

1.05 Sanitary Facilities

The CONTRACTOR shall provide and maintain such sanitary accommodations for the use of his employees and those of his subcontractors as may be necessary to comply with the requirements and regulations of the local and state departments of health. These accommodations shall be at the CONTRACTOR'S expense.

1.06 Maintenance of Traffic

A. It shall be the sole responsibility of the CONTRACTOR to furnish and maintain, until the work has been accepted by the OWNER, signs, lights, barricades, flagmen, torches, etc. necessary for the safety of the general public, including both vehicular and pedestrian traffic.

B. Traffic control on public roads shall be in accordance with the current Federal Highway Administration Manual on Uniform Traffic control Devices (MUTCD). Costs for maintenance of traffic shall be included in the contract.

C. CONTRACTOR shall recognize activity of the operating landfill and shall operate vehicles and equipment in a safe manner. CONTRACTOR and Subcontractors shall provide safe passage of landfill customers at all times.

D. The CONTRACTOR shall promptly remove excavated material or other debris that may be spilled or tracked onto the traveled pavement during the conduct of his work.

E. Flagging should only be employed when required to control traffic or when other methods of traffic control are inadequate to warn and direct drivers. At least one lane of traffic shall be maintained at all times. While work is not in progress, traffic is to be returned to the normal fashion.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01560

EROSION AND SEDIMENT CONTROL

Part 1 General

1.01 Requirements Included

A. Provide personnel, equipment, materials, and supplies to limit erosion and control sediment during the construction period.

B. Comply with local and state erosion control regulations. Comply with erosion and sediment controls as set forth on the Contract Drawings.

C. CONTRACTOR is solely responsible for control of erosion on site and is responsible for taking measures to limit and control erosion. Measures may be necessary above and beyond those shown on the Contract Drawings and CONTRACTOR shall implement those additional measures. The CONTRACTOR shall install additional measures that may be required by the City but not shown on the Contract Drawings. The CONTRACTOR shall be entitled to compensation for additional measures that must be installed in the area of the work shown on the Contract Drawings, unless they are required solely for the CONTRACTOR'S convenience or because of improvements or activities by the CONTRACTOR not shown on the Contract Drawings.

D. Measures installed in conjunction with the development and operations of borrow and stockpile areas shall be considered incidental to construction and additional compensation will not be paid.

1.02 Related Requirements

Virginia Erosion and Sediment Control Handbook, 1992.

Part 2 Products

2.01 Filter Fabric Siltation Control Fences

Filter fabric used in siltation control fences shall be woven or non-woven geotextile fabric that is resistant to ultra-violet light and specifically manufactured to be used in siltation control fences. Acceptable manufacturers include Mirafi, Inc. or Amoco. Fence height shall be a minimum of 36 inches.

2.02 Riprap

Riprap used shall be in accordance with the Virginia Erosion and Sediment Control Handbook, latest edition and as shown on the Contract Drawings.

2.03 Erosion Control Blanket

Erosion Control Blanket, Treatment 1 (equivalent to VDOT EC-2) or Treatment 2 (equivalent to VDOT EC-3), shall be in accordance with the Virginia Erosion and Sediment Control Handbook latest edition and VDOT Road and Bridge Standards latest edition. Treatment 1 shall be North American Green C125 or approved equal. Treatment 2 shall be North American Green S150 or approved equal.

Part 3 Execution

3.01 General

Prior to significant disturbance of the site, perimeter erosion control shall be established in order to limit uncontrolled drainage from leaving the limits of construction or from reaching State waters. Sediment barriers shall be constructed as soon as possible.

3.02 Installation

CONTRACTOR shall be responsible for the following activities:

A. A continuous siltation barrier shall be down slope from construction activities as indicated on the Contract Drawings to limit sediment runoff. Barriers shall be placed around stockpiled material subject to erosion.

B. Filter fabric fences shall be installed as per the manufacturer's directions. The fence shall be supported by wooden or metal posts driven at least two feet into the ground and spaced no further than eight feet apart. Eight inches of the fabric shall be put in a trench facing the erosion source. The trench shall be backfilled after placing the fabric.

Part 4 Maintenance

4.01 General

A. In general, existing and proposed erosion and sediment control measures will be checked weekly by the CONTRACTOR and after each precipitation event. Temporary and permanent seeding shall be completed in accordance with Section 02480. The following will be checked in particular:

1. Silt fences for signs of clogging.

2. Check dams, inlet protection and outlet protection for signs of clogging.

3. Surface berms, roadside ditches, and stormwater conveyance channels for signs of erosion damage and adequacy.

4. Construction entrance and access roads for degradation.

B. Upon finding that a measure is filled to render it nonfunctional or if the measure has failed, the CONTRACTOR shall repair said measure at no additional cost to the OWNER.

C. It shall be the sole responsibility of the CONTRACTOR to adequately control dust that is created as a result of construction activity.

END OF SECTION

This page intentionally blank

SECTION 01580

PROJECT COORDINATION

Part 1 General

1.01 OWNER Occupancy

The CONTRACTOR shall plan his work to minimize disruption of soil borrow operations, landfill gas and groundwater monitoring, storage of materials and miscellaneous items, and other normal site procedures by the OWNER and shall cooperate fully and coordinate his work with the OWNER in all aspects, including, but not limited:

A. Coordinate with the OWNER construction effecting access roads. Some work may need to be performed during non-working hours to accommodate the OWNER'S operations. The CONTRACTOR and OWNER will confer on an acceptable schedule for the entire project, including a schedule required for work during such hours.

B. Keep access roads open and free from obstructions at all times for the use of employees, public, and staff of the OWNER and provide ample protection of existing equipment and apparatus, as well as the employees, staff, and public, against the elements and possible harm or injury from any operations of the CONTRACTOR during the entire period of construction.

C. Existing services must be maintained for the OWNER'S operation. Aspects of the construction that involve the temporary interruption of essential services shall be scheduled in consultation with the OWNER and ENGINEER and shall not be of longer duration than essential to accomplish the purpose of such interruption.

D. Operations that require the use of machines that produce excessive noise such as rotary hammers, jack hammers, etc., as well as machines that will produce structural vibrations shall be coordinated with the OWNER and ENGINEER prior to execution.

E. Modifications to the existing landfill gas extraction system shall be schedule such that the system is down for no longer than one (1) week. Work on the system can take place after the one week down time, but the system shall be reconnected and operational at the end of each work day after the down time.

1.02 Coordination with Other Contractors

CONTRACTOR shall coordinate construction activities with the OWNER and other contractors that may be working on the site. Additionally, the CONTRACTOR shall

cooperate fully with the OWNER about operating hours, and shall verify that gates are locked and access to the public controlled after landfill hours.

Part 2 Products

Not Used

Part 3 Execution

3.01 Superintendent

CONTRACTOR shall identify personnel as superintendent of the site in writing to the OWNER and ENGINEER. The CONTRACTOR'S superintendent shall maintain a presence at the site during construction activities related to the project. The superintendent shall not be changed without the consent of the OWNER unless the superintendent ceases to be employed by the CONTRACTOR.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

Part 1 General

1.01 Final Inspection

A. Upon suspected completion of project, submit to CQA ENGINEER written certification that the work has been completed in accordance with the Contract Documents and is ready for the CQA ENGINEER'S inspection.

B. Final Inspection meeting will be held at the site to determine completeness.

C. A final "punch list" of items to be completed will be prepared by the OWNER, ENGINEER, and CONTRACTOR at this meeting. Complete items on punch list and notify ENGINEER of completeness.

D. Schedule a final cleaning as approved by the ENGINEER to enable the OWNER to accept a completely clean project. Clean up debris and dirt.

1.02 Application for Final Payment

OWNER'S payment of final application shall terminate the Contract except as provided for bonds and warranties for the guarantee period.

1.03 Submittals

A. Provide one complete set of Contract Drawings and project manual recording changes to the work to indicate actual installation. Addenda items, bulletin drawings, change order items, field changes, and items changed during project meetings shall be included on the Record Drawings. Changes shall be noted in legible red letters at least 1/8 inch high. These records are a specific Contract requirement, and final payment will not be made until these drawings and project manual have been submitted in an acceptable form.

B. Submit three copies of operating and maintenance manuals. Manuals shall be in durable binders with at least the following:

1. Identification on, or readable through, the front cover stating general nature of the manual.

2. Neatly typewritten index near the front of the manual.

3. Complete instruction regarding operation and maintenance of equipment involved.

4. Complete nomenclature of replaceable parts, their part numbers, current cost and name and address of nearest vendor.

5. Copy of guarantees and warranties.

6. Copy of approved shop drawings with data concerning changes made during construction.

7. All manufacturers' catalog pages clearly marked to indicate precise items included in the installation and other items deleted or otherwise clearly indicated that they are not part of the installation.

C. At the conclusion of the project, the CONTRACTOR shall submit a complete list of Subcontractors, manufacturers, and suppliers who participated in the construction or who furnished materials or equipment. The address of each firm shall be included, together with types of materials or work performed.

D. Statement of payment of taxes.

E. Affidavit of Payment of Debts and Claims.

F. Affidavit of Release of Liens.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

SECTION 01710

CLEANING

Part 1 General

1.01 Maintain the site in a neat and orderly condition at all times. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this work. Provide adequate storage for items waiting removal from the site. No open accumulation of waste will be permitted. Waste must be removed from within the project area on a daily basis.

1.02 Schedule a final cleaning as approved by the CQA ENGINEER to enable the OWNER to accept a completely clean project. Thoroughly remove from premises debris remaining from construction activities and properly dispose. Leave premises in a clean, neat, orderly, and safe condition. Sweep paved areas.

1.03 Restore areas damaged from construction activities.

1.04 Remove construction facilities and equipment from the project site.

Part 2 Products

Not Used

Part 3 Execution

Not Used

END OF SECTION

This page intentionally blank

SECTION 01720

PROJECT RECORD DOCUMENTS

Part 1 General

Throughout progress of work, maintain in the Contract Documents an accurate record of changes. Upon completion of work, transfer the recorded changes to a set of Record Documents. This includes modifications to grading, structures, piping, roads, utilities and monitoring devices.

Part 2 Products

Not Used

Part 3 Execution

3.01 Accuracy of Records

Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of the Specifications and each sheet of the Contract Drawings and other documents where such entry is required to properly show the change. Record accuracy shall be such that future searchers for items shown in Contract Documents may reasonably rely on information obtained from approved Record Documents.

3.02 Timing of Entries

Make entries within 24 hours after receipt of information.

3.03 Submittals

The CQA ENGINEER'S approval of current status of Record Documents shall be a prerequisite to the ENGINEER'S approval of requests for progress payments and the request for final payment under the Contract.

3.04 Protection of Documents

Maintain the job set of Record Documents completely protected from deterioration and from loss and damage. At completion of the Work, transfer recorded data on the job set to the final Record Documents.

3.05 Making Entries on Documents

Using an erasable colored pencil or ink (not indelible pencil), clearly describe the change by note and by graphic line, as required. Date entries. Call attention to entry by a "cloud" around the area or areas affected.

3.06 Conversion of Schematic Layouts

In some cases on the Contract Drawings, arrangement of conduits and circuits, piping, and other similar items is shown schematically and is not intended to portray precise physical layout. Final physical arrangement is as determined by the CONTRACTOR, subject to the ENGINEER'S approval. Design of future modifications of the facility may require accurate information as to the final physical arrangement of items that are shown only schematically on the Contract Drawings. The ENGINEER may waive the requirements for conversion of schematic data where, in the ENGINEER'S judgment, such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the ENGINEER.

3.07 Accuracy of Entries

Use means necessary, including the proper tools for measurement, to determine actual locations of the installed items.

3.08 Final Documents

A. The purpose of the final record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of the design to proceed without lengthy and expensive site measurement, investigation, and examination.

B. The CONTRACTOR shall be responsible for maintaining an accurate set of Record Drawings on the construction site. Record Drawings shall accurately reflect grades and locations and changes or modifications to the Contract Drawings. Upon completion of the project, the Record Drawings shall be submitted to the CQA ENGINEER.

C. The final record documents shall include Quality Control tests performed by the CONTRACTOR on materials and workmanship, certification of materials, approved submittals, and product data.

END OF SECTION

SECTION 02110

SITEWORK PROCEDURES

Part 1 General

1.01 Scope

Sitework shall include site preparation of the areas to be cleared, earthwork, and site improvements.

1.02 Related Requirements

Section 01560 Erosion and Sediment Control
Section 02200 Site Preparation
Section 02300 Earthwork

1.03 Quality Assurance

A. Prior to beginning work, become thoroughly familiar with site conditions and the Specifications.

B. Comply with pertinent codes and regulations.

1.04 Permits

Obtain required permits from appropriate authorities before sitework begins.

1.05 Maintaining Traffic

A. Do not close or obstruct roadways.

B. Conduct operations with minimum obstruction of the landfill access roads and minimum interference with facility users.

Part 2 Products

Not Used

Part 3 Execution

3.01 Site Inspection

Prior to work described in this Section, carefully inspect the entire site and objects designated to be removed and to be preserved.

3.02 Clarification

The Contract Drawings do not propose to show all objects existing on the site. Before commencing work, verify with the ENGINEER objects not clearly identified to be removed or to be preserved and discrepancies not fully resolved.

3.03 Prior Conditions Inspections

Prior to work of this Section, carefully inspect the existing conditions. In the event of a discrepancy, immediately notify the ENGINEER and do not proceed with installation in non-conforming areas until the identified discrepancy has been fully resolved.

3.04 Protection and Safety

Verify required protection devices are in place and operational.

3.05 Preparation and Layout

A. Establish extent of sitework by area and elevations; designate and identify datum elevation.

B. Set required lines and levels.

C. Maintain benchmarks, monuments and other reference points.

3.06 Excess Water Control

A. Do not place, spread, or roll fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory.

B. Provide and maintain during construction, ample means and devices with which to promptly remove and/or dispose of water from sources entering excavations. De-water by means that will maintain dry excavations and the preservation of the final lines and grades of bottoms of excavations.

3.07 Surplus Materials

Remove surplus backfill materials from site and transport to a location approved by the OWNER.

3.08 Removal of Debris

A. Promptly remove any cleared debris from site that was not used as landfill cover.

B. Remove surplus equipment and tools from the site.

END OF SECTION

This page intentionally blank

SECTION 02200

SITE PREPARATION

Part 1 General

1.01 Description

General instructions for sitework.

1.02 Related Requirements

Section 01560 Erosion and Sediment Control

1.03 Scope

Sitework shall include site preparation, earthwork, site improvements, landscaping and paving/surfacing.

1.04 Quality Assurance

A. Prior to beginning work, become thoroughly familiar with site conditions and all sections of the Division.

B. Thoroughly coordinate all sections of this Division.

C. Comply with all pertinent codes and regulations.

D. Perform all required tests in accordance with section requirements.

1.05 Submittals

A. Shop drawings, product data.

B. Releases.

C. Disinfection and bacteriological reports.

D. Pressure test logs.

E. Project Record Documents.

F. Operating and maintenance data.

1.06 Permits

Obtain required permits from appropriate authorities before sitework begins.

1.07 Dust Control

A. Use all means necessary to control dust on and near the Work, and on and near all off-site borrow areas, if such dust is caused by the Contractor's operations during performance of the work, or if resulting from the conditions in which the Contractor leaves the site.

B. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

1.08 Maintaining Traffic

A. Do not close or obstruct roadways without permits.

B. Conduct operations with minimum interference to public or private roadways.

C. Maintain designated temporary roadways, walkways and detours for vehicular and pedestrian traffic.

Part 2 Products

2.01 General

In accordance with the provisions of the following sections of Division 2.

Part 3 Execution

3.01 Site Inspection

Prior to all work of this Division, carefully inspect the entire site and all objects designated to be removed and to be preserved.

3.02 Clarification

The Drawings do not purport to show all objects existing on the site. Before commencing any work in this Division, verify with the Engineer all objects not clearly identified to be removed or to be preserved and any discrepancies not fully resolved.

3.03 Prior Conditions Inspection

A. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where installation may commence in accordance with the original design, all pertinent codes and regulations, and all applicable portions of the referenced standards.

B. In the event of discrepancy, immediately notify the Owner's Representative and do not proceed with installation in non-conforming areas until all identified discrepancies have been fully resolved.

3.04 Protection and Safety

A. Verify all required protection devices are in place and operational.

B. Establish extent of sitework by area and elevations; designate and identify datum elevation.

C. Set required lines and levels.

D. Maintain bench marks, monuments and other reference points.

3.05 Utilities

A. Before starting excavation, establish location and extent of utilities occurring in work area and disconnect or arrange for the disconnection of all utility services designated to be removed, performing all such work in accordance with the requirements of the utility company, agency, or entity involved.

B. Maintain, re-route or extend as required, existing utility lines to remain which pass through work area in accordance with the requirements of the utility company, agency, or entity involved.

C. Preserve in operating condition all active utilities traversing the site and designated to remain.

D. Remove abandoned utility service lines from areas of excavation; cap, plug or seal such lines and identify at grade.

E. Accurately locate and record abandoned and active utility lines, re-routed or extended, on Project Record Documents.

F. Notify the Owner's Representative immediately when active utilities are encountered which are not shown on Drawings. The work shall be adequately protected, supported or relocated as directed by the Engineer.

3.06 Procedure

Provide sitework in accordance with lines and levels required for construction of the Work, including space for forms, bracing and shoring, foundation drainage systems, applying dampproofing and waterproofing, and to permit inspection.

3.07 Excess Water Control

A. Do not place, spread, or roll fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory.

B. Provide berms or channels to prevent run-off into sub-grade; promptly remove all water collecting in depressions.

C. Provide and maintain at all times during construction, ample means and devices with which to promptly remove and dispose of all water from every source entering the excavations. Dewater by means which will ensure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

3.08 Surplus Materials

A. Remove surplus backfill materials from site, or as otherwise directed by Owner.

B. Leave stockpile areas completely free of all excess fill materials.

3.09 Removal of Debris

A. Promptly remove cleared debris from site. Burning of debris on site is not permitted, unless permission is obtained from applicable regulatory authority.

B. Obtain permission, as required, from applicable regulatory authority for disposal of debris at waste disposal site.

C. Remove surplus equipment and tools from the site.

3.10 Clearing and Grubbing

A. Clearing and grubbing of vegetative cover shall be performed in the required areas only. Required areas include the fill areas, access roads, stockpiles, and other areas as noted on the Contract Drawings. Vegetation in other areas shall be undisturbed.

B. Grassy vegetation and topsoil may be stockpiled for later use by the CONTRACTOR. The stockpile shall be located in a safe area and be adequately protected by temporary seeding and mulching.

C. Trees and brush shall be taken down and stumps pulled. Brush and stumps shall be chipped or removed from the site.

END OF SECTION

This page intentionally blank

SECTION 02209

INTERMEDIATE AND CAP CONTROLLED FILL LAYERS

Part 1 General

1.01 Requirements Included

Provide personnel, equipment, and materials to excavate, haul, and place intermediate fill of varying depth and a minimum of nine (9) inch layer of controlled fill both below and above the geomembrane cap.

1.02 Related Requirements

Construction Quality Assurance Manual
Section 02300 Earthwork

Part 2 Products

2.01 Intermediate Fill Layer

A. Intermediate fill refers to soil materials placed below, but not within nine (9) inches of the geomembrane cap. Intermediate fill shall classify as CL, ML, SM, SP, SW, SC, or GC as defined by Unified Soil Classification System (ASTM D 2487), or otherwise approved by the OWNER. On-site CH material may be used at the discretion of the ENGINEER. Intermediate fill shall have no particle size larger than six (6) inches in any dimension, debris, waste, vegetation, organic materials, roots, and other deleterious matter. Maximum sized particles should not be in excess of 20 percent of the volume of the fill material, and such particles shall be well distributed throughout the mass. Intermediate fill shall <u>not</u> be used for filling in areas:

1. Within nine (9) inches of the geomembrane cap.

2. The upper two (2) feet of fill below pavements and sports fields. Structural fill is to be used as specified in Section 02300 Earthwork.

3. The upper five (5) feet of fill below building structures. Structural fill is to be used as specified in Section 02300 Earthwork.

2.02 Cap Controlled Fill Layer

A. The cap controlled fill refers to soil materials that are classified as CL, ML, SM, SW, SP, or SC as defined by Unified Soil Classification System (ASTM D 2487),

or otherwise approved by the OWNER. The cap controlled fill layer shall be soil free of debris, roots and other organic matter, frozen material, sharp objects or other harmful matter that may damage the geomembrane cap. This soil shall have no particle size greater than ¾-inches.

B. Soil for the cap controlled fill layer shall come from either on-site borrow areas / stockpile provided by the OWNER, off-site borrow area provided by the OWNER, or an off-site borrow area provided by the CONTRACTOR.

C. Laboratory tests will be required in accordance with the Construction Quality Assurance Manual.

D. Cap controlled fill soils shall be used for fill within nine (9) inches of the geomembrane cap.

2.02 Structural and General Fill

Structural and General fill shall be placed above, but not within nine (9) inches of the geomembrane cap in accordance with specification Section 02300 Earthwork.

2.03 Topsoil or Amended Soil Layer

Topsoil or amended soil shall be in accordance with specification Section 02300 Earthwork.

Part 3 Execution

3.01 General

A. Strip topsoil to full depth, stockpile separate from other excavated materials and pile free of roots, stones, and other undesirable materials. Follow guidelines in Virginia Erosion and Sediment Control Handbook to limit erosion. Depressions caused by removal of stumps or the clearing operation shall be excavated to firm subgrade.

B. The OWNER shall retain Quality Control (QC) and Quality Assurance (QA) personnel (QA and QC may be the same personnel) to monitor Earthwork included in this section. The QC personnel shall be present on-site during subgrade approval and fill and backfill operations.

3.02 Subgrade Approval

Subsequent to clearing, grubbing and stripping, subgrades to receive structures or fill shall be evaluated prior to fill placement by the Quality Assurance Officer (QAO). Such evaluation shall include the observation of subgrade performance during proofrolling

with a loaded tandem dump truck provided by the CONTRACTOR. At least three passes are to be made with a fully loaded tandem dump truck. Areas that are deemed unsuitable for fill placement by the QAO shall be clearly identified by horizontal and vertical extent with recommendations for improvements and submitted to the Constructon Quality Assurance (CQA) Engineer for further action.

3.03. Moisture Content

Fill and backfill soil shall be compacted at a moisture content within a range of ± 5% of the optimum moisture content, unless otherwise approved by the CQA Engineer. As required, fill and backfill soil shall be dried by aerating with a scarifier, disc harrow, blade or other equipment or by such other means as may be necessary. As required, fill and backfill soil shall be wetted by the use of water trucks or sprinklers. Dried or wetted fill or backfill soil shall be thoroughly mixed to provide a material of uniform moisture content.

3.04. Depth and Mixing of Fill Layers

Fill and backfill soil shall be placed in layers that when compacted shall not exceed nine inches (9"). Each layer shall be spread evenly and shall be thoroughly bladed and mixed during the spreading to obtain uniformity of material in each layer.

3.05 Compaction of Fill

A. Compaction of intermediate fill and cap controlled fill layer, unless otherwise specified, as shown on the Contract Drawings and determined in the field shall be continuous over its entire area and the compaction equipment shall make sufficient trips to verify that the required density has been obtained. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted in nine inch (9") maximum compacted thickness lifts.

1. The minimum dry density of the soil shall be at least ninety five percent (95) of the maximum dry density as determined by ASTM D698 (standard Proctor) under structures, paved areas, sports fields, or embankments, unless otherwise shown on the Contract Drawings.

2. The cap controlled fill layer shall be a uniformly spread lift of soil with a minimum thickness of nine (9) inches below and above the geomembrane cap. Compaction shall be limited to tracking equipment.

3. The minimum dry density of the soil shall be at least ninety percent (90) of the maximum dry density as determined by ASTM D698 (standard Proctor) under areas other than listed in 1. and 2., above.

B. The structural and general fill placed above the cap controlled fill layer shall be installed in accordance with SECTION 02300 EARTHWORK. Roughen or rake

the surface of the final layer. Compaction equipment shall be of such design that it will be able to compact the fill to the specified density. Prior to placing the fill, at the preconstruction meeting or a minimum of 7 days prior to usage, the CONTRACTOR shall submit to the CQA Engineer, for approval, a list of compaction equipment to be used. The CQA Engineer shall have 7 days to approve or disapprove the list. The list shall include the type of equipment, manufacturer and size.

C. If, in the opinion of the CQA Engineer, the compaction equipment is not acceptable, the CONTRACTOR may demonstrate the suitability of such equipment in a test area within the prepared fill site.

D. Fill faces shall be compacted. Compacting operations shall be continued until the slope faces are stable but not too dense for planting and there is no appreciable amount of loose soil on the surface.

3.02. The structural and general fill placed above the cap controlled fill layer shall be installed in accordance with SECTION 02300 EARTHWORK. Roughen or rake the surface of the final layer.

3.04 The finished grade shall be as shown on the plans.

3.05 Spreading of these materials shall be accomplished using wide track equipment such as a Caterpillar D5 or D3, Low Ground Pressure bulldozer or equivalent.

3.06 Pumping and rutting of the layers will not be permitted. Where required, haul roads shall be constructed on the cap of sufficient depths for the operation of pans or other earth moving equipment without rutting or pumping.

3.07 When placing the layers on slopes, placement shall begin at the bottom of the slope and worked up. Material be not be pushed down the slopes unless approved by the CQA Engineer.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING AND COMPACTING

Part 1 General

1.01 Requirements Included

Provide personnel, equipment, and materials to excavate and backfill trenches for the landfill gas collection and removal system as shown on the plans.

1.02 Related Requirements

Construction Quality Assurance Manual
Section 02300 Earthwork

Part 2 Products

Included in Part 3.

Part 3 Execution

3.01 Clearing

The sites of work shall be cleared of trees, shrubs, and objectionable materials that interfere with execution of proposed work. Trees and shrubs that will not interfere with construction shall be protected from damage. Clearing of site will be considered as an incidental item of excavation.

3.02 Classification of Excavated Materials

Excavated materials shall be unclassified.

3.03 Stockpiling of Excavated Materials

Excavated material shall be stockpiled in a manner that will not endanger the work and that will not obstruct ditches and natural water courses. Topsoil shall be stockpiled separately to guarantee its replacement at the top of the backfill trench.

3.04 Sheeting and Shoring

Sheeting and shoring shall be furnished in accordance with the provisions of VOSH and as necessary to construct and protect the excavation, existing utilities, structures, and as

necessary for the safety of the employees.

3.05 Dewatering

Where conditions are such that running or standing water occurs in the trench bottom or the soil in the trench bottom displays a "quick" tendency, the water should be removed by pumps and suitable means such as well points or pervious underdrain bedding until the pipe has been installed and the backfill has been placed to a sufficient height to limit pipe flotation.

3.06 Highway Rights-of-Way

Work within existing or proposed Virginia State Rights-of-Way shall meet requirements of the Virginia Department of Transportation.

3.07 Material

A. Suitable Material

Backfilling shall normally be done with the earth removed from the trench or excavation, provided that the excavated material is suitable for backfilling.

B. Unsuitable Material

Material such as clay mass, frozen materials, cinders, ashes, refuse, and vegetable or organic material shall be construed as unsuitable material for backfill.

C. Approved Granular Material

Material shall be well graded crushed stone conforming to Size No. 57 as specified in Section 203 of the VDOT Road and Bridge Specifications. Aggregate placed within the waste footprint shall have a calcium carbonate content no greater than 15 percent.

3.08 Excavation for Trenches

A. General

Excavation for trenches shall conform to the lines and grades shown on the approved drawings. Excavated material shall be removed and used for backfilling where suitable.

B. Pipe

The trench shall be excavated to a level below the established pipe grade in accordance with the requirements for bedding as specified below. As appropriate for the type of pipe used, bell holes shall be provided at each joint to permit

proper joint assembly and pipe support. The trench bottom that is excavated below the required level shall be backfilled with approved granular material and compacted to a minimum 95 percent of theoretical maximum density as determined by ASTM D698.

3.09 Trench Width

Trench width at the ground surface may vary with and depend upon depth, type of soils, and position of surface structures. The minimum clear width of the trench, sheeted or unsheeted, measured at the springline of the pipe should be one foot greater than the outside diameter of the pipe. The maximum clear width of the trench at the top of the pipe should not exceed a width equal to the pipe outside diameter plus two feet. If the above defined trench widths must be exceeded or if the pipe is installed in a compacted embankment, pipe embedment should be compacted to a point of at least 2.5 pipe diameters from the pipe on both sides of the pipe or the trench walls, whichever is less. Excavation at manholes and similar structures shall be sufficient to provide 12 inches in the clear between the outside of the structure and the embankment or sheeting.

3.10 Unsuitable Subgrade

A. Unstable Foundation

When an unstable foundation is encountered that will not provide adequate pipe support, additional trench depth shall be excavated to a stable foundation and backfilled with approved granular material.

B. Rock

Where the bottom of the trench at subgrade is rock, excavation shall be carried at least six inches below the specified subgrade and restored to subgrade with compacted approved granule material.

3.11 Bedding

A. The pipe shall be bedded in compacted approved granular material placed in a flat bottom trench. The granular bedding shall have a minimum thickness of four inches under the barrel and shall extend to four inches over the crown of the pipe.

B. Fine aggregate bedding shall meet requirements for fine aggregates, VDOT Road and Bridge Specifications, latest edition.

C. Coarse aggregate bedding shall meet requirements for coarse aggregates, VDOT Road and Bridge Specifications, latest edition.

D. Compact pipe bedding by tamping or rodding to limit settlement.

3.12 Backfilling Trenches

A. General

Trenches shall be backfilled immediately after the pipes and appurtenances are laid therein.

B. Pipe Detection Tape

Trenches for pressure lines shall include inert polyethylene locating tape having a metallic foil core. Tape shall be placed above centerline of pipes at a depth not exceeding two feet below ground surface.

C. Initial Backfill

Initial backfill shall begin at the top of the bedding and shall be placed in six-inch layers up to a level at least one foot above the crown of the pipe. Initial backfill shall be compacted to a minimum 95 percent of theoretical maximum density as determined by ASTM D698. No lumps greater than two inches in diameter shall be allowed in initial backfill material. Backfill under roadways, driveways, and sidewalks shall be approved granular material.

D. Final Backfill

Backfill for trenches not subjected to vehicular traffic shall be placed in layers no greater than one foot thick and compacted to at least 95 percent maximum density as determined by ASTM D 698. Topsoil (in grassed areas) shall be deposited in the final layer of backfill to guarantee the areas will be returned to original or better conditions.

E. Moisture Content

Backfill soil shall be compacted at a moisture content within a range of the optimum moisture content that allows for the required compaction. As required, backfill soil shall be dried by aerating with a scarifier, disc harrow, blade or other equipment or by such other means as may be necessary. As required, fill and backfill soil shall be wetted by the use of water trucks or sprinklers. Dried or wetted fill or backfill soil shall be thoroughly mixed to provide a material of uniform moisture content.

3.13 Restoration

A. General

Physical improvements disturbed by the work shall be restored to conditions equal to or better than those existing prior to the work. Repair of damages to

structures and utilities shall be the responsibility of the CONTRACTOR.

B. Drainage Structures

Ditches, culverts, and other drainage structures that are damaged shall be restored promptly. Drainage structures shall be kept open and functional.

C. Finished Grading and Cleanup

Where possible, ground surface shall be left rounded and slightly higher than surrounding ground to allow for further settlement. Finished areas around structures shall be graded smooth and hand raked and shall meet the elevations and contours as shown on the Drawings. Lumber, earth clods or rocks larger than four inches and other undesirable materials shall be removed from the site at the completion of construction. Clean up shall be done as promptly as practicable and/or at least once a week. Ditches that are disturbed shall be restored as promptly as practical and/or at least once a week. CONTRACTOR shall maintain sediment and erosion control measures in accordance with Section 01560.

END OF SECTION

This page intentionally blank

SECTION 02222

SYNTHETIC CAP ANCHOR TRENCH

Part 1 General

Provide personnel, materials, and equipment to excavate the anchor trenches for the geosynthetic cap system.

Part 2 Products

Not Used

Part 3 Execution

3.01 Trench Excavation

The anchor trenches shall be excavated to the dimensions and in the locations shown on the plans. The trenches shall be excavated prior to placement of the geomembrane cap. Loose soil shall be removed from the trench.

3.02 Corners

Corners of the anchor trench shall be rounded slightly to avoid sharp bends in the geomembrane cap.

3.03 Backfill

The anchor trench shall be backfilled as shown on the details. The backfill shall be placed as soon as possible after installation of the geomembrane cap. Backfill operations shall occur in the morning or during periods of over-cast skies in order that the geomembrane may be in its most contracted state. Care shall be taken to limit damage to the geomembrane. No backfill shall be placed in ponded water or soft conditions within the anchor trench. If ponded water is present, the water shall be pumped out and the anchor trench allowed to dry before backfilling.

END OF SECTION

This page intentionally blank

SECTION 02300

EARTHWORK

Part 1 General

1.01 Requirements Included

The work covered by this section of the specifications consists of furnishing labor, equipment, and materials to perform excavation and other earth moving operations, including construction and maintenance of necessary haul roads, structural fill, and berms.

1.02 Related Requirements

Construction Quality Assurance Manual
Section 02209 Intermediate and Cap Controlled Fill Layers

Part 2 Products

2.01 Soil Material

A. General

1. The OWNER has existing stockpiles located both on-site and at James Madison University that are to be used for fill. The CONTRACTOR will be responsible for quantifying the amount of material at each location and shall provide the remainder of material to achieve grades shown on construction drawings.

2. The CONTRACTOR shall submit tests results to the OWNER to determine if the soil is suitable for fill prior to bidding.

3. Fill material shall not contain frozen masses of soil and shall not be placed on over-saturated, frozen, or frost-covered subgrade.

B. General Fill: General fill refers to soil materials that are classified as CL, ML, SM, SP, SW, or SC as defined by Unified Soil Classification System (ASTM D 2487), or otherwise approved by the OWNER. General fill shall have no particle size larger than four (4) inches in any dimension, debris, waste, vegetation, organic materials, roots, and other deleterious matter. Maximum sized particles should not be in excess of 20 percent of the volume of the fill material, and such particles shall be well distributed throughout the mass. General fill shall not be used for filling in areas:

1. Not to be used within nine (9) inches of the geomembrane cap, as specified in SECTION 02209 – CAP CUSHION AND INTERMEDIATE FILL.

2. Not to be used in the upper two (2) feet of fill below pavements and sports fields, as specified in C., below.

3. Not to be used in the upper five (5) feet of fill below building structures, as specified in C., below.

C. Structural Fill: Structural fill refers to select inorganic soil materials that are classified as CL, ML, SM, SP, or SC as defined by Unified Soil Classification System (ASTM D 2487), or otherwise approved by the OWNER. Structural fill soil must exhibit less than 65% passing the No. 200 sieve, and a liquid limit less than or equal to 50 percent. The maximum particle size of structural fill material should be less than three inches largest dimension. Maximum sized particles should not be in excess of 20 percent of the volume of the fill material, and such particles shall be well distributed throughout the mass. Structural Fill should be used for:

1. Fill below pavements, and sports fields – the last two (2) feet of filling for areas with greater than 2 feet of fill. For areas requiring less than 2 feet of filling, the only Structural Fill shall be used.

2. Fill below building structures – the last five (5) feet of filling for areas with greater than 5 feet of fill. For areas requiring less than 5 feet of filling, the only Structural Fill shall be used.

D. Topsoil: Topsoil refers to select material capable of promoting and sustaining vegetative growth. The topsoil shall be either off-site soil or on site soil mixed with other suitable organic amendment. The soil or soil mixture shall be free of debris, large roots, stumps, or frozen material. The topsoil shall have a pH between 5 and 7.6, contain at least 1 percent organic matter, and have a maximum particle size of two (2) inches, except within the sports fields, where all maximum particle size shall be 1 inch as specified below.

1. Topsoil within Sports Fields: Remove all stones greater than 1 inch, roots, grass, weeds and other foreign matter while placing.

E. All other materials, not specifically described, but required for proper completion of the work shall be selected by the CONTRACTOR and approved by the ENGINEER.

Part 3 Execution

3.01 General

A. Strip topsoil to full depth, stockpile separate from other excavated materials and pile free of roots, stones, and other undesirable materials. Follow guidelines in Virginia Erosion and Sediment Control Handbook to limit erosion. Depressions caused by removal of stumps or the clearing operation shall be excavated to firm subgrade.

B. The CONTRACTOR shall perform excavations described in whatever substance encountered to dimensions and elevations shown on the Contract Drawings. **Excavation shall be unclassified.**

C. Existing utilities, structures, and fencing shall be protected during the construction period, and if damaged or removed by the CONTRACTOR in his operations, shall be repaired or replaced by the CONTRACTOR at no additional cost to the OWNER.

D. The OWNER shall retain QC personnel to monitor Earthwork included in this section. The QC personnel shall be present on-site during subgrade approval and fill and backfill operations.

3.02 Subgrade Approval

Subsequent to clearing, grubbing and stripping, subgrades to receive structures or fill shall be evaluated prior to fill placement by the QC and QA personnel. Such evaluation shall include the observation of subgrade performance during proofrolling with a loaded tandem dump truck provided by the CONTRACTOR. At least three passes are to be made with a fully loaded tandem dump truck. Areas that are deemed unsuitable for fill placement by the QAO shall be clearly identified by horizontal and vertical extent with recommendations for improvements and submitted to the CQA Engineer for further action.

3.03 Moisture Content

Fill and backfill soil shall be compacted at a moisture content within a range of $\pm$ 3% of the optimum moisture content, unless otherwise approved by the CQA Engineer. As required, fill and backfill soil shall be dried by aerating with a scarifier, disc harrow, blade or other equipment or by such other means as may be necessary. As required, fill and backfill soil shall be wetted by the use of water trucks or sprinklers. Dried or wetted fill or backfill soil shall be thoroughly mixed to provide a material of uniform moisture content.

3.04 Depth and Mixing of Fill Layers

Fill and backfill soil shall be placed in layers that when compacted shall not exceed nine inches (9"). Each layer shall be spread evenly and shall be thoroughly bladed and mixed during the spreading to obtain uniformity of material in each layer.

3.05 Compaction of Fill

A. Compaction of each layer, unless otherwise specified, as shown on the Contract Drawings and determined in the field shall be continuous over its entire area and the compaction equipment shall make sufficient trips to verify that the required density has been obtained. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted in nine inch (8") maximum compacted thickness lifts.

1. The minimum dry density of the soil shall be at least ninety five percent (95) of the maximum dry density as determined by ASTM D698 (standard Proctor) under structures, paved areas, sports fields, or embankments, unless otherwise shown on the Contract Drawings.

2. The minimum dry density of the soil shall be at least ninety percent (90) of the maximum dry density as determined by ASTM D698 (standard Proctor) under areas other than listed in 1. above.

B. Compaction equipment shall be of such design that it will be able to compact the fill to the specified density. Prior to placing the fill, at the preconstruction meeting or a minimum of 7 days prior to usage, the CONTRACTOR shall submit to the CQA Engineer, for approval, a list of compaction equipment to be used. The CQA Engineer shall have 7 days to approve or disapprove the list. The list shall include the type of equipment, manufacturer and size.

C. If, in the opinion of the CQA Engineer, the compaction equipment is not acceptable, the CONTRACTOR may demonstrate the suitability of such equipment in a test area within the prepared fill site.

D. Fill faces shall be compacted. Compacting operations shall be continued until the slope faces are stable but not too dense for planting and there is no appreciable amount of loose soil on the surface.

3.06 Topsoil

Finished grading for sports fields shall be performed with small tractors outfitted with flotation (turf-type) tires utilizing laser grading equipment. Fine grade topsoil to eliminate uneven areas and to ensure proper drainage. Actual grades shall conform to design elevations with a tolerance of +/- ¾ inch. In no event shall there be any depressions or other areas where water does not freely drain from the surface of the field.

After finish grading the soil shall have a compaction level not exceeding 85% of the maximum dry density of the material.

3.07 Quality Control

See Construction Quality Assurance Manual.

3.08 Surface Water

Fill areas shall be kept free of standing water with positive drainage maintained. Sloping of the fill surface, diversion dikes, and drainage channels shall be provided to carry off water as it collects. Pumping shall be required to remove water from areas that cannot drain naturally.

3.09 Seasonal Limits

No fill material shall be placed, spread or rolled while the ground is frozen or thawing, or during unfavorable weather conditions. When the work is interrupted by inclement weather, fill operations shall not be resumed until the moisture content and density of the previously placed fill are as specified. Fill surfaces exposed to inclement weather or standing water shall be scarified to a depth of 6 inches, compacted and tested prior to placing addition fill lifts.

3.10 Integrity of the Work

It shall be the CONTRACTOR'S responsibility to maintain the integrity of the work. Work that is damaged by weather or construction activities shall be restored and retested at the CONTRACTOR'S expense.

END OF SECTION

This page intentionally blank

SECTION 02420

SURFACE RUNOFF COLLECTION SYSTEMS

Part 1 General

1.01 Requirements Included

Provide personnel, equipment, and materials to construct a surface runoff collection and diversion system.

1.02 Related Requirements

Section 01560 Erosion and Sediment Control
Section 02480 Landfill Seeding

Part 2 Products

2.01 Surface runoff collection berms, diversions and channels shall be promptly seeded following construction in accordance with Section 02480.

2.02 Riprap shall be in accordance with Sections 204 and 414 of the VDOT Road and Bridge Specifications, 2002.

2.03 Erosion Control Blanket

Erosion Control Blanket, Treatment 1 (equivalent to VDOT EC-2) or Treatment 2 (equivalent to VDOT EC-3), shall be in accordance with the Virginia Erosion and Sediment Control Handbook, latest edition. Treatment 1 shall be North American Green C125 or approved equal. Treatment 2 shall be North American Green S150 or approved equal.

Part 3 Execution

3.01 Surface runoff collection berms, diversions and channels shall be installed in the locations shown on the Contract Drawings and in accordance with Section 01560. Collection and diversion ditches shall be accurately constructed to the dimensions and grades shown on the Contract Drawings.

3.02 Surface berms shall have a minimum grade of 0.5%

3.03 Riprap shall be placed in the locations shown on the Contract Drawings and to the dimensions specified.

3.04 Geotextile fabric shall be used under the riprap in drainage ditches as per Specification Section 13300. The riprap shall be placed in a manner to reduce damage to the filter fabric. The riprap shall be placed in accordance with Section 414 of the VDOT Road and Bridge Specifications, 2002.

END OF SECTION

SECTION 02530

SANITARY SEWERAGE SYSTEMS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Provide personnel, materials, equipment, and supplies to install sanitary sewerage system as shown on the Drawings, including all piping, fittings, valves, manholes, cleanouts, and appurtenances.

B. Provide all personnel, materials, and equipment necessary to perform testing of newly laid sewerage force mains, gravity sewers, manholes, and wetwells.

C. Provide certificates that all lines meet testing requirements.

D. Compliance with most current City of Harrisonburg DCSM

1.02 RELATED REQUIREMENTS

A. Section 01720; Construction Layout

B. Section 02300; Earthwork

C. Section 02532; Sanitary Sewer Manholes and Cleanouts

D. Section 15105; Pipe and Pipe Fittings

1.03 QUALITY ASSURANCE

Comply with all applicable codes and regulations as required by regulatory agencies having jurisdiction over this Work. Comply with the pertinent sections of the Virginia Department of Health's “Sewage Collection and Treatment Regulations”. Comply with all pertinent requirements of the Virginia Department of Transportation "Road and Bridge Specifications", and "Standard Details", latest editions.

1.04 SUBMITTALS

A. Shop drawings and product data for pipe and appurtenances.

B. Submit test logs with location of lines, date tested, length of line tested, pressure at beginning of test, pressure at end of test, time period, amount of leakage allowable, amount of leakage, signature of person responsible for test and any other pertinent data with Quality Control Report.

PART 2 PRODUCTS

Materials, equipment, and water source shall be suitable for the purpose of test.

PART 3 EXECUTION

3.01 GENERAL

Gravity sewer lines shall be laid to lines and grades shown on the drawings with manholes and service connections at required locations. Installation of all materials shall be in strict conformance with manufacturer's recommendations.

3.02 CLEARANCE

A. Wherever gravity sewer lines are within 10 feet of water mains, the top of the sewer line shall be not less than 18 inches below the bottom of the water main. This vertical separation should be maintained for that portion of the sewer line located within 10 feet horizontally of the waterline, said feet to be measured as the normal distance from the water main to the sewer.

B. Wherever possible, sewer lines shall be laid at least 10 feet, horizontally, from any existing or proposed waterline. Should local conditions prevent a lateral separation of 10 feet, a sewer line may be laid closer than 10 feet to a waterline provided that the line is laid in a separate trench and the top of the sewer line is maintained at 18 inches below the bottom of the waterline. The Contractor shall obtain approval from the Engineer before laying any sewer line closer than 10 feet, to a waterline. Whenever a sewer line passes over a water line, a vertical separation of at least 18 inches between the bottom of the sewer and the top of the waterline shall be maintained. Whenever a sewer line passes over a waterline, the sewer shall be constructed of AWWA approved water pipe and shall be pressure tested in place without leakage prior to backfilling.

C. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer shall be constructed of AWWA approved water pipe and shall be pressure tested in place without leakage prior to backfilling.

3.03 EXISTING UTILITIES

A. The location of existing utilities, including underground utilities, is indicated on the drawings insofar as their existence and location were known at the time of preparation of the drawings. However, nothing in these Contract Documents shall be construed as a guarantee that such utilities are in the location indicated or that they actually exist, or that other utilities are not within the area of operations. The Contractor shall make all necessary investigations to determine the existence and locations of such utilities far enough in advance of pipelaying to allow for adjustments due to conflicts in the horizontal and vertical location of the pipe line.

B. The Contractor shall obtain field utility locations by calling “Miss Utility” (1-800-552-7001) forty-eight (48) hours prior to working in the vicinity of existing utilities. If the utilities fail to locate, a second call shall be made providing an

additional three (3) hour notice.

C. The Contractor shall pay for any damage to and for maintenance and protection of existing utilities and structures.

3.04 LAYING PIPE AND PLACING MANHOLES

A. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipes, fittings, valves, and manholes shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to sewer pipe and appurtenances. Under no circumstances shall materials be dropped or dumped into the trench. The excavation shall be dewatered prior to installation of the pipe and manholes. Installation of sewage force main shall be in accordance with AWWA C600.

B. All materials shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject materials.

C. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any other foreign material before the pipe is laid.

D. Foreign material shall be prevented from entering the pipe and manholes while being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe. Each pipe shall be swabbed or brushed out as necessary to assure that no debris gets into the finished line.

E. Pipe that may require field cutting shall be done so in a neat and workmanlike manner, so as to leave a smooth end at right angles to the axis of the pipe. Care shall be taken to avoid damaging the pipe and any coatings or linings. Ductile iron pipe shall not be cut with an oxyacetylene torch.

F. Pipe and fittings shall be strung out along the route of construction where it will cause least interference with traffic. Construction of gravity sewer shall commence at the lowest point in the system. The downstream sections shall be completed, tested, and approved prior to allowing sanitary sewage to enter the system.

G. Laying of pipe shall be commenced immediately after excavation is started and every measure must be used to keep pipe laying closely behind trenching. No more than 10 feet of trench shall remain open at the end of each working day.

H. The Contractor shall maintain existing sewage flows at all times by pumping, diversion, or other means approved by the Engineer. The Contractor shall at no time allow sewage to be diverted into a natural watercourse or back up into any service connections. The Contractor shall pay for all damages which may occur as a result of failing to maintain the sewage flow in the system.

I. The Contractor shall make provisions at all times to allow natural drainage to flow through the work area with minimum damage to the new construction and/or existing downstream storm drain system. The Contractor shall at no time allow drainage to back up or be diverted onto private property. The Contractor shall pay for all damages which may result by failing to maintain drainage flow.

J. Gravity sewer pipe shall be laid in true straight lines with the bell ends upstream and with the invert of the pipe being the true elevation and grade of the system. The Contractor shall establish and maintain the horizontal alignment and vertical elevation and grade of the system in accordance with the survey information indicated on the Drawings.

K. The horizontal alignment of gravity sewer pipe shall be maintained by a transit or theodolite plumbed over the center of the downstream manhole. The vertical elevation and grade shall be maintained by an adjustable laser level mounted at the invert of the downstream manhole with target(s) placed in the bell end of the pipe being laid.

L. Connections to existing sewers shall be made in accordance with local standards and requirements. Contractor shall verify invert elevations of existing sewers to which connections are to be made and inform the Engineer immediately of any discrepancies on the Drawings.

M. For force mains, the trench may be curved to change direction or to avoid obstructions within 2/3 of the limits of the curvature of the pipe as recommended by the manufacturer. Where necessary to maintain the required curvature, short sections of the pipe or fittings shall be provided. Harnessing shall be provided for these short sections of pipe or where fittings are provided for the force main.

N. When work is not in progress, the Contractor shall plug the open ends of the pipe to prevent trench water or other substances from entering the pipe. The plug shall be watertight and shall remain in place until any required dewatering has been completed.

3.05 JOINTING

A. The sanitary sewer system shall be laid and joined complete-in-place in order that each length and section of pipe between the manholes shall have a smooth and uniform invert. The previous joint shall have been completed and the entire length of pipe shall be well bedded and firmly backfilled before jointing another

length of pipe. Bell holes shall be dug of sufficient size to insure proper jointing.

B. The Contractor shall not use excavation equipment to push the pipe into the home position, unless approved by the Engineer, and then only for one length of pipe at a time.

C. Joints for pipes of different materials shall either be made at manholes or with standard adapter fittings.

D. The Contractor shall join the pipe as recommended by the manufacturer to obtain the degree of watertightness required. The use of lubricants, primers, adhesives and similar materials shall be as recommended by the manufacturers.

3.06 LOCATION TAPE

A. Plastic encased aluminum foil tape shall be installed above all non-metallic force main such that pipe can be located in the future with a metal locating device. Tape shall be color coded and permanently imprinted with identification message. Tape shall be LINEGUARD Detectable Underground Marking Tape, or equal.

3.07 SERVICE CONNECTIONS

A. Service lines shall be connected to the sewer by means of wye fittings with a branch as shown on the Drawings. The branch of the wye fitting will be elevated as directed depending upon the depth of the sewer. The service line shall be connected to the wye fitting with a 45° bend. Service lines shall extend from the sewer line to the property line as indicated, unless otherwise specified. Ends shall be plugged and marked. The Contractor shall verify that the elevation of the service line will allow gravity flow from the unit served. Cleanouts shall be installed on the upstream end of all horizontal deflections in the service lateral. All work to comply with City of Harrisonburg DCSM.

B. Acceptance of Installation

Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

3.08 TESTING OF GRAVITY SEWER LINE

A. Prior to final inspection, the required tests shall be completed in the presence of the Engineer, the Owner, or the Owner's authorized representative. The Contractor shall prove the watertightness of the sewer system or portions thereof by a low pressure air test. The Contractor might utilize an infiltration or

exfiltration test in special circumstances, but only after receiving written approval from the Engineer. All testing expenses shall be borne by the Contractor, and shall be bid as a part of the price of the sanitary sewer.

B. AIR TEST: A low pressure air test may be employed on pipes of 18" diameter or less. The testing equipment, procedure, and results will all be subject to the strict approval of the Engineer. Results of the air test will be reviewed for compliance with ASTM C828 and C924. The air test is to be conducted between two (2) consecutive manholes. The test equipment shall consist of two (2) plugs (one tapped and equipped for air inlet connection), a shut-off valve, a pressure regulating valve, a pressure reduction valve, and a monitoring pressure gauge having a pressure range from 0 to 5 psi, graduated in 0.10 psi with an accuracy of ± .04 psi. Contractor equipment shall be set up outside the manhole for easy access and reading. Air shall be supplied to the test slowly and shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig. The pipeline shall be filled until a constant internal pressure of 3.5 psig is maintained. The internal pressure shall be maintained at 3.5 psig or slightly above for a five (5) minute stabilization period, after which time the internal pressure will be adjusted to 3.5 psig, the air supply shut off and the test begun. No person shall remain in the manhole while pipe is being pressurized or throughout the test for safety purposes. A pressure drop of 1.0 psi from 3.5 to 2.5 psig shall be allowed for the test times specified in the following table, based upon the designated pipe size and test segment length. Should the 1.0 psi drop occur in less time than that specified in the table the sewer segment shall have failed. If the time required for the pressure to drop 1.0 psi is greater than that shown in the table, the sewer segment shall have passed. For a more detailed description of the air test method refer to ASTM C828, current revision. An air pressure correction shall be required when the prevailing ground water is above the sewer line being tested and shall be calculated as follows:

Ground Water Depth (ft.)/2.31 + 3.5 = Starting Test Pressure
Ending Test Pressure = Starting Pressure - 1.0 psi

There is no change from time requirements established for the basic air test.

AIR TEST TABLE

BASED ON EQUATIONS FROM ASTM C828 LATEST REVISION
SPECIFICATIONS TIME (MIN:SEC)
REQUIRED FOR PRESSURE DROP FROM 3.5 TO 2.5 PSI
WHEN TESTING ONE PIPE DIAMETER ONLY

Length of Test Segment	Pipe Diameter (in)						
	4	6	8	10	12	15	18
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56

125	0:22	0:50	1:28	2:18	3:18	5:09	7:26
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30
175	0:31	1:09	2:03	3:13	4:37	7:05	
200	0:35	1:19	2:21	3:40	5:17		
225	0:40	1:29	2:38	4:08	5:40		
250	0:44	1:39	2:56	4:35			8:31
275	0:48	1:49	3:14	4:43			9:21
300	0:53	1:59	3:31				10:12
350	1:02	2:19	3:47			8:16	11:54
400	1:10	2:38	4:04		6:03	9:27	13:36
450	1:19	2:50			6:48	10:38	15:19
500	1:28			5:14	7:34	11:49	17:01

C. VISUAL TEST: All sewer lines shall be inspected visually to verify accuracy of alignment and freedom from debris and obstructions. The full diameter of the pipe for straight alignments shall be visible when viewed between consecutive manholes. The method of test shall be visually lamping with mirrors and lights.

D. DEFLECTION TEST: The maximum allowable pipe deflection (reduction in inside diameter) shall be 7%. The Engineer reserves the right to require the Contractor to perform random deflection tests of pipe before final acceptance. The device for testing shall be a properly sized go - no go mandrel.

E. WATER CROSSINGS: All sewers crossing streams, estuaries, lakes, reservoirs, and/or stormwater detention ponds shall be tested in place and shall exhibit zero infiltration and leakage.

F. INFILTRATION TEST (ONLY IF APPROVED): This test will only be allowed when the hydrostatic head outside the pipe is a minimum of 4 feet above the crown of the entire length of the pipe being tested. The Contractor shall verify the level of the hydrostatic head during testing. Measurement of the infiltration shall be made before sewage flows are allowed in the sewer, and shall be made by means of a V-notch weir or by measuring the direct volume at the nearest down-grade manhole. Allowable leakage shall not exceed 100 gallons per inch of nominal pipe diameter per day per mile for any section of the system, including manholes. This test shall be conducted in accordance with ASTM Standard C654.

G. EXFILTRATION TEST (ONLY IF APPROVED): This test shall be accomplished by bulkheading the sewer at the end of lower grade and filling the upstream manhole to a minimum of 4 feet of head above the crown of the pipe, or to the top of the manhole, whichever is less. Leakage shall be computed by measuring the volume of water which left the manhole during the test period. Allowable leakage shall be the same as that specified for the Infiltration test.

Vented cleanouts will need to be sealed for the exfiltration test. A watertight cap may be utilized for this purpose.

3.09 TESTING OF PRECASR MANHOLES, WET WELLS, VALVE VAULTS, ETC.

A. Precast structures shall be tested by vacuum test, after assembly, but prior to backfilling. Alternate methods of testing might be utilized in special circumstances but only after receiving written approval from the Engineer.

B. The procedure for the vacuum test shall be as follows:

1. Test shall comply with ASTM standards or Division of Water Programs Working Memo #550 dated November 4, 1987. This test method is only applicable to precast concrete manholes. Testing shall include the joint between the concrete cone or spacer rings and the manhole frame.

2. Stubouts, manhole boots and pipe plugs shall be secured to prevent movement while the vacuum is drawn.

3. Installation and operation of vacuum equipment and indicating devices shall be in accordance with equipment specifications for which performance information has been provided by the manufacturer and approved by the Virginia Department of Health.

4. A measured vacuum of 10 inches of mercury shall be established in the manhole. The time for the vacuum to drop to nine inches of mercury shall be recorded.

5. Acceptance standards for leakage shall be established from the elapsed time for a negative pressure change from 10 inches to nine inches of mercury. The maximum allowable leakage rate shall be in accordance with the following:

TIME (SECONDS) FOR VACUUM TO DROP FROM 10" HG TO 9" HG

Depth (ft)	Pipe Diameter (in)								
	30	33	36	42	48	54	60	66	72
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	34	39	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105

28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

6. If the structure fails the test, necessary repairs shall be made and the vacuum test and repairs shall be repeated until the manhole passes the test or the manhole shall be tested in accordance with the standard exfiltration test and rated accordingly.

7. If a structure's joint mastic is completely pulled out during the vacuum test, the structure shall be disassembled and the mastic replaced.

C. If approved by Engineer completed precast structure may be tested by exfiltration. Inflatable stoppers shall be used to plug all lines entering and exiting the subject structures. The stopper shall be positioned far enough into the lines to ensure testing of that section of line not air tested. The manhole shall then be filled with water and allowed to soak for 12 hours. Allowable leakage during that period shall not exceed 0.25 gallons per hour.

3.10 COORDINATION

All work in this section shall be coordinated with the plumbing and mechanical work so that connections and minor adjustments can be made.

END OF SECTION

This page intentionally blank

SECTION 02532

SANITARY SEWER MANHOLES AND CLEANOUTS

Part 1 GENERAL

1.01 WORK INCLUDED

A. The work shall include providing all equipment, materials, labor, and services required to construct and install manholes and cleanouts as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02300; Earthwork

B. Section 02530; Sanitary Sewerage System

1.03 QUALITY ASSURANCE

Comply with all applicable codes and regulations as required by regulatory agencies having jurisdiction over this Work. Comply with the pertinent sections of the following standards:

A. ASTM - American Society of Testing and Materials

B. VDOT - Virginia Department of Transportation

C. AASHTO - American Association of State Highway & Transportation Officials

D. ACI - American Concrete Institute

E. City of Harrisonburg most current DCSM.

1.04 SUBMITTALS

Shop drawings and product data for manholes and cleanouts, and related accessories.

Part 2 PRODUCTS

2.01 MANHOLES

A. Manholes shall be constructed of precast reinforced concrete with cast iron frames and covers as shown on the Drawings. Precast manholes shall conform to ASTM C478. All reinforcing steel shall conform to ASTM A615. Joints between concrete riser sections shall be sealed with flexible butyl resin sealant conforming to Federal Specification SS-S-210A and AASHTO M198.

B. Each unit shall have no more than two (2) holes for installation and/or handling. All holes shall be plugged with rubber stoppers and mortared upon completion of setting manhole.

C. Base units shall be tub or monolithic type with walls that extend above the top of the largest inlet or outlet pipe. Sanitary sewer manholes shall have an inside diameter of four (4) feet unless otherwise shown on the Drawings. Minimum wall thickness shall be five (5) inches. Concrete shall be minimum compressive strength of 4000 psi at 28 days.

D. Manhole top units shall be eccentric taper type, at least three (3) feet in height, or flat top where indicated.

E. Manholes shall be constructed to the required height to insure that the top of the frame and cover will be set at finished grade, unless specified or indicated otherwise. Spacer rings or other means shall be provided to allow up to eight (8) inches adjustment to final pavement.

2.02 MANHOLE CONNECTIONS

A. Sanitary sewer pipe connections to manholes shall be made utilizing rubber gaskets cast integrally in the manhole base at the time of manufacture. Rubber gaskets shall conform to ASTM C923 and shall meet the performance and test requirements of ASTM C425. Flexible connections shall be A-LOK Manhole Pipe Seal, manufactured by A-LOK Corp., or equal.

B. As an alternate, connections may be made utilizing field installed positive seal gasketing systems. Field installed connections shall be PRESS-BOOT, manufactured by Press Seal Gasket Corporation; KOR-N-SEAL, manufactured by National Pollution Control Systems, Inc.; or equal.

2.03 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be cast ductile iron in accordance with the dimensions shown on the Drawings. Minimum opening diameter shall be 24 inches. The words "SANITARY SEWER" shall be cast in the cover so as to be plainly visible. Casting shall be manufactured true to pattern with component parts fitted together in a satisfactory manner. Frames and covers shall have machined bearing surfaces to prevent rocking or rattling. Castings shall be uniform in quality, without defects.

B. Standard manhole frames and covers shall be GTS, manufactured by Quality Water Products, or equal. Watertight manhole frames and covers shall be PAM-TIGHT, manufactured by Quality Water Products, or equal. Anchor bolts shall be supplied by manufacturer.

2.04 MANHOLE STEPS

A. Steps shall be steel encapsulated in corrosion resistant rubber or copolymer polypropylene plastic, as manufactured by Delta Pipe Products (WEDG-LOK), Model #PS1-PF as manufactured by M.A. Industries, or equal.

B. Steps shall be in accordance with the dimensions and capable of withstanding the loads specified in ASTM C478, and shall be designed for installation in a sanitary sewer.

C. Steps shall be required in all structures with a depth greater than four (4) feet. Steps shall be vertically aligned and uniformly spaced for the entire depth of the structure. Steps shall be located in the structures so as to land upon a bench.

D. Steps shall be vertically spaced twelve (12) inches on center. Step width shall be sixteen (16) inches. Steps shall protrude from the wall of the structure a minimum of five (5) inches and a maximum of seven (7) inches and shall have a drop front and a grooved step surface.

2.05 INVERT SHAPING

A. The invert channels of manholes shall be smooth and semi-circular in shape sized to match the inlet and outlet pipes and sloped to provide a smooth transition between the inlet and outlet pipes. Changes in direction of flow shall be made with a smooth curve channel with a radius as large as the base will permit.

B. The invert channels and benches may be formed directly in the concrete base unit of the manhole or may be constructed with brick and mortar. The benches shall slope a minimum of two (2) inches per foot toward the invert channel. The surface of the channels and benches shall be concrete.

C. Modified shaping, defined as a channel two-thirds the height of the largest pipe, shall be acceptable.

2.06 GROUT

A. Aggregate shall be clean, washed natural sand, free from dirt and foreign material, in accordance with ASTM C144.

B. Portland Cement shall be Type II, in accordance with ASTM C150.

C. Water shall be clean and free from injurious amounts of oil, acid, alkali, organic or other deleterious matter.

D. Grout used for shaping invert channels and filling connection openings shall be composed of two (2) parts aggregate and one (1) part Portland Cement, mixed in accordance with ASTM C270.

2.07 CLEANOUTS

A. Sewer cleanouts shall be constructed of Schedule 40 PVC pipe, unless otherwise indicated, which is the same diameter as the sewer main it is servicing. Cleanouts shall be threaded to accept pipe plug.

Part 3 EXECUTION

3.01 INSTALLATION

A. Items shall be installed in accordance with manufacturer's recommendations, the Drawings, and related Specification Sections.

END OF SECTION

This page intentionally blank

SECTION 02630

STORM DRAINAGE

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Provide personnel, materials, equipment, and supplies to install storm sewerage system as shown on the Drawings, including all piping, fittings, drop inlets, manholes, and appurtenances.

1.02 RELATED REQUIREMENTS

A. Section 01720; Construction Layout

B. Section 02300; Earthwork

C. Section 15105; Pipe and Pipe Fittings

1.03 QUALITY ASSURANCE

Comply with all applicable codes and regulations as required by regulatory agencies having jurisdiction over this Work. Comply with all pertinent requirements of the Virginia Department of Transportation "Road and Bridge Specifications", and "Standard Details", latest editions. **Compliance with City of Harrisonburg most recent DCSM.**

1.04 SUBMITTALS

Shop drawings and product data for pipe and appurtenances.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Types of material for storm sewer pipe and fittings shall be as indicated on the Drawings. See Section 15105 for pipe and fitting specifications.

2.02 DRAINAGE STRUCTURES

A. Drop inlets, manholes, junction boxes, endwalls and other structures shall be precast concrete in accordance with the VDOT Road and Bridge Standards. Types and sizes of structures shall be as indicated on the Drawings.

PART 3 EXECUTION

3.01 GENERAL

Storm sewer lines shall be laid to lines and grades shown on the drawings with drop inlets and manholes at required locations. Installation of all materials shall be in strict conformance with manufacturer's recommendations.

3.02 EXISTING UTILITIES

A. The location of existing utilities, including underground utilities, is indicated on the drawings insofar as their existence and location were known at the time of preparation of the drawings. However, nothing in these Contract Documents shall be construed as a guarantee that such utilities are in the location indicated or that they actually exist, or that other utilities are not within the area of operations. The Contractor shall make all necessary investigations to determine the existence and locations of such utilities far enough in advance of pipelaying to allow for adjustments due to conflicts in the horizontal and vertical location of the pipe line.

B. The Contractor shall obtain field utility locations by calling "Miss Utility" (1-800-552-7001) forty-eight (48) hours prior to working in the vicinity of existing utilities. If the utilities fail to locate, a second call shall be made providing an additional three (3) hour notice.

C. The Contractor shall pay for any damage to and for maintenance and protection of existing utilities and structures.

3.03 LAYING PIPE AND PLACING STRUCTURES

A. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipes, fittings, drop inlets, and manholes shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to storm sewer pipe and appurtenances. Under no circumstances shall materials be dropped or dumped into the trench. The excavation shall be dewatered prior to installation of the pipe and appurtenances.

B. All materials shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject materials.

C. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any other foreign material before the pipe is laid.

D. Foreign material shall be prevented from entering the pipe, drop inlets and manholes while being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe. Each pipe shall be

swabbed or brushed out as necessary to assure that no debris gets into the finished line.

E. Pipe that may require field cutting shall be done so in a neat and workmanlike manner, so as to leave a smooth end at right angles to the axis of the pipe. Care shall be taken to avoid damaging the pipe and any coatings or linings. Ductile iron pipe shall not be cut with an oxyacetylene torch.

F. Pipe and fittings shall be strung out along the route of construction where it will cause least interference with traffic. Commence at the lowest point in the system. The downstream sections shall be completed, tested, and approved prior to allowing drainage to enter the system.

G. Laying of pipe shall be commenced immediately after excavation is started and every measure must be used to keep pipe laying closely behind trenching. No more than 10 feet of trench shall remain open at the end of each working day.

H. The Contractor shall make provisions at all times to allow natural drainage to flow through the work area with minimum damage to the new construction and/or existing downstream storm drain system. The Contractor shall at no time allow drainage to back up or be diverted onto private property. The Contractor shall pay for all damages which may result by failing to maintain drainage flow.

I. Pipe shall be laid in true straight lines with the bell ends upstream and with the invert of the pipe being the true elevation and grade of the system. The Contractor shall establish and maintain the horizontal alignment and vertical elevation and grade of the system in accordance with the survey information indicated on the Drawings.

J. The horizontal alignment of the pipe shall be maintained by a transit or theodolite plumbed over the center of the downstream manhole. The vertical elevation and grade shall be maintained by an adjustable laser level mounted at the invert of the downstream manhole with target(s) placed in the bell end of the pipe being laid.

K. Connections to existing storm sewers shall be made in accordance with local standards and requirements. Contractor shall verify invert elevations of existing storm sewers to which connections are to be made and inform the Engineer immediately of any discrepancies on the Drawings.

L. When work is not in progress, the Contractor shall plug the open ends of the pipe to prevent trench water or other substances from entering the pipe. The plug shall be watertight and shall remain in place until any required dewatering has been completed.

3.04 JOINTING

A. The storm sewer system shall be laid and joined complete-in-place in order that each length and section of pipe between the drop inlets and manholes shall have a smooth and uniform invert. The previous joint shall have been completed and the entire length of pipe shall be well bedded and firmly backfilled before jointing

another length of pipe. Bell holes shall be dug of sufficient size to insure proper jointing.

B. The Contractor shall not use excavation equipment to push the pipe into the home position, unless approved by the Engineer, and then only for one length of pipe at a time.

C. Joints for pipes of different materials shall either be made at drop inlets, manholes or with standard adapter fittings.

D. The Contractor shall join the pipe as recommended by the manufacturer to obtain the degree of watertightness required. The use of lubricants, primers, adhesives and similar materials shall be as recommended by the manufacturers.

E. The pipe shall be connected to drop inlets and manholes using A-LOK Manhole Pipe Seal or equal.

3.05 INSTALLATION OF INLETS

Drop inlets shall be constructed to the required height to insure that the collar and grate of the catch basin type inlets and the curb opening of the curb type inlets will be set at the finished grade.

3.06 INVERT SHAPING

A. The invert channels of manholes, inlets and junction boxes shall be smooth and semi-circular in shape sized to match the inlet and outlet pipes and sloped to provide a smooth transition between the inlet and outlet pipes. Changes in direction of flow shall be made with a smooth curve channel with a radius as large as the base will permit.

B. The invert channels and benches may be formed directly in the concrete base unit of the manhole or may be constructed with brick and mortar. The benches shall slope a minimum of one (1) inch per foot toward the invert channel. The surface of the channels and benches shall be concrete.

C. Modified shaping, defined as a channel two-thirds the height of the largest pipe, shall be acceptable.

3.07 COORDINATION

All work in this section shall be coordinated with the plumbing and mechanical work so that connections and minor adjustments can be made.

END OF SECTION

SECTION 02702

PAVEMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all equipment, materials, labor and services required to return all excavated sections of roadways to an original or better condition, and to provide all new pavement indicated.

1.02 RELATED WORK

A. Section 02300; Earthwork

1.03 REFERENCES

A. All materials and methods of construction shall be in accordance with the latest revision of the applicable Virginia Department of Transportation (VDOT) Standards and Road and Bridge Specifications and City of Harrisonburg DCSM.

1.04 WARRANTY

A. The Contractor shall maintain the paved surface over all excavated areas for a period of one (1) year after the work has been completed and accepted by the Owner.

1.05 JURISDICTION

A. The Contractor shall note that the roadways on this project are under the jurisdiction of the City of Harrisonburg and work in the street right of way will be subject to inspection by the City Public Works Department. The Contractor shall pay any and all charges, fees, and assessments from the Department including the cost of the permit for this project.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse Aggregate shall be Number 78, Grade B minimum and shall conform with VDOT Section 203.

B. Aggregate Base Material shall be Type I for Size 21 or 21A and shall conform with VDOT Section 208.

C. Liquid Asphalt Material shall conform with VDOT Section 210 and shall be of the Grade as follows:

Tack Coat	Grade RC-250 or CSS-1h
Prime Coat	Grade RC-250 or CSS-1h
Seal Coat	Grade CRS-2 or CMS-2 or CMS-2h

D. Asphalt Concrete Base Material shall be Type BM-25 Asphalt Concrete, as available, and shall conform with VDOT Section 211.

E. Asphalt Concrete Surface Material shall be Type SM-9.5 Asphalt Concrete, each where indicated, and shall conform with VDOT Section 211. Aggregate shall be limestone.

F. Paint shall be No. 44 conforming to VDOT Section 231, for traffic areas and shall be Benjamin Moore "Ironclad Safety Zone" (white) or equal for parking stripes.

PART 3 EXECUTION

3.01 SUBGRADE

A. In cut areas remove any existing pavement and remove subgrade to a depth to allow for pavement thickness. Subgrade should be scarified and compacted. In cut and fill areas, subgrade should be compacted to ninety-five (95) percent of maximum dry density as determined by ASTM D698, moistened or dried to within plus or minus three (3) percentage points of optimum moisture, and brought up to a height suitable to allow for the pavement thickness. Subgrade fill shall be suitable material as specified in Section 02300.

B. Edges of existing asphalt concrete or surface treatment pavement shall be cut in a straight line using a mechanical saw manufactured for that purpose, a minimum of six (6) inches back from the edge of the trench.

3.02 ASPHALT CONCRETE PAVEMENT

A. Prepare subgrade by grading and compacting backfill prior to placing the base course. The surface shall be true to line and grade.

B. Aggregate Base Course shall consist of aggregate base material as specified herein and placed in accordance with VDOT Section 309, to the compacted thickness indicated on the drawings or as a minimum to a compacted thickness of six (6) inches, on the subgrade. Aggregate base material shall be compacted to ninety-five (95) percent of maximum dry density per VTM-10 (Nuclear Density) at a frequency of one test per 10,000 square feet. Base material placement shall be confirmed by proof rolling with a fully loaded tandem axle dump truck, with the number of passes to be at the discretion of the City inspector.

C. Prime Coat shall consist of liquid asphalt material as specified herein and applied on the aggregate base course at a rate of 0.30 gallons per square yard and in accordance with VDOT Section 311.

D. Asphalt Concrete Base Course shall consist of the compacted thickness indicated on the drawings or as a minimum four (4) inches compacted thickness of asphalt concrete base material as specified herein and shall be placed in accordance with VDOT Section 315 on the primed aggregate base course. Where a trench is in a street that is to receive a street pavement overlay, the top of the asphalt base shall be flush with the existing, adjacent street surface, and the asphalt base course shall be 4½ inches compacted thickness.

E. Tack Coat shall consist of liquid asphalt material as specified herein and applied at a rate of 0.10 gallons per square yard and in accordance with VDOT Section 310 on the asphalt base course.

F. Asphalt Concrete Surface Course shall consist of the compacted thickness indicated on the drawings or as a minimum two (2) inches compacted thickness of asphalt concrete surface material as specified herein and shall be placed in accordance with VDOT Section 315 on the tacked asphalt base course. Where a trench is in a street that is to receive a street pavement overlay, the entire street, including that over the trench, shall receive the overlay during a single paving operation, in which case the asphalt surface course over the trench shall be 1½ inches.

3.03 SURFACE TREATMENT PAVEMENT

A. Prepare subgrade by grading and compacting backfill prior to placing the base course. The surface shall be true to line and grade.

B. Aggregate Base Course shall consist of aggregate base material as specified herein and placed in accordance with VDOT Section 309, to the compacted thickness indicated on the drawings or to a minimum compacted thickness of six (6) inches, on the subgrade.

C. Prime Coat shall consist of liquid asphalt material as specified herein and applied on the aggregate base course at a rate of 0.30 gallons per square yard with a cover of coarse aggregate applied at the rate of twenty-five (25) pounds per square yard, all conforming to VDOT Section 311.

D. The first seal coat shall consist of liquid asphalt material applied at the rate of three tenths (0.30) gallons per square yard in accordance with Section 312. Aggregate cover shall consist of coarse aggregate applied at the rate of twenty-five (25) pounds per square yard.

E. The second seal coat shall be as specified for the first seal coat.

3.04 TEMPORARY RESTORATION

A. The Contractor shall make temporary street, driveway entrance restoration when it is not feasible to immediately replace pavement after the placement and compaction of the backfill.

B. The Contractor shall furnish and install crushed stone or gravel or temporary asphalt base material as required to maintain traffic until permanent pavement can be restored.

C. The Contractor shall continuously maintain the temporary material in a smooth condition, free of holes or ruts, until the permanent pavement is restored. No trench in a street shall be left open overnight without lighted barricades. The Contractor shall maintain the surface such that dust is not a nuisance to the public.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

Part 1 General

1.01 Scope

The work covered by this Section consists of furnishing labor, equipment, and materials necessary to install required chain link fencing and gates for the Work. The Contract Documents apply to this Section.

1.02 Related Requirements

Division 1; General Requirements

1.03 Reference Specifications

A. American Society of Testing and Materials; ASTM.
B. Chain Link Fence Manufacturer's Institute; CLFMI

1.04 Submittals

Submit shop drawings showing details of the chain link fence and gates.

Part 2 Materials

2.01 Fence

A. Tubular members shall meet the requirements of ASTM A120 for weight and coating.

B. Structural shapes shall meet the requirements of ASTM A123 for galvanized coatings.

C. End, corner and pull posts shall be 2.875 inch O.D. pipe weighing 5.79 pounds per linear foot.

D. Line posts shall be 2.375 inch O.D. pipe weighing 3.65 pounds per linear foot.

E. Swing gate post shall be 4 inch O.D. pipe weighing 9.11 pounds per linear foot.

F. Fit top posts with galvanized malleable iron fittings designed to exclude water from the post interior. The top shall have provisions for accommodating a rail.

G. A No. 7 gauge coiled spring tension wire having a zinc coating of 1.6 ounces of zinc per square foot of surface shall be provided along the bottom of the fence. Top of the fence shall be finished with a pipe rail of 1.5 inch O.D. weighing 2.27 pounds per linear foot.

H. Bracing and Tensioning

1. Bands shall be unclimbable, beveled edge type, secured with 0.375-inch diameter square shouldered aluminum carriage bolts, nonremovable from outside the fence enclosure.

2. Terminal posts shall have 1.660 inch O.D. horizontal compressive member braces, securely attached to terminal and first line posts with malleable iron fittings and bevel edge bands and 0.375 inch diameter rod and turnbuckle truss braces from first line post to bottom of terminal post.

3. Tension bars for attaching fence fabric to terminal posts shall be 0.25 x 0.75 inch high carbon steel, and shall be attached to terminal posts by means of beveled edge bands.

I. Fabric

1. Fencing fabric shall consist of individual wire pickets, helically wound, and interwoven from 9-gauge copper bearing steel wire to form a continuous chain link fabric in 2-inch mesh. Top and bottom edges of the fabric shall have a twisted and barbed finish and fabric shall be 6 feet in height between top and bottom edges, exclusive of the barbed wire brackets.

2. Fence fabric edging shall be barbed top and bottom

3. The wire in the completed fabric shall have a tensile strength of not less than 80,000 pounds per square inch.

J. Gates, Frames and Hardware.

1. Swing gate frames shall be minimum 2 inches, O.D. standard weight steel pipe with interval bracing of 1.625 inch O.D. standard weight steel pipe. Frame members shall be welded at joints to form a watertight construction.

2. Fabric for gates shall be as specified for fence.

3. Hinges shall be standard offset type that will allow gates to swing back parallel with line fence. Hinge material shall be malleable iron or steel

forgings.

4. Double latches shall be drop-bar type, securely bolted to the gate frames and designed to engage heavy malleable iron gate stops anchored in concrete footings.

5. Single latches for gate frames up to and including 6 feet wide shall be malleable iron, gravity type, designed to automatically engage a pin welded to the gate frame and to be secured with an approved type padlock.

6. Gate shall be equipped with a gate keeper designed to engage with the gate when opened wide to secure it in this position.

7. The OWNER will provide a padlock for the gate.

8. Provide diagonal cross bracing consisting of a 0.375 inch diameter adjustable length truss rods on gates where necessary to provide frame rigidity without sag or twist.

K. Miscellaneous fence fittings shall be malleable iron, pressed steel, aluminum, or forgings. Miscellaneous ferrous metals shall be hot dipped galvanized.

L. Wire ties for tying fabric to post shall be 6 gauge steel wire clips for H-section posts and minimum 9 gauge aluminum or steel wire ties for tubular posts. For tying fabric to rails and braces use 9 gauge aluminum wire ties. For tying fabric to tension wire, use 11 gauge pig rings. Finish for coil wire, pig rings and wire ties shall be the same as fencing fabric.

Part 3 Execution

3.01 General

A. Space post no more than 10 feet on center.

B. Encase post in concrete footings at least 3 feet in depth. There shall be a minimum of 6 inches of concrete below the post. Provide 10 inch diameter footings for line posts and 14 inch diameter footings for corner, end, and gate posts. Extend footings 2 inches above the ground line and slope to drain away from posts.

C. Where rock is encountered drill holes 3 feet deep and 2 inches greater than the outside diameter of the post or the greatest diameter of the H-section. Then fill hole around the post with grout. The post shall be 6 inches off the bottom of the hole.

D. Where fence is located on concrete structures, cast or grout a 18 inch section of steel pipe with an inside diameter at least 2 inches larger than the post into the structure. Grout the fence post into the steel pipe.

E. Brace terminal posts with horizontal compressive member and truss braces and fittings.

F. Brace corner posts in each direction with the bracing specified for terminal posts.

H. Brace line fence at not more than 500 foot intervals and each vertical angle point of 15 degrees or more with the bracing specified for terminal posts. Install corner posts at each horizontal angle point.

I. Install fence uniformly 2 inches above the ground.

J. Fasten fabric to top rail and bottom tension wire at intervals of 2 feet with pig rings.

K. Attach fabric to posts at intervals of not more than 14 inches and on the outside of the post with relation to the enclosed area.

L. Bend ends of wire ties to minimize hazard to persons and clothing.

M. Attach stretcher bars to terminal posts with beveled edge band.

N. Install gates plumb, level and secure for full opening without interference. Install ground-set items in concrete as recommended by the manufacturer. Adjust and lubricate hardware as required for smooth operation.

O. Install gate stops so that the plunger can be fully engaged.

P. Install nuts for tension band and hardware bolts on the inside of the fence.

END OF SECTION

SECTION 02920

LAWNS AND GRASSES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all equipment, materials, labor, and services required to establish a permanent vegetative cover over all areas disturbed or altered by construction.

1.02 RELATED WORK

A. Section 02300; Earthwork

1.03 SUBMITTALS

A. Product Data: Submittals on seed and fertilizer shall include a test report from the Virginia Department of Agriculture and Consumer Services (VDACS) or a comparable testing lab. The test report shall bear the specific lot number of the product as well as the date sampled, the purity, and germination, the percent weed seed, the analysis, date tested as well as other pertinent data about the product.

B. Guarantee: Written guarantee for a period of one growing season (minimum six months). Replacement shall be at no cost to the Owner.

1.04 REFERENCES

A. The materials and method of construction for protective covering and erosion control shall be in accordance with the latest revisions of the Virginia Department of Transportation (VDOT) Standards, the Road and Bridge Specifications.

1.05 JOB CONDITIONS

A. Topsoil shall be stockpiled, on the project site, for reuse on all disturbed areas in the grading and landscape work.

B. Seeding shall not begin until all site work has been completed, except utility trenches shall be seeded so that no more than 2000 lineal feet remain unseeded at any one time.

C. Seeding shall only be performed between March 1 and May 31 or between August 15 and September 30. At other times, sodding or seeding with annual rye for temporary cover shall be made until the desired spring or later summer seeding time.

D. Seeding shall not be performed on frozen or muddy grounds or when prevailing winds exceed five (5) miles per hour.

PART 2 PRODUCTS

2.01 GENERAL

A. Materials shall be delivered in unbroken containers, clearly marked by the manufacturer as to contents. Limes, Fertilizer and Seed shall be labeled as to proportions, analysis and quality. Store all materials in a manner affording protection from damage by weather or vandalism.

2.02 LIME

A. Lime shall be ground or pulverized agricultural grade limestone containing not less than 85 percent total carbonates and shall be ground to such a fineness that at least 50% will pass a 100 mesh sieve and at least 90% will pass a 20 mesh sieve.

2.03 FERTILIZER

A. Fertilizer shall be 15-30-15 at 150 pounds per acre. Fertilizer shall be commercial/agricultural grade, free flowing, uniform in composition and shall conform to State and Federal regulations. Fertilizer shall bear the manufacturer's guaranteed statement of analysis.

2.04 SEED

A. Grass seed for ballfields shall be 90/10 blend of Kentucky 31 tall fescue and hybrid bluegrass (Southern Lawn Extreme or approved equal). Application rate shall be 6 pounds per 1000 sq. ft.

B. Seed for steep slopes (3:1 or steeper) shall be the following. Application rate shall be 200 pounds per acre.

- 42% tall fescue (Kentucky 31)
- 35% hard fescue (Aurora Gold)
- 2% white clover
- 20% annual rye
- 1% red top

C. Grass seed for drainage channels shall be 67 percent by weight Kentucky 31 Tall Fescue and 33 percent by weight Red Creeping Fescue.

D. Grass seed for other areas not listed above shall be 50/50 blend of Kentucky 31 tall fescue and Aurora Gold hard fescue. Application rate shall be 200 pounds per acre.

E. Grass seed shall be clean, fresh stock, and labeled in accordance with the Federal Seed Act and shall be produced by a recognized manufacturer and guaranteed by the dealer. The seed shall have the State of Virginia certification.

2.05 MULCH

A. Mulch shall be straw or grain mulch as described or wood cellulose fiber.

B. Straw mulch shall be from oats wheat and or barley and shall be free of noxious weeds and noxious weed seeds. The straw will not contain sticks, rocks, or other objectionable material and will not be wet, moldy, or otherwise undesirable.

C. Wood cellulose fiber used for hydraulic mulching shall consist of specially manufactured commercially available products containing wood cellulose fiber, recycled newsprint fibers, or a combination of these materials. The wood cellulose fiber or newsprint fiber will contain no growth or germination inhibiting factor and shall contain a dye for color. The dye shall allow the operator to monitor the amount of mulch being applied to the area to insure proper coverage.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. All subgrade for finished lawn areas and drainage channels shall be raked to remove all debris and stones over two (2) inches in diameter. All subgrade for open field areas and shoulders shall be raked to remove all debris and stone over three (3) inches in diameter.

B. Prior to spreading topsoil, the subgrade shall be loosened to a minimum of four (4) inches by tilling, disking or harrowing.

3.02 TOPSOIL PREPARATION

A. Topsoil shall be spread over the prepared subgrade in all lawn areas to a minimum depth of four (4) inches. Bond topsoil to subgrade by tilling, disking or harrowing. Topsoil shall not be spread over the subgrade when either the topsoil or subgrade are frozen or excessively wet.

B. Where topsoil is not applied, the surface of finished grade shall also be prepared as specified for topsoil hereinafter.

C. Prior to seeding finished lawn areas and drainage channels, topsoil surface shall be raked to remove all debris and stones over two (2) inches in diameter and to smooth any surface irregularities. Prior to seeding open field areas and shoulders, topsoil shall be raked to remove all debris and stones over three (3) inches in diameter and to smooth any surface irregularities.

D. Topsoil finish grade of lawn areas and open fields shall be slightly higher than existing grade and rounded off to avoid abrupt changes in grade.

3.03 PREPARATION OF AREAS TO BE SEEDED

A. Slopes 3:1 or steeper

1. On slopes, use the walking or tracking method with a dozer or other tracked equipment. Vertically "walk" the slope so as to leave track marks perpendicular to the toe of the slope. Remove large rocks, stones and roots over two inches in diameter.

2. Where this tracking of slope areas is not possible or practical, the use of a slope chain may be used to loosen the top two inches of soil for proper seedbed preparation. The chain shall be dragged across the top of the slope. The spikes on the chain shall produce puncture marks in the slope as well as serve to loosen the soil surface.

3. Where the sloped areas are smoothly graded and are unable to be loosened satisfactorily for seedbed preparation, cutting horizontal grooves into the slope may be required with the use of grading equipment or by other means.

4. If the slope is freshly graded and the surface is friable without disturbing, the Contractor may be allowed to seed the slope without further slope preparation.

B. Areas Flatter Than 3:1

1. Use a disk or harrow to loosen the top 4 inches of soil. Where this is not possible backdrag the area with the toothed bucket or dozer type equipment to loosen the soil surface.

2. Rake the area smooth and remove roots, rocks and other debris that may interfere with the seeding operation. Debris larger than two inches in diameter should be raked from the surface with the use of a York Rock Rake, hand rake or other comparable equipment.

3. In the final preparation of the surface, care should be taken to insure that low areas or depressions do not occur which could later cause ponding or settling out areas.

C. Ditchlines, Waterways, Channel Change Areas

1. Care should be taken to insure that a minimum of disturbance occurs in all areas that are to carry water through the site. Preparation for seeding in these areas consists of removing large stones, rocks, roots and other debris that may interfere with the germination of seed.

2. In ditchlines that will receive erosion control treatment, the ditch shall be free of all obstructions that may prevent the erosion control from being attached securely and to the bottom and sides of the ditch.

3.04 LIME APPLICATION

A. Lime shall be applied at the rate recommended by soil samples and analysis by CONTRACTOR, maximum 50 lb./1000 sq. ft. in one application.

B. Lime may be applied with the use of a bulk spreader, drop type spreader, Hydroseeder or any other equipment approved for application by the Engineer. The application shall result in an even spreading of the lime over the entire area to be seeded.

C. In areas 3:1 or flatter the lime shall be applied after the disking operation and before raking the soil. Lime shall be applied before any application of fertilizer, except when the seeding equipment used is a hydroseeder. On slopes 3:1 or steeper or where a hydroseeder is used in the seeding operation, the application of lime can be made in connection with the fertilizer seed and mulch in the slurry mix in the hydroseeder.

3.05 FERTILIZER APPLICATION

A. The rate of application shall be the equivalent of 23 lbs./1000 sq ft. except where otherwise directed.

B. Fertilizer may be applied with the use of a bulk spreader, cyclone spreader, Hydroseeder or other equipment approved for application by the Engineer. The application shall result in an even spreading of the fertilizer over the entire area to be seeded.

C. The Contractor shall take care as to not spill large amounts of the fertilizer in the areas to be seeded during the loading and spreading of fertilizer.

D. The fertilizer shall be worked into the topsoil to a depth of 3 inches.

3.06 SEEDING

A. Prior to seeding, scarify the topsoil surface with a rake to a minimum depth of 1/4 inch. The application of seed shall be by broadcast, cyclone type, drill type, hydroseeder, or other equipment approved for application by the Engineer. The application of the seed over the area shall be even and at the rates specified.

B. Sow Seed by Mechanical Seeder as Follows:

1. Mix seed thoroughly with clean dry sawdust and broadcast at rate of 200 lbs. of seed per acre for permanent seeding or as specified elsewhere for temporary seeding.

2. Apply mulch uniformly to depth of approximately 1-1/4 inches.

3. Anchor mulch by the following methods.

a. Apply light tack coat of asphalt emulsion or synthetic mulch binder.

b. On slopes steeper than 3 horizontal to 1 vertical, anchor with EC-2 (jute mesh) matting fastened to wooden stakes.

C. Sow Seed by Hydraulic Seeder as Follows:

1. Prepare homogeneous slurry equal to the seed mixture used for mechanic seeding as specified in this Section.

2. Distribute slurry uniformly at rate equal to the rate specified for mechanical seeding.

3. Apply mulch as specified for sowing by mechanical seeder.

D. The Contractor shall take great care to insure that the seed is not sown into areas that are to receive landscaping or other treatment such as asphalt and or concrete pavement. This includes bed areas, landscaped berms, parking and drive areas as well as sidewalks, etc.

E. After sowing, seed shall be rolled with a cultipacker and immediately mulched with straw or wood cellulose fiber.

3.07 MULCHING

A. Straw mulch will be applied at the rate of 45 lbs./1000 sq. ft. Wood cellulose fiber mulch shall be applied at the rate of 35 lbs. dry weight/1000 sq. ft.

B. The application of straw mulch will be through a blower or other approved equipment capable of shredding the material from the bale and distributing it evenly over the seeded areas. The application of mulch will take place no more than 24 hours after the seeding operation of the area.

C. The application of wood cellulose fiber mulch shall be in a slurry mix through a hydroseeder. The slurry mixture shall be constantly agitated from the initial mixing point until the material is discharged onto the ground. The material shall then be applied over the seeded area in a manner not disruptive to the placement of seed.

D. The Contractor will take all necessary precautions to prevent the application of the wood cellulose fiber mulch, straw or binders onto landscaped areas, fixtures, fences and signs in the area to be mulched.

3.08 MULCH TACKIFIER

A. Straw mulch will be tacked to the seeded area by the use of one of the following methods. A crimping device may be used that will punch the straw into the soil to prevent wind disturbance. The use of a chemical binder manufactured for the purpose of securing mulch may also be used when applied with a hydroseeder. The use of wood cellulose is also allowed for tacking straw mulch.

B. When a chemical binder is used, follow the manufacturer's recommendations as to the rates of material required. The Contractor may also elect the use of an application of wood cellulose fiber at the rate of 750 pounds to the acre as a tackifier in lieu of the above methods.

C. The tacking or securing of the straw mulch shall be completed immediately after the mulching is complete.

3.09 PROTECTION AND MAINTENANCE OF SEEDED AREAS

A. After the seeding is completed in a particular area, the area shall be protected from vehicular, and or foot traffic by erecting, barricades, signs, ropes or other such devices to prevent traffic where necessary.

B. Surfaces gullied or otherwise damaged following seeding shall be repaired and re-graded as required and re-seeded as directed by the Engineer.

C. In utility installation and erosion control areas, the maintenance period shall be the amount of time required to establish the desired species or its companion crop over 90% of the seeded area or 90 calendar days from the last seeding date.

D. In industrial lawn and shoulder areas, the maintenance period will extend through the time necessary to establish a healthy, uniform, two (2) inch high close stand of grass, free of weeds, bare spots, and surface irregularities.

3.10 ACCEPTANCE OF SEEDED AREAS

A. The acceptance of seeded areas shall be at the end of the establishment period mentioned above. Final acceptance shall be made when the specified vegetation is successfully established in the area to be accepted.

END OF SECTION

This page intentionally blank

SECTION 03100

CONCRETE FORMWORK

Part 1 General

1.01. Requirements Included

A. Provide personnel, materials and equipment to construct approved formwork.

B. Provide personnel, materials and equipment for removal of the forms after a minimum period of four days by a method that does not overstress the concrete.

1.02. Related Requirements

Section 03200 Concrete Reinforcements
Section 03300 Cast-in-Place Concrete

Part 2 Products

2.01. General

Forms shall be of wood, metal or other approved material and shall be mortar tight and sufficiently rigid to limit distortion due to pressure of the concrete and other loads incident to the construction operations including vibration. Wood forms shall be constructed and maintained so as to limit the opening of joints due to shrinkage of the lumber. Stay-in-place forms will not be permitted.

2.02. Forms for Surfaces Exposed to View

A. Forms for surfaces exposed to view shall be constructed of new 5/8 or 3/4 inch 5-ply structural plywood or concrete form grade. The plywood may be reused for form surfaces exposed to view only upon written approval by the CQA Engineer.

B. Forms shall be built-in-place type except prefabricated panel type may be used where a single panel extends over an entire area from reveal to reveal, with no panels joining on flat surfaces. Full size 4' x 8' sheets shall be used for built-in-place type except where smaller pieces will cover an entire area.

C. Forms for concrete exposed to view shall conform to shape and dimensions of the members as shown on the plans. They shall be constructed to resist the pressure to which they are subjected. For walls, studs will be 16 inch on center when used with 3/4-inch plywood or 12 inch on center when used with 5/8-inch plywood. When the outer plys run parallel to the studs, the spacing shall be reduced 2

inches. Wales shall be spaced 24 inches and ties 27 inch on centers when used with double 2 x 4 wales.

2.03. Forms for Surfaces Not Exposed to View

Forms for surfaces not exposed to view may be constructed of wood or metal sufficiently tight to limit leakage. Forms for pan-type joist floor construction may be wood, metal, waterproof cardboard, fiberglass or plastic. Forms shall conform to shape lines and dimensions of the members shown or called for on the plans. They shall be properly braced and tied so as to maintain position and shape.

2.04. Metal Forms

The metal used for the forms shall be of such thickness that the forms will remain true to shape. Blts and rivet heads shall be countersunk. Clamps, pins, and other connecting devices shall be signed to hold the forms rigidly together and to allow removal without injury to the concrete. Metal forms that do not present a smooth surface or do not line up properly shall not be used. Metal forms shall be kept free of rust, grease, or other foreign matter.

2.05. Form Coatings

Form coatings may be an approved form oil or lacquer. The coating shall not be of the type that will affect the bonding of plaster, paint, or waterproofing materials to the concrete where used. Wall ties shall be of a type that leaves no metal closer than 1 inch to the surface of the concrete.

Part 3 Execution

3.01. General

A. Execution of work shall be in accordance with ACI 301, ACI 318, and ACI 347.

B. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the CONTRACTOR.

C. It shall be the responsibility of the CONTRACTOR that forms, shores, bracing, etc., are of sufficient capacity to carry live and dead loads, before, during, and after pouring concrete.

3.02. Form Coating

Form coatings for exposed concrete shall consist of either nonstaining form oil, lacquer or plastic. Plywood approved for reuse shall be recoated as directed by the observer. When oil is used, the excess shall be wiped off with rags. When lacquer is used, a light

coating of form oil over the lacquer will be permitted, provided the excess is wiped off. When factory applied coatings are used, follow manufacturer's instructions. The contact surface of forms must be free of foreign matter, including dust.

3.03. Concrete Ties

Ties for concrete walls shall have a working strength of 3000 pounds. They shall be fitted with washers to act as spreaders within the forms. Cones, 7/8 inch diameter or smaller, may be used. Ties, when removed, shall leave no metal closer than 1-1/2 inches to the columns. Ties or removal 5/8 inch bolts shall be located 4 inches below the joints spaced not more than 27 inch centers to be used to tighten the form at the joints for the next lift of concrete.

3.04. Form Inspection

When the form for exposed concrete is erected and reinforcement is in place and before the backside form is erected, the CQA Engineer shall approve, in writing, work already done. Open joints in the sheathing and the moldings shall be pointed with water putty. No pointing material shall be used on the surface.

3.05. Form Removal

A. Form for exposed work shall remain in place four (4) days after placing the concrete, except where curing conditions and the hardness of the concrete or structural strength dictates a shorter or longer time, to be decided by the CQA Engineer.

B. Nails holding moldings shall be removed as described in the previous paragraph. After the sheathing is removed, the molding shall be removed carefully to avoid spalling the corners of the concrete. Form ties shall be broken back 1-1/2 inches from the face of the concrete or wholly withdrawn at a time and in a manner that will avoid spalling the concrete. Metal tools shall not come in contact with the concrete surfaces during form removal.

C. Forms shall be removed in such a manner to maintain the complete safety of the structure. Where the concrete as a whole is supported on shores, the forms of vertical surfaces, such as columns, girders, beam sides and walls, may be removed after 24 hours, providing the concrete is sufficiently hard enough not to be injured thereby. In no case shall the supporting forms or shoring be removed until the members have acquired strength to support safely their weight and the loads thereon.

D. Where the bottom of the form is inaccessible, the lower form area shall be left loose or other provisions made so that the extraneous material may be removed from the forms immediately before placing the concrete.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

Part 1 General

1.01. Requirements Included

A. Provide personnel, materials, and equipment to place reinforcement for concrete for support piers, and concrete slabs, and cast-in-place junction boxes.

B. Bar reinforcement shall meet the requirements of AASHTO M31. Bar shall be of the deformed type unless otherwise specified.

1.02. Related Requirements

Section 03100 Concrete Formwork
Section 03300 Cast-in-Place Concrete

1.03. Quality Assurance

Concrete reinforcement work shall be done in accordance with the pertinent requirements of the following standards.

A. ACI 301, "Specifications for Structural Concrete for Buildings".

B. ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures".

C. ACI 318, "Building Code Requirements for Reinforced Concrete".

D. AWS D1.4, "Structural Welding Code - Reinforcing Steel".

Part 2 Products

2.01. Metal Reinforcement

Metal reinforcement shall be free of scale, oil, and grease and shall conform to the current ASTM Specifications and AISC as follows:

Billet Steel Bars - Grade 60	Designation A-15
Cold Drawn Steel Wire (64,000)	Designation A-82
Welded Wire Fabric (60,000)	Designation A-185

Part 3 Execution

3.01. Hooks and Bends

A. Hooks and bends shall comply to details shown on the drawings.

B. Bars shall be shop-bent unless otherwise permitted in writing by the ENGINEER.

3.02. Cleaning Reinforcement

Metal reinforcement at time concrete is placed shall be free from loose flaky rust, mud, oil, or other coatings that will destroy or reduce the bond.

3.03. Placing and Spacing of Reinforcement

Reinforcement shall be accurately placed and supported by concrete, metal or other approved chairs, spacers, or ties. In flexural members, walls, and columns, where 'd' is greater than 24 inches, the tolerance shall be $\pm$1/2 inch. Spacing of reinforcement shall be as called for on the plans.

3.04. Splices of Reinforcement

Splices of reinforcement shall be made only where shown on the plans unless otherwise authorized by the ENGINEER. Lapped splices shall be in accordance with details on the plans. Welding, when authorized in writing by the ENGINEER, shall conform to AWS D12.1 recommendations. Welded splices shall have the bars butted and shall develop in tension at least 125 percent of the specified strength of the reinforcing.

3.05. Concrete Protection for Reinforcement

A. The metal reinforcement shall be protected by the thickness of concrete indicated on the plans. Where not shown, the thickness of concrete over the reinforcement shall be as follows:

B. Where concrete is deposited against ground without the use of forms, not less than 3 inches. Where concrete is exposed to the weather, or exposed to the ground but placed in forms, not less than 2 inches for bars more than 5/7 inches in diameter and 1-1/2 inches for bars 5/8 inches or less in diameter.

C. In slabs, joists, and walls not exposed to the ground or the weather, not less than 3/4 inches. In beams, girders, and columns not exposed to the ground or to the weather, not less than 1-1/2 inches. The thickness of concrete over the reinforcement shall be at least equal to the diameter of bars, except for slabs and joists as heretofore specified. Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

END OF SECTION

This page intentionally blank

SECTION 03300

CAST-IN-PLACE CONCRETE

Part 1 General

1.01. Requirements Included

Provide personnel, materials, and equipment to install concrete at locations shown on drawings.

1.02. Related Requirements

Section 03100 Concrete Formwork
Section 03200 Concrete Reinforcement

1.03. Quality Assurance

A. Cast-in-place concrete work shall be done in accordance with the pertinent requirements of the following standards.

1. ACI 301, "Specifications for Structural Concrete for Buildings", and referenced standards contained therein.

2. ACI 318, "Building Code Requirement for Reinforced Concrete", and referenced standards contained therein.

B. Where the provisions of the above Standards are in conflict with the Building Code in force for this project, the more stringent Standard shall govern.

1.04. Submittals

A. Concrete mix design, including documentation as to selection of mix proportions.

B. Manufacturer's literature/test data for proposed concrete admixtures.

C. Reinforcing steel shop drawings, including placement details.

Part 2 Products

2.01. Class A-3, General Use, 3000 psi concrete as defined by Section 217 – Hydraulic Cement Concrete of the Virginia Department of Transportation, Road and Bridge Specifications, latest revision.

2.02. Class A-3, Paving, 3000 psi concrete as defined by Section 217 – Hydraulic Cement

Concrete, of the Virginia Department of Transportation, Road and Bridge Specifications, latest revision.

Part 3 Execution

3.01. General

Concrete shall be handled and placed according to construction practices outlined in Section 404, 502, and 506, as applicable, and concrete for slabs according to Section 316 of the Virginia Department of Transportation, Road and Bridge Specifications, latest revision.

3.02. Thrust Restraints

Concrete thrust blocks shall bear on original unexcavated earth. Concrete must be kept clear of gaskets, bolts, and fittings.

END OF SECTION

SECTION 13300

GEOTEXTILE FABRICS

Part 1 General

1.01 Scope

Provide personnel, equipment, and materials to install the geotextile fabrics as shown on the attached Contract Drawings.

1.02 Submittals

Submit shop drawings and product data for components. A change in the manufacturer shall require resubmittal.

Part 2 Product

2.01 Manufacturer's Certification

Geotextile shall be of the type specified or an approved equal. Manufacturer shall submit a certificate to the ENGINEER stating the name of the manufacturer, the chemical composition of the filaments or yarns, and other pertinent information so as to fully describe the geotextiles. At a minimum the other pertinent data shall include Grab Strength, Elongation, Puncture Strength, and Apparent Opening Size. The manufacturer shall include in the certificate a guarantee stating that the geotextile that is furnished meets the requirements of the Specification for Geotextiles, AASHTO Designation M288-90.

2.02 Material Properties

The geotextile shall meet or exceed the following minimum average roll values:

A. Toe Drain, LFG Surface Collector, and road and ditch underlayment:

Fabric	Non-woven needlepunched polypropylene
Min. Weight, oz./s.y.	10
Grab Tensile Strength, lbs., ASTM D4632	200
Grab Tensile Elongation, %, ASTM D4632	50
Puncture, lbs, ASTM D4833-88	110
AOS, ASTM D4751	#70
UV Resistance, %, ASTM D4355	70

B. Geocomposite Drainage Media:

Fabric	Nonwoven needlepunched polypropylene
Min. Weight, oz./s.y.	7.1
Grab Tensile, lbs., ASTM D4632	210
Grab Elongation, %, ASTM D4632	50
Puncture, lbs, ASTM D4833	110
AOS, ASTM D4751	#70
Coefficient of Permeability, cm/sec, ASTM D4491	0.2

2.03 Shipping and Identification

A. The geotextile shall be uniformly rolled onto a core, and shall be wrapped in plastic to protect the material from moisture and damage during shipment. Protective wrapping shall be left on the geotextile until installation.

B. Rolls shall be externally tagged for easy field identification. External tagging shall include the following:

1. Name of Manufacturer
2. Product Type
3. Product Grade
4. Lot Number
5. Physical Dimensions (length, width & weight)

Part 3 Execution

3.01 Exposure

The geotextile shall not be exposed to precipitation prior to being installed. The geotextile shall not be exposed to sunlight for more than 15 consecutive calendar days unless otherwise specified and guaranteed in writing by the geotextile manufacturer. The CONTRACTOR shall replace geotextile that is left exposed for more than 15 consecutive calendar days.

3.02 Placement

Geotextile shall be placed smoothly and in direct contact with the underlying medium. Excessive wrinkles shall not be acceptable. Equipment shall never be run directly on the geotextile.

3.03 Overlapping

Geotextile sections that require more than one panel should be overlapped a minimum of 18 inches.

3.04 Protection from Damage

Geotextiles should be secured from the wind until cover is placed. Geotextiles shall be covered within two weeks of installation. The CONTRACTOR is responsible for damage that occurs to the geotextile during installation and will replace the damaged geotextile at no additional cost.

3.05 Protection from UV

The geotextile shall not be exposed to precipitation prior to being installed. The geotextile shall not be exposed to sunlight for more than 15 consecutive calendar days unless otherwise specified and guaranteed in writing by the geotextile manufacturer. The CONTRACTOR shall replace geotextile that is left exposed for more than 15 consecutive calendar days.

END OF SECTION

This page intentionally blank

SECTION 13302

GEOCOMPOSITE DRAINAGE MEDIUM

Part 1 General

1.01 Requirements Included

Provide personnel, equipment, and materials to install a double-sided geotextile/geonet drainage layer as specified on the plans.

1.02 Related Requirements

The specifications sections following shall apply to the components of the Geocomposite Drainage Medium:

Section 13300 Geotextile Fabrics

Part 2 Products

2.01 Geonet Material

A. The geonet shall be comprised of HDPE material and manufactured of first-quality products designed and manufactured specifically for the purpose of hydraulic conductance.

B. The net shall meet or surpass physical standards for HDPE geonets. The geonet shall meet or surpass the following minimum standards:

Specific Gravity, ASTM D792, Method A or ASTM D1505 ..... 0.94 g/cc
Melt Index, ASTM D1238, Condition E..... 1.0 max
Carbon Black Content, ASTM D1603..... 2.0 % min
Thickness, ASTM D1777 or ASTM D374..... 0.200 in. min.
Tensile Strength @ Break, ASTM D1682 .....23 lbs/in. min.

C. The net strands shall be so produced as to be free of holes, blisters, undispersed raw materials, or sign of contamination by foreign matter. Defects discovered in the field shall be repaired by cutting out the defect and joining a new piece of net material in its place. The joint shall be placed in accordance with the requirements for field joints.

D. Labels on each roll shall identify the thickness, length, width, and manufacturer's mark number. The roll shall also indicate the date, lot and batch number of the roll, the square feet in the roll, and the total roll weight as measured after manufacture.

E. Joints shall be made in the field by factory-trained technicians using approved methods. Edges of rolled material shall be trimmed at the factory to remove non-conforming material.

F. The net material shall meet the specification values according to the specification sheet for HDPE geonet. It shall have a warranty of a minimum 20 years relative to materials, and 1 year on installation.

2.02 Geotextile Material

A. Geotextile shall be of the type specified on the drawings or an approved equal. Manufacturer shall submit a certificate to the CQA Engineer stating the name of the manufacturer, the chemical composition of the filaments or yarns, and other pertinent information so as to fully describe the geotextiles. At a minimum the other pertinent data shall include Grab Strength, Elongation, Puncture Strength, and Apparent Opening Size.

B. The geotextile shall meet or exceed properties listed in Section 13300.

2.03 Composite Material

A. The composite shall consist of a non-woven geotextile heat-bonded to both sides of the drainage netting. The drainage net strands shall be High Density Polyethylene (HDPE).

B. Heat bonding shall prevent flattening of filter fabric and surface. Glues and adhesives shall not be permitted to bond materials.

C. CONTRACTOR shall provide the manufacturer's certificate prior to delivery of the material. The manufacturer shall certify in writing that the material supplied meets the minimum specifications. The certificate shall be signed by a person with authority to bind the manufacturer and shall be notarized.

D. The composite (finished) material shall meet or surpass the following minimum standards:

Transmissivity, ASTM D4716 ..... 6×10^{-5} m^2/sec
(gradient = 0.1, load = 10,000 psf)
Ply Adhesion, ASTM D413 or GRI GC7 ..... 1.0 ppi

2.04 Manufacturer's Experience

The manufacturer of the drainage material described hereunder shall have previously demonstrated his ability to produce this geocomposite by having successfully manufactured similar material for hydraulic conductance installations.

2.05 Shop Drawing Submittals

A. In order to qualify as an approved drainage material, the CONTRACTOR shall submit material samples, minimum specifications and warranty to the CQA Engineer. The specification sheet shall give full details of minimum physical properties and test methods used, joining methods, and a certificate confirming compliance of the material with the minimum specifications. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted to the CQA Engineer.

B. The CONTRACTOR shall submit a certification from the manufacturer of the geocomposite, stating that the geocomposite meets physical property requirements for the intended application, and that the geocomposite meets the physical requirements for the manufacture and installation of HDPE landfill drainage media.

C. At the time of delivery, the manufacturer shall certify in writing that the material supplied meets the minimum specifications. The certificate shall be signed by a person with authority to bind the manufacturer and shall be notarized.

D. The manufacturer shall submit results of confirmation testing showing that the material lot of the resin used in the geonet supplied meets the material requirements for the resin. A description of the quality control steps used during manufacture shall also be provided.

2.06 Instructions and Drawings Required after Contract Award

A. The CONTRACTOR shall furnish complete written instructions for the storage, handling, installation, and joining of the net in compliance with this specification and the condition of his warranty.

B. The manufacturer shall furnish complete written instructions for the repair of HDPE geonet material.

C. The manufacturer or his designated representative shall furnish layouts and details as required for the net installation. Details of placement around net penetrations such as pipes shall be provided as well. The above details must be approved by the CQA Engineer prior to net installation. Material left outside shall be covered to reduce accumulation of dust in the net and to protect it from ultraviolet light.

Part 3 Execution

3.01 Storage

A. Storage of the rolls shall be the responsibility of the CONTRACTOR. A dedicated storage area shall be selected at the job site that is away from high

traffic areas and is level, dry, and well drained. The OWNER shall approve the storage area.

B. Rolls shall be stored in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls. Rolls shall be stacked at a height no higher than that at which the lifting apparatus can be safely handled (typically no higher than four).

C. Stored materials must be off of the ground and be covered with a plastic sheet or tarpaulin until their installation.

D. The integrity and legibility of the labels shall be preserved during storage.

3.02 Installation

A. The installation of the geocomposite shall be done with labor and equipment provided by an approved contractor. The manufacturer shall provide the proper cutting equipment for the installation. Only installation methods approved by the manufacturer and the CQA Engineer in accordance with this specification shall be used.

B. The composite drainage layer shall be installed in accordance with manufacturer's instructions.

C. The composite drainage layer shall be free of dirt and dust when installed. If dirt or dust is present, the CONTRACTOR shall wash the geocomposite until clean as directed by the CQA Engineer.

D. Coordinate with geomembrane installer for installation of the drainage layers.

E. Composite drainage layers shall be unrolled and installed to the lines and grades shown.

F. Composite drainage layer shall be anchored at the top of slopes in an anchor trench as shown on the drawings. Care shall be taken not to entrap small stones, from the anchor trench excavation, in the net channels.

G. After being secured in the anchor trench, the drainage layer shall be stretched to minimize wrinkle formation.

H. Overlaps:

1. Layout of geocomposite shall minimize horizontal seams on sideslopes. If horizontal seams are necessary, adjacent seams shall be offset.

2. The composite drainage layers shall be overlapped in the corners of the side slopes.

3. Overlap geocomposite material by at least 6 inches and geotextile material by at least 4 inches.

4. Overlap at end of composite layer on a slope shall be shingled so the upslope geocomposite shall be atop the downslope geocomposite.

I. Connections:

1. Overlapping geocomposite layers shall be connected with plastic fastener ties or polymer braid.

2. Ties shall be white or another contrasting color to facilitate inspection.

3. Connections shall be a maximum of 5 feet on center along the sides of rolls, 6 inches in anchor trenches, and 6 inches on center along the end of rolls.

4. Geotextile fabrics shall be continuously sewn on slopes of 10H:1V or steeper. On slopes less than 10H:1V, geotextile fabrics shall be continuously thermally bonded, or as approved by the QAO.

5. Sewing shall be performed using polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. Sewing equipment shall be approved by the QAO.

J. During installation, care shall be taken to keep the net and filter fabric as clean as possible.

3.03 Geocomposite Repair

Holes or tears (smaller than 3 feet by 3 feet) in the gecomposite shall be repaired by placing a patch extending 2 feet beyond edges of the hole of tear. The patch shall be secured to the original geocomposite by tying every 6 inches. Tying devices shall be as indicated above. Geotextile fabric shall be continuously thermally bonded or continuously sewn. If the hole or tear width is greater than 3 feet by 3 feet, or if the tear across the roll is more than 50 percent of the width of the roll, the damaged area shall be cut out and the two portions of the geocomposite shall be joined as indicated in Paragraph 3.01. Geotextile fabric shall be continuously sewn on large repairs.

3.04 Field Damage

A. The CONTRACTOR shall take every precaution to protect the net from damage due to natural and field conditions. As the panels are placed, they shall be secured to limit excessive movement.

B. Panels moved by the wind shall be inspected and, if damaged, shall be replaced or repaired as required in the judgment of the QAO. Similarly, panels that have developed excessive wrinkles, particularly at the toe of slopes shall be inspected and repaired or replaced as necessary.

3.05 Placement of Cover Material

A. Cover material such as soil or stone that is placed over geocomposites shall be placed in such a manner as to verify that the geocomposite is not damaged.

B. Care shall be taken to minimize slippage of the geocomposite and to verify that no tensile stress is induced in the geocomposite.

3.05 Records and Quality Assurance

A. The installation of the geocomposite shall be monitored by QAO provided by the OWNER. The purpose of the third party monitoring shall be to document the installation of the geocomposite. The following records shall be kept by the installer as part of the installation process:

1. Panel Placement Checklist
2. Panel Joining Checklist
3. Repair and Patching Checklist
4. Panel and Joint Layout Record Drawing

B. The geocomposite may not be covered until defects, patched, etc. have been properly logged.

C. The reports shall be turned over to the CQA Engineer for review on a daily basis. Reports shall be complete within 24 hours of the installation of the panel, joint, repair, etc.

D. The manufacturer/installer shall provide a written warranty for materials for a period of no less than 20 years. A written warranty for 1 year shall also be provided for quality of workmanship.

END OF SECTION

SECTION 13306

LLDPE GEOMEMBRANE CAP

Part 1 General

1.01 Requirements Included

A. Provide personnel, equipment, and materials to install a textured 40 mil Linear Low Density Polyethylene (LLDPE) geomembrane on the prepared base grades of the landfill as shown on the attached drawings.

B. These specifications describe LLDPE geomembranes. The supply and installation of these materials shall be in strict accordance with this specification, and be subject to the terms and conditions of the contract.

1.02 Definitions

"OWNER" refers to the Owner or his designated representative. "ENGINEER" refers to Engineer who is acting as design Engineer. “CQA Engineer” refers to engineer who is acting as OWNER's designated construction project representative. "Manufacturer" and "Installer" are interchangeable and refer to the manufacturer of the membrane.

1.03 Related Requirements

Comply with applicable codes and regulations as required by regulatory agencies having jurisdiction over this work. Comply with the pertinent sections of the following standards:

American Society for Testing and Materials (ASTM)
American Association of State Highway and Transportation Officials (AASHTO)
Geosynthetic Research Institute (GRI) Test Methods and Standards, latest edition
Virginia Department of Transportation (VDOT) Standard Specifications, latest edition

1.04 Manufacturer's Experience

The manufacturer of the synthetic material described hereunder shall have previously demonstrated his ability to produce this membrane by having successfully manufactured similar material for hydraulic installations. The manufacturer must meet or exceed appropriate requirements listed by GRI Test Methods GM17 “Test Properties, Testing Frequency and Recommended Warranty for Low Linear Density Polyethylene (LLDPE) Smooth and Textured Geomembranes” and GM19 “Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes” for geomembranes.

1.05 Installer's Experience

Installer of the membrane must have previous experience installing LLDPE membrane for landfill cap use. Experience required is a minimum of 5 installations of LLDPE (or VLDPE) membrane equal to or greater than 220,000 square feet of cap per installation. The Supervisor in charge of the installation crew shall have a minimum of 500,000 square feet of cap installation experience and each welding technician shall have 500,000 square feet of LLDPE (or VLDPE) installation experience.

1.06 Shop Drawing Submittals

A. In order to qualify as an approved lining material, the CONTRACTOR shall submit material samples, minimum specifications and warranty to the CQA Engineer at the pre-construction conference. The specification sheet shall give full details of minimum physical properties and test methods used, site seaming methods, and a certificate confirming compliance of the material with the minimum specifications. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted to the CQA Engineer.

B. The CONTRACTOR shall submit a certification from the manufacturer of the sheeting, stating that the sheeting meets physical property requirements for the intended application, and that the membrane meets the physical requirements for the manufacture and installation of geomembrane.

C. At the time of delivery the manufacturer shall certify in writing that the material supplied meets the minimum specifications. The certificate shall be signed by a person with authority to bind the manufacturer and shall be notarized.

D. The manufacturer shall submit results of confirmation testing showing that the material lot of the resin used in the membrane supplied meets the material requirements for the resin. A description of the quality control steps used during manufacture shall also be provided.

1.07 Instructions and Drawings Required After Contract Award

A. The CONTRACTOR shall furnish complete written instructions for the storage, handling, installation, and seaming of the membrane in compliance with this specification and the condition of his warranty to the QAO no less than 30 days prior to installation.

B. The material supplier shall furnish complete written instructions for the repair of the membrane material to the QAO no less than 30 days prior to installation.

C. The CONTRACTOR shall furnish panel layouts and seam details as required for

the membrane installation. The goal of the plan will be to minimize the required number of seams. Care should be taken to reduce areas of stress concentration. Horizontal seams are not allowed unless the slope length exceeds roll lengths. In that event, the horizontal seam will be installed on a 45 degree diagonal across the slope. Details of placement around penetrations such as pipes shall be provided. The above details must be approved by the QAO prior to cap installation. Material left outside shall not be exposed to sunlight for more than 30 days.

Part 2 Products

2.01 Material

A. The membrane shall be comprised of LLDPE material, manufactured of new, first-quality products designed and manufactured specifically for the purpose of liquid containment in hydraulic structures.

B. The raw polymer shall meet or surpass the minimum standards in GRI GM17 and GM19.

C. The membrane shall meet or surpass the minimum average roll standards in GRI AM17 and GM19.

Properties	Test Method	Test Value	Frequency (minimum)
Thickness, 40 mils (minimum average) • Lowest individual for 8 out of 10 values • Lowest individual for any of the 10 values	ASTM D 5994	nom. (-5%) -10% -15%	per roll
Asperity Height, mils (min. ave) *(1)*	GRI GM 12	10	Every second roll *(2)*
Density, g/ml (max)	ASTM D 1505 or D 792	0.939	200,000 lb
Tensile Properties *(3)* (min ave) • Strength at Break, lb/in • Elongation at Break, %	ASTM D 6693, Type IV	60 250	20,000 lb
2% Modulus – lb/in (max.)	ASTM D 5323	2400	per formulation
Tear Resistance, lb (min. ave.)	ASTM D 1004	22	45,000 lb
Puncture Resistance, lb (min. ave.)	ASTM D 4833	44	45,000 lb
Axi-Symmetric Break Resistance Strain - % (min.)	ASTM D 5617	30	per formulation
Carbon Black Content, %	ASTM D 1603 *(4)*	2.0 – 3.0	45,000 lb
Carbon Black Dispersion	ASTM D 5596	*Note 5*	45,000 lb
Oxidative Induction Time (OIT) (min. ave.) *(6)* Standard OIT or High Pressure OIT	ASTM D 3895 ASTM D 5885	100 400	200,000 lb
Oven Aging at 85C *(7)* Standard OIT (min. ave.) - % retained after 90 days or High Pressure OIT (min. ave.) - % retained after 90 days	ASTM D 5721 ASTM D 3895 ASTM D 5885	 35 60	per formulation
UV Resistance *(8)* Standard OIT (min. ave.) or High Pressure OIT (min. ave.) – % retained after 1600 hours *(10)*	 ASTM D 3895 ASTM D 5885	 N. R. *(9)* 35	per formulation

(1) Of 10 readings; 8 out of 10 must be ≥ 7 mils, and lowest individual reading must be ≥ 5 mils; also see Note 9.

(2) Alternate the measurement side for double sided textured sheet

(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.

- Break elongation is calculated using a gauge length of 2.0 in. at 2.0 in./min.

(4) Other methods such as D 4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D 1603 (tube furnace) can be established.

(5) Carbon black dispersion (only near spherical agglomerates) for 10 different views:

- 9 in Categories 1 or 2 and 1 in Category 3

(6) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

(7) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

(8) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.

(9) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

(10) UV resistance is based on percent retained value regardless of the original HP-OIT value.

D. The membrane material shall be so produced as to be free of holes, blisters, undispersed raw materials, or sign of contamination by foreign matter. Defects discovered in the field shall be repaired by cutting out the defect and welding a new piece of membrane material in its place. The weld shall be placed in accordance with the requirements for field welded seams. Seams for repairs shall be tested in accordance with the required field seam test procedures.

E. Labels on each roll shall identify the thickness, length, width, and manufacturer's mark number. The roll shall also indicate the date, lot and batch number of the roll, the square feet in the roll, and the total roll weight as measured after manufacture. Should the total weight not meet the minimum weight based upon the minimum material density of 0.90 g/cc, the material thickness, and square footage provided, then the delivered material will be rejected for use.

F. Transportation, handling, and storage of the membrane shall be in accordance with written instructions from the manufacturer. These instructions shall be supplied prior to delivery of the material. In general, equipment used shall be adequate to handle the rolls of membrane without risk of damage to the material. Extreme care will be taken whenever handling the material. The rolls of membrane shall be stored on a surface free of sticks, rocks, roots, or other matter that may damage the material. Upon delivery, QC and QA personnel shall inspect each roll of material for damage. This inspection shall be recorded and included in the QA/QC reports.

G. There shall be no factory seams. Seams shall be welded in the field by factory trained technicians using a non-destructive hot-wedge fusion or extrusion process. Edges of rolled material shall be trimmed at the factory to remove non-conforming material. The first three feet of material on selected rolls shall be used for confirmation testing of the characteristics of the membrane material. Sampling and testing shall be performed by the QAO.

2.02 Factory Quality Control

A. The Manufacturer shall randomly sample compound ingredients of the LLDPE materials upon delivery to the membrane manufacturing plant to determine compliance with specifications. Tests to be carried out shall include Density and Melt Index as listed in GRI GM17. These test results shall be submitted by the Contractor to the QAO for approval.

B. Samples shall be randomly chosen and the thickness measured at 1 measurement/square inch for a minimum of 12 square inches. Measurements shall be taken at the low points of the textured material. One sample per roll is required. Sample shall be shipped to QAO for archival record. In lieu of random measurements, measurement across the entire width of the roll using a manufacturing process using a nuclear backgauge or measurements in accordance with ASTM D5994 will be allowed.

C. Samples of the production run shall be taken and tested accordingly to ASTM D638 to determine that tensile strength at yield and break, elongation at yield and break meet the minimum specifications. A quality control certificate shall be issued with the material. The resin used to manufacture the membrane must be new and of first quality, and the same resin must be used throughout the project. The installer shall submit the resin type to be used for approval.

2.03 Conformance Quality Assurance

The Construction Quality Assurance firm shall obtain samples and conduct conformance tests as described in the Construction Quality Assurance Manual.

Part 3 Execution

3.01 Area Preparation

Surfaces to be lined shall be smooth and free of rocks, stones, sticks, roots, sharp objects, or debris of any kind which could, in the opinion of the membrane installer, damage the membrane. The surface shall not contain particles larger than 3 inches. As necessary, the surface shall be groomed by hand to bring the surface up to the desired smoothness. The surface should provide a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed. The membrane installer and QCO shall certify in writing that the surface on which the membrane is to be installed is acceptable before commencing work.

3.02 Contractor Approval

The installation of the membrane shall be done with labor and equipment as recommended by the manufacturer of the membrane material. The installer shall provide the proper extrusion or hot-wedge fusion welding equipment for the installation. Only

installation methods approved by the manufacturer and the CQA Engineer in accordance with this section shall be used.

3.03 Field Seams

A. CONTRACTOR shall install the membrane at a rate which does not exceed his capacity for patching and testing field welds each day. Patches and repairs shall be completed and tested (including visual, air pressure and vacuum) each day on the material installed. Destructive test samples shall be obtained daily on the material installed.

B. Individual panels of membrane material shall be laid out and overlapped by a minimum of 4 inches prior to welding. Extreme care shall be taken by the installer in the preparation of the areas to be welded. The area to be welded shall be cleaned and prepared according to the procedures laid down by the material manufacturer. Sheeting shall be welded together by means of integration of the extrudate bead with the membrane material (extrusion method), or the hot-wedge fusion method. The composition of all extrudate used shall be identical to the membrane material.

C. Wedge seams shall be double track wedge seams. If extrusion seams are used, grinding shall be done by trained technicians only. Areas which show gouges or excessive wear due to grinding shall be removed and replaced using the procedure for replacement of damaged material.

D. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the membrane material so as to assure changes in environmental conditions will not affect the integrity of the weld. Equipment, rolls of material or other heavy loads and points of potential movement against a fixed object shall be guarded with a scuff pad of a second layer of LLDPE material.

E. No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped, and an overlap weld shall be applied. Welds on completion of the work shall be tightly bonded. Membrane areas showing injury due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of LLDPE membrane.

3.04 Weather Conditions

Membrane shall not be installed when wind is greater than 15 mph or the air temperature is less than or equal to 32°F.

3.05 Field Seam Test/Quality Control

A. The installer shall employ on-site physical non-destructive testing on welds to ensure watertight homogeneous seams. The methods of testing considered shall be the vacuum box test, the air pressure test and the visual inspection. Tests must include visual inspection of all seams. A detailed test protocol must be submitted for approval prior to installation of the cap.

B. Vacuum Testing:

1. The equipment shall be comprised of the following:

   A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a gauge to indicate chamber vacuum; a steel vacuum tank and pump assembly equipped with a pressure controller and pipe connections; a rubber pressure/vacuum hose with fittings and connections; a bucket and wide brush or spray assembly; a soapy solution.

2. The following procedures shall be followed:

   Energize the vacuum pump and reduce the tank pressure to approximately 5 psi (10 inches of Hg.) gauge; wet a strip of geomembrane approximately 12 inches by 48 inches (0.3 m by 1.2 m) with the soapy solution; place the box over the wetted area; close the bleed valve and open the vacuum valve; ensure that a leak tight seal is created; for a period of approximately 5 to 10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles; if no bubble appears after 10 to 15 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches (75 mm) overlap, and repeat the process; areas where soap bubbles appear shall be marked and repaired in accordance with Part 3.06.

C. Air Testing:

1. The equipment shall be comprised of the following:

   An air pump (manual or motor driven) equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi (160 and 200 kPa); a rubber hose with fittings and connections; a sharp hollow needle, or other approved pressure feed device.

2. The following procedures shall be followed:

   Seal both ends of the seam to be tested; insert needle or other approved pressure feed device into the tunnel created by the fusion wield; energize

the air pump to a pressure between 25 and 30 psi (160 and 200* kPa), close valve, and sustain pressure for approximately five minutes; if loss of pressure exceeds 2 psi (15 kPa), or does not stabilize, locate faculty area and repair in accordance with Section 3.05.H; remove needle or other approved pressure feed device and seal.

D. Tests must include visual inspection of all seams. A detailed test protocol must be submitted to the CQA Engineer for approval a minimum of 30 days prior to installation of the cap.

E. A manufacturer's quality-control technician shall inspect each seam. Areas showing a defect shall be marked and repaired in accordance with LLDPE repair procedures. In addition the QCO and QAO shall review the seams.

F. A test weld three (3) feet long from each welding machine shall be run once every five (5) hours, prior to membrane welding and under the same conditions as exist for the membrane welding. The test weld shall be marked with date, ambient temperature, and welding machine number. Samples of weld 1/4" to 1/2" wide shall be cut from the test weld and tested for shear and peel. Seams shall be stronger than the material as determined by Film Tear Bond failure. The weld sample shall be kept for subsequent testing on laboratory tensiometer equipment in accordance with the applicable ASTM standards designated in the National Sanitation Foundation Standard Number 54. Random weld samples may be removed from the installed welded sheeting at a frequency determined by the QAO.

G. Destructive testing of the seams will be required on each seam at a 500 foot frequency or fraction thereof. The OWNER will specify the location of the tests. Additional samples may be required at the QAO discretion in areas of contamination, visual variations, or other suspicious observations. A sample of the weld will be removed and tested a specified for test welds. For each test, a three foot section shall be removed. The three foot section shall be divided into three 1 foot samples. Each sample shall include 10 test coupons. One sample will be tested by the CONTRACTOR, one sample will be retained for laboratory testing by the OWNER, and the third will be retained by the QAO for the archival record of the weld and/or testing.

H. If a weld sample fails any test, the testing must be repeated at a point 10 feet away from the same seam. If the second test passes, the failed portion of the seam must be repaired. If the second test fails, the above procedure must be repeated until a passing section of seam is found. The failed seam must be reconstructed. Seams must be bounded on both ends by passing tests. Upon completion of the test, the area of the test shall be patched as described in the section on patching of defects. The patch shall be tested as described above.

I. The OWNER or his designated representative reserves the right of access for inspection of any or all phases of this installation.

J. Tests shall meet the following minimums:

1. Hot Wedge Seams

Shear Test, ASTM D4437 FTB.....60 lb/in
Peel Test, ASTM D4437 FTB .....50 lb/in

2. Extrusion Fillet Seams

Shear Test, ASTM D4437 FTB.....60 lb/in
Peel Test, ASTM D4437 FTB .....50 lb/in

Values are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values.

3.06 Field Damage

The CONTRACTOR shall take every precaution to protect the membrane from damage due to natural and field conditions. CONTRACTOR shall not use metal tools or equipment in situations that the use of those tools might endanger the cap. As the panels are placed they shall be secured to prevent excessive movement. Panels moved by the wind shall be inspected and if damaged shall be replaced or repaired as required in the judgment of the QAC at no additional cost to the OWNER. Similarly, panels which have developed excessive wrinkles, particularly at the toe of slopes shall be inspected and repaired or replaced as necessary at no additional cost to the OWNER. If a large wrinkle develops at the toe of the slope and cutting and seaming is determined to be an acceptable repair, this operation shall be the final operation in the installation prior to covering.

3.07 Records and Quality Assurance

A. The installation of the membrane shall be monitored by the QAO. The purpose of the monitoring shall be to document the installation of the membrane system. The following records shall be kept as part of the cap installation process:

1. Panel Placement Checklist
2. Panel Seaming Checklist
3. Seam Testing Checklist
4. Repair and Patching Checklist
5. Panel and Seam Layout Record Drawing
6. Sample Location Drawing
7. Sample tags with Duplicates
8. Inventory of amount of material used versus amount delivered to the site.

B. All repaired field defects, patches, reworked seams, repaired fishmouths and other non-standard field seams shall have the following information marked on the cap with a marker suitable for the purpose:

1. Initials of Welder
2. Date of Weld
3. Initials of QC Technician
4. Date of QC Test
5. Indication of Pass/Fail

C. The cap may not be covered until defects, patches, etc. have been properly tested, logged, and marked.

D. The results of the test and monitoring reports shall be turned over to the QAO for review on a daily basis. Reports shall be complete within 24 hours of the installation of the panel, seam, repair, etc.

3.08 Sandbags

A. Cap shall be weighted down with sand bags to prevent wind uplift until covered by subsequent layers of the final cover.

B. Number and placement of sand bags shall be the responsibility of the CONTRACTOR.

3.09 Payment

Payment by the OWNER for installation of the membrane shall not be made until testing is completed and the test results reviewed and approved.

3.10 Warranty

The manufacturer/installer shall provide a written warranty for materials for a period of no less than 20 years. A written warranty for 1 year shall also be provided for quality of workmanship.

END OF SECTION

This page intentionally blank

SECTION 15060

PIPE AND PIPE FITTINGS

Part 1 General

1.01 Requirements Included

B. Provide personnel, equipment, and materials to install pipe, fittings, and appurtenances to general lines and grades shown on the Contract Drawings.

B. Provide personnel, materials, and equipment necessary to perform testing of newly laid gravity lines.

C. Provide certificates that lines meet testing requirements.

1.02 Related Requirements

A. Section 02300 Earthwork
B. Section 02410 Leachate Collection Systems
C. Section 02530 Gravity Leachate Line Systems

1.03 Quality Assurance

A. Comply with applicable codes and regulations as required by regulatory agencies having jurisdiction over this work. Comply with the pertinent sections of the following Standards:

AWWA - American Water Works Association
ANSI - American National Standards Institute
ASTM - American Society of Testing and Materials
Virginia Department of Health's "Sewage Collection and Treatment Regulations"
VDOT "Road and Bridge Specifications"
VDOT Standard Details

B. Certificates shall be presented to the ENGINEER prior to material's final installation.

1.04 Submittals

Shop drawings and product data are required for pipe and fittings.

Part 2 Products

2.01 Schedule 40 PVC Pipe

A. Schedule 40 PVC pipe used in the toe drain collection system shall conform to ASTM D1785. Pipe joints shall be solvent welded. Pipe shall be perforated as shown on the Contract Drawings.

B. Perforations shall be slotted with two rows of rectangular slots having a width of 0.1 inches, spaced 0.5 inches apart, and having a length of 2.70 inches.

C. Fittings shall be of the same material and manufacturer as the pipe they are to be attached to. PVC fittings shall conform to ASTM D 2466.

D. ADS N-12 may be used in lieu of OVC

2.02 Corrugated Plastic Pipe

A. Corrugated plastic pipe used for temporary culverts shall consist of heavy-duty, flexible material with a minimum strength of SDR-11.

B. Pipe shall be polyethylene, single wall, non-perforated.

C. Pipe connections shall be made with split couplers with gasket for soil tight applications.

2.03 Reinforced Concrete Piping

A. Reinforced concrete piping to be used for permanent stormwater culverts shall conform to ASTM C76 Class III, and AASHTO M170.

B. Joints shall be sealed with gaskets conforming to ASTM C-443-05A or greater.

Part 3 Execution

3.01 Waste Removal

Waste encountered during excavation of the leachate gravity line trench shall be collected by the owner.

3.02 Pipe Installation

A. General

1. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. Pipe, fittings, and appurtenances shall be lowered carefully into the trench by means of a derrick, rope, or other suitable tools or equipment, in such a manner as to minimize damage to materials and protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench. The trench should be dewatered prior to installation of the pipe.

2. Pipe and fittings shall be strung out along the route of construction where it will cause least interference with traffic. Commence at the lowest point in the system. Laying of pipe shall be commenced immediately after the excavation is started and every measure must be used to keep pipe laying closely behind trenching. No more than 10 feet of trench shall remain open at the end of each working day. Required connections to existing lines shall be made in accordance with local standards and requirements. Observe extreme care to keep debris from entering lines. Check carefully the invert elevations of existing lines to which connections are to be made and inform the ENGINEER immediately if there is a discrepancy with the Contract Drawings. Each pipe shall be inspected for defects prior to being lowered into the trench and swabbed or brushed out to determine that no dirt or foreign material gets into the finished line.

3. Holes shall be scooped out where the bells occur to keep the entire barrel of the pipe bedded firmly and uniformly. Lay the pipe in straight lines and on uniform grades between points where changes in alignment or grade are shown. Fit the pipe to form close concentric joints. Immediately after each joint is made, drag a close fitting swab past the joint within the pipe. The pipe shall be kept closed by means of a test plug whenever work is not in progress.

B. Examination of Materials

Pipe fittings, valves, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the OWNER, who may prescribe corrective repairs or reject the materials.

C. Pipe Ends

Lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped

clean and dry and be free from dirt, sand, grit, or foreign material before the pipe is laid.

D. Pipe Cleanliness

Foreign material shall not enter the pipe while it is being placed in the trench. During pipe laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.

E. Pipe Placement

As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

F. Pipe Deflection

When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane, or where long radius curves are permitted, the amount of deflection shall not exceed manufacturer's recommendations.

G. Pipe Cutting

Cutting pipe for the insertion of valves, fittings, or closure pieces shall be done in a neat, workmanlike manner without creating damage to the pipe or lining.

3.03 Jointing

A. The gravity line shall be laid and joined complete-in-place in order that each length and section of pipe shall have a smooth and uniform invert. The previous joint shall have been completed and the entire length of pipe shall be well bedded and firmly backfilled before jointing another length of pipe. Bell holes shall be dug of sufficient size to insure proper jointing.

B. The CONTRACTOR shall not use excavation equipment to push the pipe into the home position, unless approved by the ENGINEER, and then only for one length of pipe at a time.

C. The CONTRACTOR shall join the pipe as recommended by the manufacturer to obtain the degree of watertightness required. The use of lubricants, primers, adhesives and similar materials shall be as recommended by the manufacturers.

D. The pipe shall be connected to the holding tank utilizing connections supplied by the CONTRACTOR.

3.04 Location Tape

Plastic encased aluminum foil tape shall be installed above all pipe such that pipe can be located in the future with a metal locating device. Tape shall be color coded and permanently imprinted with identification message. Tape shall be LINEGUARD Detectable Underground Marking Tape, or equal.

3.05 Testing of Gravity Line

A. Prior to final inspection, the required tests shall be completed in the presence of the ENGINEER, the OWNER, or the OWNER'S authorized representative. The CONTRACTOR shall prove the watertightness of the line or portions thereof by a low pressure air test. The CONTRACTOR might utilize an infiltration or exfiltration test in special circumstances, but only after receiving written approval from the ENGINEER. Testing expenses shall be borne by the Contractor, and shall be bid as a part of the price of the line.

B. AIR TEST: A low pressure air test may be employed on pipes of 18" diameter or less. The testing equipment, procedure, and results will all be subject to the strict approval of the ENGINEER. Results of the air test will be reviewed for compliance with ASTM C828 and C924. The air test is to be conducted between two (2) consecutive manholes. The test equipment shall consist of two (2) plugs (one tapped and equipped for air inlet connection), a shut-off valve, a pressure regulating valve, a pressure reduction valve, and a monitoring pressure gauge having a pressure range from 0 to 5 psi, graduated in 0.10 psi with an accuracy of ± .04 psi. CONTRACTOR shall provide certification of accuracy of test equipment to the ENGINEER. The test equipment shall be set up outside the manhole for easy access and reading. Air shall be supplied to the test slowly and shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig. The pipeline shall be filled until a constant internal pressure of 3.5 psig is maintained. The internal pressure shall be maintained at 3.5 psig or slightly above for a five (5) minute stabilization period, after which time the internal pressure will be adjusted to 3.5 psig, the air supply shut off and the test begun. No person shall remain in the manhole while pipe is being pressurized or throughout the test for safety purposes. A pressure drop of 1.0 psi from 3.5 to 2.5 psig shall be allowed for the test times specified in the following table, based upon the designated pipe size and test segment length. Should the 1.0 psi drop occur in less time than that specified in the table the pipe segment shall have failed. If the time required for the pressure to drop 1.0 psi is greater than that shown in the table, the pipe segment shall have passed. For a more detailed description of the air test method refer to ASTM C828, current revision. An air pressure correction shall be required when the prevailing ground water is above the line being tested and shall be calculated as follows:

Ground Water Depth (ft.)/2.31 + 3.5 = Starting Test Pressure

Ending Test Pressure = Starting Pressure - 1.0 psi

There is no change from time requirements established for the basic air test.

AIR TEST TABLE BASED ON EQUATIONS FROM ASTM C828 LATEST REVISION SPECIFICATIONS TIME (MIN:SEC) REQUIRED FOR PRESSURE DROP FROM 3.5 TO 2.5 PSI WHEN TESTING ONE PIPE DIAMETER ONLY							
Length of Test Segment	Pipe Diameter (in)						
	4	6	8	10	12	15	18
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30
175	0:31	1:09	2:03	3:13	4:37	7:05	
200	0:35	1:19	2:21	3:40	5:17		
225	0:40	1:29	2:38	4:08	5:40		
250	0:44	1:39	2:56	4:35			8:31
275	0:48	1:49	3:14	4:43			9:21
300	0:53	1:59	3:31				10:12
350	1:02	2:19	3:47			8:16	11:54
400	1:10	2:38	4:04		6:03	9:27	13:36
450	1:19	2:50			6:48	10:38	15:19
500	1:28			5:14	7:34	11:49	17:01

C. VISUAL TEST: All lines shall be inspected visually to verify accuracy of alignment and freedom from debris and obstructions. The full diameter of the pipe for straight alignments shall be visible when viewed between consecutive manholes. The method of test shall be visually lamping with mirrors and lights.

D. DEFLECTION TEST: The maximum allowable pipe deflection (reduction in inside diameter) shall be 7%. The ENGINEER reserves the right to require the CONTRACTOR to perform random deflection tests of pipe before final acceptance. The device for testing shall be a properly sized go - no go mandrel.

E. INFILTRATION TEST (ONLY IF APPROVED): This test will only be allowed when the hydrostatic head outside the pipe is a minimum of 4 feet above the crown of the entire length of the pipe being tested. The CONTRACTOR shall verify the level of the hydrostatic head during testing. Measurement of the infiltration shall be made before flows are allowed in the pipe, and shall be made by means of a V-notch weir or by measuring the direct volume at the nearest down-grade manhole. Allowable leakage shall not exceed 100 gallons per inch of nominal pipe diameter per day per mile for any section of the system. This test

shall be conducted in accordance with ASTM Standard C654.

END OF SECTION

This page intentionally blank

SECTION 15062

LANDFILL GAS/CONDENSATE SYSTEM HDPE PIPING AND FITTINGS

Part 1 General

1.01 General

The CONTRACTOR shall supply and install all piping and fittings for the landfill gas collection system.

1.02 Related Requirements

Section 13300 Geotextile Fabrics
Section 15060 Pipe and Pipe Fittings

1.03 References

A. ASTMD-1248: *Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.*

B. ASTM D-2513: *Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.*

C. ASTM D-3261: *Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.*

D. ASTMD-3350: *Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.*

1.04 Submittals

Shop drawings and product data shall be submitted for pipe and fittings, including detailed drawings on pipe, fittings, gaskets, and appurtenances and evidence that pipe and fittings comply with Contract Specifications. Testing procedure shall be provided with submittals.

1.05 Packaging, Delivery and Handling

The pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport by commercial carrier. When delivered, a receiving inspection shall be performed by the CONTRACTOR and any shipping damage reported to the pipe and fittings manufacturer. Pipe and fittings shall be handled, installed, and tested in accordance with manufacturer's recommendations, and the requirements of this specification.

Part 2 Products

2.01 Physical Properties

A. Materials shall be in accordance with manufacturer's specifications for PE 3408 pipe.

B. There shall be no evidence of splitting, cracking or breaking when the pipe is tested in accordance with Section 3.03.

C. Ring Stiffness Constant (RSC) values for the pipe can be directly related to the pipe's class designation. (Nominal RSC of Class 40 pipe = 40, etc.). The minimum RSC is 90% of the nominal.

D. The pipe and fittings shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.

E. Clean rework or recycled material generated by the manufacturer's own production may be used so long as the pipe or fittings produced meet all the requirements of this specification.

2.02 Pipe and Fittings

A. Where possible, pipe and fittings should be produced from identical materials meeting the requirements of this specification.

B. Pipe and pipe fittings shall be 6 inch diameter HDPE DR-17 or 2 inch HDPE DR-17 (as shown on plans) and transition from solid to perforated when required. Landfill gas surface collector and vertical toe drain shall be perforated with 3/8" diameter perforations in 90 degree increments at 6" on center, beginning at the top of stone.

C. All HDPE pipe and pipe fittings shall be joined as in accordance with section 3.02.A.

D. Fittings such as coupling, wyes, tees, adapters, etc. for use in laying pipe shall have standard dimensions that conform to ASTM D3261.

E. Pipe and fittings shall be pressure rated at 100 psi. Whether molded or fabricated, fittings shall be fully pressure rated to at least the same service pressure rating as the pipe to which joining is intended.

F. Molded fittings shall meet the requirements of ASTM D-3261. At the point of fusion, the outside diameter and minimum wall thickness of fitting butt fusion outlets shall meet the diameter and wall thickness specifications of the mating

system pipe. Fitting markings shall include a production code from which the location and date of manufacture can be determined. Upon request, the manufacturer shall provide an explanation of his production code.

G. Marking:

1. Each standard and random length of pipe and fitting in compliance with this standard shall be clearly marked with the following information:

   a. ASTM Standard Designation
   b. Pipe Size
   c. Class & Profile Number
   d. Production Code
   e. Standard Dimension Ratio

2.03 Gravel Pack

Gravel pack, if necessary as shown by drawings, shall be VDOT #57 stone. Stone shall have a calcium carbonate content no greater than 15 percent.

2.04 Geotextile Fabric

Geotextile fabric shall be non-woven, needlepunched polypropylene conforming to Section 13300.

2.05 Bentonite

Bentonite shall be suitable commercially processed bentonite pellets or chips that range from 0.25 to 0.5 inches in diameter. Bentonite shall be high-swelling sodium montmorillonite clay free of additives, produced by WyoBen, American Colloid Co., or N.L. Baroid Company or approved equal.

Part 3 Execution

3.01 Field Quality Control

A. Pipe may be rejected for failure to conform to Specifications or following:

1. Fractures or cracks passing through pipe wall, except single crack not exceeding 2 in. in length at either end of pipe which could be cut off and discarded. All pipes within one shipment shall be rejected if defects exist in more than 5% of shipment or delivery.
2. Cracks sufficient to impair strength, durability or serviceability of pipe. Defects indicating improper proportioning, mixing, and molding.
3. Defects indicating improper proportioning, mixing, and molding.

4. Damaged ends, where such damage prevents making satisfactory joint.

B. Acceptance of fittings, stubs or other specifically fabricated pipe sections shall be based on visual inspection at job site.

C. Notify Owner prior to backfilling trench to allow Owner to obtain as-built top of pipe coordinates and elevations.

3.02 Installation of Pipe

A. Heat Fusion of Pipe:

1. Weld in accordance with manufacturer's recommendation for butt fusion methods. Provide fusion operators certified by the pipe manufacturer.
2. Butt fusion equipment for joining procedures shall be capable of meeting conditions recommended by pipe manufacturer including, but not limited to, temperature requirements, alignment, and fusion pressures.
3. For cleaning pipe ends, solutions such as detergents and solvents, when required, shall be used in accordance with manufacturer's recommendations.
4. Do not bend pipe to greater degree than minimum radius recommended by manufacturer for type and grade.
5. Do not subject pipe to strains that will overstress or buckle piping or impose excessive stress on joints.
6. Branch saddle fusions shall be joined in accordance with manufacturer's recommendations and procedures. Branch saddle fusion equipment shall be of size to facilitate saddle fusion within trench.
7. Before butt fusing pipe, inspect each length for presence of dirt, sand, mud, shavings, and other debris or animals. Remove debris from pipe.
8. Cover at end of each working day open ends of fused pipe. Cap to prevent entry by animals or debris.
9. Use compatible fusion techniques when polyethylenes of different melt indexes are fused together. Refer to manufacturer's specifications for compatible fusion.

B. Flange Jointing:

1. Use on flanged pipe connection sections.
2. Connect slip-on carbon steel backup flanges with galvanized nuts and bolts.
3. Butt fuse fabricated flange adapters to pipe.
4. Observe following precautions in connection of flange joints.
   a. Align flanges or flange/valve connections to provide tight seal. Require 1/8-inch EPDM flat ring gaskets if needed to achieve seal. Gaskets are required for flange/valve connections.

b. Place U.S. Standard round washers as may be required on some flanges in accordance with manufacturer's recommendations. Bolts shall be lubricated in accordance with manufacturer's recommendations.
c. Tighten flange bolts in sequence and accordance with manufacturer's recommendations. CAUTION: Do not over-torque bolts.

5. Pull bolt down by degrees to uniform torque in accordance with manufacturer's recommendation.
6. Protect below grade bolts and flanges by covering with a 5 mil polyethylene wrap. Duct tape wrap to HDPE pipe.
7. Electrofusion couplings, where used, shall be installed per manufacturer's specifications.

C. Pipe Placement:

1. Grade control equipment shall be of type to accurately maintain design grades and slopes during installation of pipe. A positive grade shall be maintained from the well heads through the flex hose and through the entire length of gas header piping.
2. Dewatering: Remove standing water in trench before pipe installation.
3. Unless otherwise specifically stated, install pipe, fittings and well heads in accordance with manufacturer's recommendations.
4. Maximum lengths of fused pipe to be handled as one section shall be placed according to manufacturer's recommendations as to pipe size, pipe SDR, and topography so as not to cause excessive gouging or surface abrasion.
5. Cap pipe sections longer than single joining (usually 40 ft.) on both ends during placement except during fusing operations.
6. Notify ENGINEER prior to installing pipe into trench and allow time for ENGINEER'S inspection. Correct any irregularities found during inspection.
7. Complete tie-ins within trench whenever possible to prevent overstressed connections.
8. Allow pipe sufficient time to adjust to trench temperature prior to testing, segment tie-ins or backfilling activity.
9. Install reducers adjacent to laterals and tees.
10. To reduce branch saddle stress, install saddles at slope equal to and continuous with lateral piping.
11. Place in trench by allowing minimum 12 in./100 ft. for thermal contraction and expansion.

3.03 Pipe Testing

A. All PE header pipes shall be tested to detect any leaks in the piping. Testing shall be performed below grade (inside the trench). The CONTRACTOR shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing

any leaks detected during testing. Air testing shall be used. All testing shall be conducted in accordance with the manufacturer's specifications.

B. Like sizes of polyethylene piping shall be butt welded together into testing segments not to exceed 800 feet. Segments shall be connected to a testing apparatus on one end and fitted with caps on all openings.

C. The segment to be tested shall be allowed time to reach constant and/or ambient temperature before initiating the test.

D. The test should be performed during a period when the pipe segment will be out of direct sunlight when possible; i.e., early morning, late evening, or cloudy days. This will minimize the pressure changes which will occur during temperature fluctuations.

E. The test pressure shall be 5 psig.

F. Pressure drop during the test shall not exceed one percent of the testing gauge pressure over a period of one hour. This pressure drop shall be corrected for temperature changes before determining pass or failure.

G. The Engineer shall be notified prior to commencement of the testing procedure and shall be present during the test.

3.04 Test Failure

A. The following steps shall be performed when a pipe segment fails the test.

1. The pipe and all fusions shall be inspected for cracks, pinholes or perforations.
2. All blocked risers and capped ends shall be inspected for leaks.
3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and re-fusing the pipe.

C. After all leaks are repaired, a retest shall be performed in accordance with Section 3.03.

3.05 Installation of LFG Vent/Drain Component

A. The vent or drain piping shall be installed first and held vertical. The gravel pack (if required) shall be installed carefully so as to avoid damaging the piping. If the piping is damaged, the stone and piping shall be removed and reinstalled. The gravel pack shall be installed so as to provide a uniform blanket of stone around

the central well piping.

B. The piping for each vent/drain shall be assembled prior to installation to ensure that the joints are properly set and are secure.

C. Layers above the cap shall be installed identical to the landfill cap design around the vents. The top of the vents shall be capped as shown in the plans. Grade the area to drain.

D. A boot, of the same material as the cap, shall be provided.

E. Backfill above the stone with clean soil and bentonite layers as indicated on the drawings when required.

Part 4 Safety

The CONTRACTOR shall prepare and implement a safety plan for installation of the gas vents. Gas migration, in particular, poses a hazard, and has been responsible for some deaths and serious injuries. Therefore, it makes sense to take more than routine safety precautions when working in or near a landfill.

END OF SECTION

This page intentionally blank

SECTION 133420

BUILDING SPECIFICATIONS

Building Shape: ..... Gable

Building Width:..... 30 feet

Building Length: ..... 60 feet

L. Eave Height:..... 14 feet

R. Eave Height: ..... 14 feet

Roof Pitch: 2:12

Rigid Frames: .....I-Beam

Frame Spacing: .....Mixed

Framed Openings (1) on Each 30' End: .....(2) 12 x 12

Framed Opening, (1) Access Door on north side. ..... (1) 3' X 6'8"

Wind Bracing: ..... Rod

Building Code:..... Current City of Harrisonburg, VA

Design Loads and Exposure: ..... Code requirement

Foundation design by Virginia Licensed Professional Engineer

Building's Standard Features and Warranties to Include:

- AZ55 Galvalume Plus Roof Coating - 25 year rust through warranty
- Minimum 25-Year Warranty on Sidewall Panel Paint - Siliconized Polyester Baked on Enamel - No chipping, cracking, peeling or blistering.
- Galvanized Purlins and Girts
- Minimum 26 Gauge PBR Panels - Roof and Walls.
- Extended Purlin Bearing Rib Overlap.
- Complete Trim Package - Base Trim, Eave Trim, Jamb Trim, Jamb Covers, Rake Trim etc. included at no additional cost.
- Fasteners - Surgical Stainless Steel with Neoprene washer - Life Time Warranty.

END OF SECTION

This Page Intentionally Blank

SECTION 133421

PREFABRICATED BUILDING WITH PRESSBOX

Construction:

Building Shape: .....2-story rectangular

Building Width:..... 20 feet

Building Length: ..... 24 feet

Press box Width ..... 8 feet

Press box Length ..... 8 feet

Restroom and Press box Ceiling Height ..... 8 feet

Construction 5000 psi steel reinforced concrete

Framed Openings: .....(4) 3'-0" x 6'-8"

Lexan Windows (main building): .....(2)

Lexan Windows (press box):..... (2) 48" x 72" x ¼"

Building Code:..... Current City of Harrisonburg, VA

Foundation design by Virginia Licensed Professional Engineer

Standard Features to Include:

- Delivered and Installed
- Exposed Aggregate, brick, or broom exterior finish
- Flat and Gabled rooflines (press box is gable)
- Fixed louvers and bug screens (2)
- Stain exterior/interior
- Non-slip epoxy floor coating
- Galvanized steel interior doors (4) 3'-0" x 6'-8" w/heavy duty hardware and locks
- Dual stainless steel wall grab bars (2)
- Stainless steel grab bars (4) 48"
- Stainless steel grabs (4) 36"
- Koala Baby Changing Station (2)
- Stainless steel soap dispenser (manual push) (2)
- Stainless steel mirror (2)

- Stainless steel lockable 3-roll toilet paper dispensers (6)
- Men's/Women's ADA signs (1 each)
- Two-coat coat hooks (6)
- Plastic stall doors – 26"W (3)
- Plastic stall doors – 36"W (2)

Electrical:

Panel LP (per plan sheet E0.1)..... provided by electrical contractor

Ceiling Mounted interior 4' 2-bulb fluorescent light fixtures.....(7)

- 2 in each restroom (4)
- 2 in equipment room
- 1 in press box

Motion sensor packages.....(4)

- 1 in each restroom (2)
- 1 in each restroom fan (2)

Exhaust fans .....(2)

5kW heavy-duty electric heart with thermostat .....(1)

Excel Xcellerator sensor operated hand dryer.....(2)

Duplex GFI Outlets.....(3)

- 1 in each restroom (2)
- 1 in equipment room (1)

Standard duplex outlets (press box).....(8)

All other electrical installation – circuits, conduit, wire – by building manufacturer

Electrical Contractor to meet National Electrical Code (NEC)

Plumbing:

PEX and PVC water supply lines

Exterior Elkay Water Fountain.....(1)

Hose bibs ..... (3)

- Lockable (2)
- Non-lockable (1)

Vitreous China wall-hung manual flush valve toilets ..... (6)

- Men's restroom (2)
- Women's restroom (4)

Vitreous China wall-hung manual faucet sinks ..... (2)

- Men's/Women's restrooms (1 each)

Vitreous China wall-hung manual flush valve urinal ..... (2)

- Men's restroom (2)

Trap covers for drain on sink ..... (2)

- Men's/Women's restrooms (1 each)

Floor drains with trap primers ..... (3)

- Men's restroom (1)
- Women's restroom (1)
- Equipment room (1)

All required building permits to be provided by the contractor.

Contractor shall include providing a level compacted stone base installed per manufacturer's recommendations.

Contractor must provide level unobstructed area large enough for crane and tractor trailer to park adjacent to pad. Crane must be able to place outriggers within 3'-0" of edge of pad and truck and crane must be able to get side-by-side under their own power.

No overhead lines may be within 75' radius of center of pad. Firm roadbed with turns allowing a 65' lowbed tractor and trailer must be provided directly to the site. No building shall be placed closer than 2'-0" to an existing structure.

This Page Intentionally Blank

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. This section is only a portion of the Contract Documents. All of the Contract Documents, including General Conditions of the Construction Contract and Division 01 General Requirements, apply to this section.

B. This Section applies to all Division 26 sections. Requirements of this section apply only to new work unless otherwise indicated.

C. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 01 Specification Sections, apply to all Division 26 Sections.

D. This Section applies to all Electrical sections.

1.02 JOB CONDITIONS

A. The Contract Documents specify the scope and arrangement of the Work and shall be followed as closely as actual conditions allow.

B. The Contractor shall give consideration to all other trades, and make arrangements to avoid conflicts and interference with other Work, new or existing. Contractor shall coordinate all components of the Work, and provide minor adjustments as required, including offsets, transitions, fittings, and accessories to meet actual conditions.

C. The Contractor shall visit the job site prior to bid date to examine the conditions under which the Work is to be performed. No extra charges shall be paid for providing of Products or furnishing of Work resulting from failure to comply with this requirement.

1.03 CONFORMANCE TO REGULATIONS

A. All Work shall conform to the regulations of the applicable state laws, ordinances and codes.

1.04 REGULATORY REQUIREMENTS

A. All applicable Work shall conform to the requirements of NFPA 70.

B. All Products shall be listed by the Underwriters Laboratories, Inc. (UL), and shall bear the UL label. Where UL labels are not provided from the factory, the

Contractor shall be responsible for having the equipment or materials tested by a UL testing firm, acceptable to authority having jurisdiction, to determine suitability of the Product for purpose specified.

1.05 QUALITY ASSURANCE

A. Work shall meet or exceed minimum recommendations of:
   1. ANSI - American National Standards Institute
   2. ASTM - American Society for Testing Materials
   3. AWG - American Wire Gauge
   4. EEI - Edison Electric Institute
   5. ETL - Electrical Testing Lab
   6. EIA - Electronic Industries Association
   7. IEEE - Institute of Electrical and Electronic Engineers
   8. IPCEA - Insulated Power Cable Engineers Association
   9. ISA - Instrument Society of America
   10. NEC - National Electrical Code, NFPA 70
   11. NECA - National Electrical Contractors Association
   12. NEMA - National Electrical Manufacturer's Association
   13. NESC - National Electrical Safety Code
   14. NFPA - National Fire Protection Association
   15. OSHA - Occupational Safety and Health Act
   16. UL - Underwriters' Laboratories, Inc.
   17. VUSBC - Virginia Uniform Statewide Building Code, 2009

B. Reference to the standards of any technical society, organization, or association, or to the laws, ordinances, or codes of governmental authorities shall mean the latest standard, code, or specification adopted, published, and effective on the date of Bid Opening.

C. The specifications, codes, and standards referenced in these specifications (including addenda, amendments, and errata) shall govern in all cases where references thereto are made. In case of conflict between the referenced specifications, the more stringent requirement shall govern unless otherwise permitted by the Architect/Engineer. Major conflicts shall be referred to the Architect/Engineer for resolution.

1.06 MATERIALS AND EQUIPMENT

A. Unless specifically noted otherwise, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards, be of a current design, new, unused, and undamaged.

B. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate equipment shall be interchangeable.

1.07 UTILITIES AND CONNECTIONS

A. Verify location of all existing utilities before laying out and making connections. Report any inconsistencies to Architect/Engineer before commencing Work. Contractor shall be responsible for correcting any errors, and repairing or replacing all materials and equipment damaged as a result of failure to comply with this requirement.

1.08 WIRING DIAGRAMS

A. All electrical equipment shall be provided with complete wiring diagrams showing all power and control connections. The diagrams shall be legible and placed in a clear plastic pouch that is permanently affixed to the equipment.

1.09 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect Products from damage, marring, and soiling.

B. Any marring of factory finishes shall be repaired or replaced as necessary to match the original factory finish.

1.10 SUBMITTALS

A. Refer to Division 01 requirements.

B. Submittal Schedule: The Contractor shall submit a Submittal Schedule to the Architect/Engineer for review within 30 days of the Award of Contract. The Architect/Engineer shall review the schedule for content and return with comments or approval. Revise and resubmit as required.

C. General: The Contractor shall submit information, for Architect/Engineer's review, to demonstrate compliance of proposed Products and/or installations with the Contract Documents. This information shall include, but not be limited to catalog data; performance data; noise levels; etc. Proposed Products that are not in compliance with the Contract Documents may be rejected. Information must be submitted on all required Products, including proposed Products that appear to be in compliance with the Contract Documents.

D. Contractor preparation:

1. The Contractor shall review and approve each submittal and coordinated all other related or affected Work before submitting for review. All copies of each submittal shall bear the Contractor's stamp, with signature or initials, certifying review and approval; verification of field dimensions; and coordination with adjacent Work are in compliance with the requirements of the Contract Documents.
2. The Contractor shall identify variations from the requirements of the Contract Documents on all copies of applicable submittals. No extra charges shall be paid for the providing of Products or furnishing of Work required as a result of failure to comply with this requirement.

E. Submittal Format:
1. Each submittal shall be accompanied by a letter of transmittal listing Project Title, Contractor, Subcontractor or supplier, submitted Products, pertinent drawing and detail number, and specification section number, as appropriate.
2. Provide a minimum of five copies of each submittal. Provide additional copies as required by Owner and/or Contractor. Each copy of a submittal shall be bound in a three-ring binder, and indexed to allow ready reference to each Product.
3. Product data shall be clearly marked to identify the applicable Products or models. Options or modifications required by the Contract Documents shall be clearly identified.
4. Submittals shall be complete with all associated Products. Submittals on portions of a Product or system shall not be reviewed.

F. Architect/Engineer Procedures: Submittals will be reviewed with reasonable promptness. The Contractor shall allow 15 days for review of each submittal. The Architect/Engineer's comments will be indicated on a Submittal Review Comments form, which will be attached to each copy of the submittal. Contractor shall be responsible for distributing copies of reviewed submittals as appropriate.

G. Resubmission: Contractor shall change or correct submittals as required by the Architect/Engineer and resubmit until approved. The Contractor shall identify any changes other than those required by the Architect/Engineer on all copies of the resubmittal.

H. Approval required: The ordering, fabrication and/or installation of Products before approval of all relevant submittals shall be at the Contractor's risk. Any damage to new or existing Work resulting from the installation of unapproved Products shall be repaired or replaced by the Contractor at no additional cost. Payment will not be recommended for any Work that does not have an approved submittal.

1.11 SUBSTITUTIONS

A. Refer to Division 01 requirements.

B. For a Product specified by naming one or more manufacturer and model, and followed with the statement “or approved equal,” the Contractor may submit a Product other than the Product specified by manufacturer and model, that Product shall be considered a Substitute Product and shall comply with the following conditions:
   1. The Contractor shall verify the Substitute Product is equal or superior in all respects to the Specified Product.
   2. The Contractor shall submit data on the Substitute Product in compliance with the “Submittals” paragraph herein.
   3. The Contractor shall be responsible for coordinating the installation of the Substitute Product with all trades. The Contractor shall be responsible for any changes required incorporating the Substitute Product into the Work.
   4. The Contractor waives all claims for additional costs related to the Substitute Product that become apparent before, during or after installation.

1.12 OPERATING AND MAINTENANCE MANUAL

A. Refer to Division 01 requirements.

B. General: The Contractor shall submit one copy of the Operation and Maintenance Manual to the Architect/Engineer for review a minimum of 60 days prior to Instruction and Training Sessions. This copy will be returned to the Contractor with Architect/Engineer's comments or approval. The Contractor shall revise and resubmit one copy of the O&M Manual as required. The Contractor shall provide four copies of the approved O&M Manual. Instruction and Training Sessions shall begin 30 days after receipt of the approved O&M Manuals. Refer to “Instruction and Training Sessions” paragraph herein.

C. Binders: Commercial quality, 8-1/2x 11 inches, three ring binders with durable plastic covers; three inch maximum ring size. Attach printed labels to the front and side of each binder stating '(PROJECT NAME) OPERATION AND MAINTENANCE MANUAL'; applicable volume number, and project title. Provide tabbed dividers for each Product and system, with typed description or applicable Specification Section. Provide a table of contents for the entire manual and insert at the front of each binder.

D. Contents: The manual shall consist of three parts as follows:
   1. Part 1: Directory listing names, addresses, and telephone numbers of Architect, Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions including, but not limited to, the following:
      a. General description and specifications of each component and of each system as a whole.

b. Manufacturer's catalog description of each component supplemented by approved equipment submittals.
c. Operating instructions including:
   1) Sequence of operation
d. Trouble shooting guide with service instructions
e. Parts list with names, addresses, and telephone numbers of local parts suppliers.
f. Names, addresses, and phone numbers of nearest service organizations
g. Complete equipment schedules.

3. Part 3: Project documents including, but not limited to, the following:
   a. Testing report(s).
   b. Certificates
   c. Copies of warranties.

E. Quality: The quality of the manual will be checked by the Architect/Engineer for accuracy, completeness and quality of printing. Deficiencies will necessitate resubmittals by the Contractor. Refer to "Submittals" paragraph herein.

1.13 INSTRUCTION AND TRAINING SESSIONS

A. Refer to Division 01 requirements.

B. After all equipment and services are in operation and receipt of the approved Operation and Maintenance Manuals, Instruction and Training Sessions shall be conducted for representatives of the Owner.

C. Instruction Session shall be conducted during the Owner's normal working periods and at times satisfactory to the Owner. Session shall last not less than one 8-hour working day.

D. The Training Session shall address the operation and maintenance of each piece of equipment and of the system as a whole. Preventative maintenance techniques shall be included.

E. Competent, factory-trained service and operating personnel from the appropriate manufacturer(s) shall give instructions and training. The Contractor shall record the names of all personnel present at each Instruction and Training Session and shall forward a copy of the attendance log to the Architect/Engineer within seven days after each session.

1.14 RECORD DRAWINGS

A. Refer to Division 01 requirements.

1.15 PROJECT/SITE CONDITIONS

A. Install Work in accordance with the Contract Documents unless prevented by Project conditions.

B. When Project/Site conditions require a revision to the Work the Contractor shall prepare drawings to show proposed revision. The drawings shall include revisions to Work specified in other Sections when applicable. Submit drawings to Architect/Engineer for review. The Contractor shall allow a minimum of three business days for the Architect/Engineer to respond to proposed revision. The Contractor shall not proceed with that portion of the Work until a response has been returned.

1.16 WARRANTIES

A. Refer to Division 01 requirements.

B. Warranty periods shall begin from Date of Substantial Completion.

1.17 CONTRACTOR COORDINATION

A. Electrical contractor shall coordinate their work with all other trades prior to fabrication of systems and commencement of installation. It shall be the responsibility of the electrical contractor to review the work of other trades (including, but not limited to civil) as it affects their work, and as their work affects other trades, to insure that the construction documents are closely followed and conflicts are avoided. Where discrepancies arise, they shall be referred to the Architect/Engineer for resolution before proceeding with the Work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. Unless otherwise noted, install equipment in accordance with manufacturer's printed instructions for application indicated. Maintain copies of manufacturer's printed instructions at the project site.

B. Install, operate, and adjust systems in accordance with the Contract Documents.

C. Wiring, conduit, and other items associated with the electrical system shall not obstruct access to any new or existing electrical equipment and/or mechanical equipment. All electrical equipment shall be installed where it is readily accessible for servicing.

D. A Request For Information (RFI) shall be submitted to the Architect/Engineer for any portion of the Work that the Contractor determines a clarification is required. Prior to submitting a RFI the Contractor shall thoroughly research the Contract Documents to ensure information has not been overlooked. The RFI shall include references to the portion of the Contract Documents that requires a clarification. The Contractor shall allow a minimum of three business days for the Architect/Engineer to respond to the RFI. The Contractor shall not proceed with that portion of the Work until a response has been returned.

E. All Products delivered to the site(s) shall be stored in accordance with the manufacturer's printed instructions. If a manufacturer does not have printed instructions then the Product shall be adequately housed and otherwise protected against damage or corrosion. If any Product stored at the site(s) is not protected as specified herein, the Contractor shall not receive payment for that Product. That Product shall be stored by the Owner at the expense of the Contractor. Any Product damaged as a result of failure to comply with this requirement shall be replaced by the Contractor at no additional cost to the Owner.

3.02 WORKMANSHIP

A. Install Work using procedures defined in NECA Standard of Installation.

3.03 ACCESSIBILITY

A. Wiring, conduit, and other Products associated with the electrical system shall not obstruct access to any other electrical equipment, mechanical equipment, access hatches, doorways, windows, or other portions of the building and its systems. All electrical equipment shall be installed where it is readily accessible for servicing.

3.04 INSPECTIONS AND TESTS

A. Only persons trained and familiar with this work shall be used for testing and adjusting.

B. Tests shall include, but not be limited to, the following.
   1. Measure the load on each phase of the main service and each phase of every feeder under full load conditions.

2. Make insulation resistance tests on all power and lighting circuitry.
3. Test all wiring for continuity and grounds before connecting any equipment or devices. Concealed wiring shall be tested before being closed in.
4. Contractor shall test the entire system when the Work is completed to insure all portions are free from short circuits and grounds. Contractor shall make necessary corrections and adjustments then retest until performance requirements are met.

C. Feeder insulation resistance testing:
1. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500-volt megger. The procedures listed below shall be followed:
   a. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
   b. After all fixtures, devices and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The contractor shall correct troubles, reconnect and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
   c. At final inspection, the contractor shall furnish a meggar and show the Architect / Engineer that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and voltmeter to take current and voltage readings as directed by the Engineers.

D. Ground system testing:
1. Upon completion of installation of the electrical grounding and bonding systems, the ground resistance shall be tested with a ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, appropriate action should be taken to reduce the resistance to 25 ohms, or less, by driving additional ground rods. (The compliance shall be demonstrated by re-testing.)

E. Documentation:
1. All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information.
2. All required documentation of readings indicated above shall be submitted to the Architect/Engineer prior to, and as one of the prerequisites for, final acceptance of the project.

F. All equipment to conduct the tests shall be furnished at the Contractor's expense.

G. Make corrections and adjustments and repeat tests until performance requirements have been met. Submit written reports to Owner.

H. Submit certificate of final inspection and approval from authority having jurisdiction to Architect/Engineer.

I. Architect/Engineer's Right to Retesting:
   1. Should the Contractor refuse or neglect to make any tests necessary to demonstrate the integrity of the completed system, the Architect/Engineer may retain the services of an outside consultant to make such tests and perform necessary corrections and adjustments.
   2. The costs for such tests and adjustments shall be deducted from amounts owing to the Contractor and shall not be borne by the Owner or Architect/Engineer.

3.05 CLEANING THE INSTALLATION

A. After the equipment, wiring, and conduit has been proven operational, carefully clean all interiors of cabinets and external parts of each piece of equipment, thoroughly removing all traces of dirt, oil, grease, and other foreign substances or objects.

END OF SECTION

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES (600 V & LESS)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wire and cable for 600 volts and less.

C. Wiring connectors.

1.02 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2001 (Reapproved 2007).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2009).

D. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers; 2005 (Reapproved 2011).

E. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation; 2007.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

G. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable; National Electrical Contractors Association; 2006 (NECA/AA 104).

H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).

I. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

J. NFPA 70 - National Electrical Code; National Fire Protection Association, 2008.

K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect/Engineer and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 ALL CONDUCTORS AND CABLES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Conductors for Grounding and Bonding: Also comply with Section 260526.

H. Conductor Material:
   1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
   2. Tinned Copper Conductors: Comply with ASTM B33.

3. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

I. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
   a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
3. Color Code:
   a. 480Y/277 V, 3 Phase, 4 Wire System:
      1) Phase A: Brown.
      2) Phase B: Orange.
      3) Phase C: Yellow.
      4) Neutral/Grounded: Gray.
   b. 208Y/120 V, 3 Phase, 4 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
      4) Neutral/Grounded: White.
   c. Equipment Ground, All Systems: Green.
   d. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
   a. Size 10 AWG and Smaller: Solid.
   b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
   a. Size 4 AWG and Larger: Type XHHW-2.
   b. Installed Underground: Type XHHW-2.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 260526.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

F. Mechanical Connectors: Provide bolted type or set-screw type.

G. Compression Connectors: Provide circumferential type or hex type crimp configuration.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage wire and cable has been completed.

B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Install aluminum conductors in accordance with NECA 104.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

I. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

J. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   2. Wet Locations: Use heat shrink tubing.

K. Insulate ends of spare conductors using vinyl insulating electrical tape.

L. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

M. Identify conductors and cables in accordance with Section 260553.

N. Color Code Legend: Provide identification label identifying color code for ungrounded conductors at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Division 01 requirements.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground rod electrodes.

1.02 REFERENCE STANDARDS

A. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; National Electrical Manufacturers Association; 2007.

B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

C. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.

D. NFPA 70 - National Electrical Code; National Fire Protection Association, 2008.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.04 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 25 ohms.

1.05 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect/Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
      b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
      c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
   3. Ground Rod Electrode(s):
      a. Provide single electrode unless otherwise indicated or required.
      b. Space electrodes not less than 10 feet from each other and any other ground electrode.
      c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
   4. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

F. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

G. Pole-Mounted Luminaires: Also comply with Section 265600.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in addition to requirements of Section 260519:
1. Use insulated copper conductors unless otherwise indicated.
   a. Exceptions:
      1) Use bare copper conductors where installed underground in direct contact with earth.

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that conditions are satisfactory for installation prior to starting work.

C. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
   1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.

D. Make grounding and bonding connections using specified connectors.

E. Identify grounding and bonding system components in accordance with Section 260553.

F. Install ground electrodes at pole mounted fracture locations. .

3.03 FIELD QUALITY CONTROL

A. Provide field inspection in accordance with Division 01 requirements.

B. Inspect and test in accordance with NETA STD ATS except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 REFERENCE STANDARDS

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

B. NFPA 70 - National Electrical Code; National Fire Protection Association, 2008.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.04 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated, where applicable.
   3. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that mounting surfaces are ready to receive support and attachment components.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

E. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

F. Secure fasteners according to manufacturer's recommended torque settings.

G. Remove temporary supports.

END OF SECTION

CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. Electrical metallic tubing (EMT).

D. Rigid polyvinyl chloride (PVC) conduit.

E. Conduit fittings.

F. Accessories.
   1. Includes additional requirements for fittings for grounding and bonding.

1.02 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); National Electrical Contractors Association; 2003.

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; National Electrical Manufacturers Association; 2003.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.

J. NFPA 70 - National Electrical Code; National Fire Protection Association, 2008.

K. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

M. UL 651 - Schedule 40 and 80 Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

N. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

O. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   3. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use PVC-coated galvanized steel rigid metal conduit.
   2. Exterior, Direct-Buried: Use rigid PVC conduit.
   3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
   4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.

D. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

E. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet, except within electrical and communication rooms or closets.

F. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.

G. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

2.02 CONDUIT REQUIREMENTS

A. Electrical Service Conduits: Also comply with Section 262701.

B. Fittings for Grounding and Bonding: Also comply with Section 260526.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

E. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.

2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.07 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated and routing is not shown, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
   5. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.

G. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.

H. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.

I. Penetrations:

J. Underground Installation:
   1. Provide trenching and backfilling in accordance with Sections 312316 and 312323.
   2. Minimum Cover, Unless Otherwise Indicated or Required:
      a. Underground, Exterior: 24 inches.
   3. Provide underground warning tape in accordance with Section 260553 along entire conduit length for service entrance where not concrete-encased.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.

M. Provide grounding and bonding in accordance with Section 260526.

N. Identify conduits in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Underground handhole enclosures.
   1. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
   1. Wall plates.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

C. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008 (Revised 2010) (ANSI/NEMA OS 1).

D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; 2008 (Revised 2010) (ANSI/NEMA OS 2).

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

F. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   2. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   3. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   4. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures and underground handhole enclosures.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations for cabinets and enclosures and underground handhole enclosures.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.
   5. Use raised covers suitable for the type of wall construction and device configuration where required.
   6. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   7. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   8. Wall Plates: Comply with Section 262726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
   1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
   2. NEMA 250 Environment Type, Unless Otherwise Indicated:
      a. Indoor Clean, Dry Locations: Type 1, painted steel.
      b. Outdoor Locations: Type 3R, painted steel.

D. Underground Handhole Enclosures:

1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Applications:

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Locations:
   1. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260534.

E. Install boxes plumb and level.

F. Install boxes as required to preserve insulation integrity.

G. Underground Handhole Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches deep.
   2. Flush-mount enclosures located in concrete or paved areas.
   3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.

4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

I. Close unused box openings.

J. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

K. Provide grounding and bonding in accordance with Section 260526.

L. Identify boxes in accordance with Section 260553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Underground warning tape.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; national Fire Protection Association; 2008.

1.03 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.04 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         4) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

b. Transformers:
1) Identify kVA rating.
2) Identify voltage and phase for primary and secondary.

2. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
a. Minimum Size: 3.5 by 5 inches.
b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
2. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. Equipment Designation: 1/2 inch.
5. Color:

a. Normal Power System: White text on black background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.04 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 6 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
1. Tape for Buried Power Lines: Black text on red background.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 12 inch(es) below finished grade.

3.03 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Short circuit study.

B. Arc flash analysis.

1.02 REFERENCE STANDARDS

A. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001.

B. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.

C. NFPA 70 - National Electrical Code, 2008.

1.03 SUBMITTALS

A. Refer to Division 01 requirements.

B. Study Report: Submit protective device studies as specified, prior to submission of product data submittals or ordering or fabrication of protective devices.
   1. Evaluation of product data submittals by Architect/Engineer will not commence until acceptable studies have been submitted.
   2. Include stamp or seal and signature of preparing engineer.

C. Field Engineer Qualifications.

D. Field Inspection Report: Show final adjusted settings of protective devices.

E. Project Record Documents: Revise protective device study as required to show as-built conditions.
   1. Include hard copies in operation and maintenance data submittals.
   2. Include all files prepared using software packages, on CD-ROM, with file name cross-references to specific pieces of equipment and systems.

1.04 PROTECTIVE DEVICE STUDY

A. Analyze the specific electrical and utilization equipment (according to NEC definition), the actual protective devices to be used, and the actual feeder lengths to be installed.

1. Scope of Studies: All new distribution wiring and equipment, from primary source to buses and branch circuit panelboards.
2. Primary Source, for Purposes of Studies: Utility company primary protective devices.
3. Study Methodology: Comply with requirements and recommendations of NFPA 70, IEEE 399, and IEEE 242.
4. Report: State the methodology and rationale employed in making each type of calculation; identify computer software package(s) used.

B. One-Line Diagrams: Prepare schematic drawing of electrical distribution system, with all electrical equipment and wiring to be protected by the protective devices; identify nodes on the diagrams for reference on report that includes:
1. Calculated fault impedance, X/R ratios, utility contribution, and short circuit values (asymmetric and symmetric) at the main switchboard bus and all downstream devices containing protective devices.
2. Breaker and fuse ratings.
3. Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
4. Identification of each bus, with voltage.
5. Conduit materials, feeder sizes, actual lengths, and X/R ratios.

C. Short Circuit Study: Calculate the fault impedance to determine available 3-phase short circuit and ground fault currents at each bus and piece of equipment during normal conditions, alternate operations, emergency power conditions, and other operations that could result in maximum fault conditions.
1. Show fault currents available at key points in the system down to a fault current of 7,000 amps at 208 volts.
2. Primary Fault Level Assumptions: Obtain data from utility company.
3. Report: Include all pertinent data used in calculations and for each device include:
   a. Device identification.
   b. Protective device.
   c. Device rating.
   d. Calculated short circuit current, asymmetrical and symmetrical, and ground fault current.

D. Analysis: Determine ratings and settings of protective devices to minimize damage caused by a fault and so that the protective device closest to the fault will open first.
1. Required Ratings and Settings: Derive required ratings and settings of protective devices in consideration of upstream protective device settings and optimize system to ensure selective coordination.
2. Identify any equipment that is underrated as specified.

E. Perform arc flash risk assessment and provide equipment labels. Labels to meet requirements of NFPA 70E. Label shall be per listing under PART 3 execution in

NFPA 70E. At a minimum it shall include hazardous boundaries, short circuit current available, risk category, PPE rating in cal/cm2 and clothing description.

1.05 QUALITY ASSURANCE

A. Study Preparer Qualifications: Qualified engineer of switchgear manufacturer or approved professional engineer.

B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

C. Contractor Responsibility: Provide all project-related data needed by study preparer, including equipment, wire sizes, insulation types, conduit types, and actual circuit lengths.

D. Owner's Responsibility: Provide data on relevant Owner power distribution equipment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Provide the services of a qualified field engineer and necessary tools and equipment to test, calibrate, and adjust the installed protective devices to conform to requirements determined by the coordination analysis.

B. Adjust installed protective devices having adjustable settings to conform to requirements determined by the coordination analysis.

C. Submit report showing final adjusted settings of all protective devices.

END OF SECTION

LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General purpose transformers.

1.02 REFERENCE STANDARDS

A. IEEE C57.94 - Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers; 1982 (R2006).

B. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 1999 (R2004).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2009.

E. NEMA ST 20 - Dry-Type Transformers for General Applications; National Electrical Manufacturers Association; 1992 (R1997).

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008

G. NEMA TP 1 - Guide for Determining Energy Efficiency for Distribution Transformers; 2002.

H. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

I. NFPA 70 - National Electrical Code; national Fire Protection Association; 2008.

J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.

K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.

D. Project Record Documents: Record actual locations of transformers.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with documented experience.

C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ALL TRANSFORMERS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet.

2. Ambient Temperature: Not exceeding 86 degrees F average or 104 degrees F maximum measured during any 24 hour period.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.02 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. Insulation System and Allowable Average Winding Temperature Rise:
1. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

E. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.

F. Winding Taps:
1. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

G. Energy Efficiency: Standard efficiency complying with NEMA TP 1.

H. Sound Levels: Standard sound levels complying with NEMA ST 20.

I. Mounting Provisions:
   1. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.

J. Transformer Enclosure: Comply with NEMA ST 20.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor clean, dry locations: Type 1.
   2. Construction: Heavy gage steel.
      a. 15 kVA and Larger: Ventilated.
   3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.

K. Coil Conductors: Continuous windings with terminations brazed or welded.

L. Isolate core and coil from enclosure using vibration-absorbing mounts.

M. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.03 SOURCE QUALITY CONTROL

A. Factory test transformers according to NEMA ST 20.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Install transformers in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 260534, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Set transformers plumb and level.

G. Provide grounding and bonding in accordance with Section 260526.

H. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

I. Where not factory-installed, install lugs sized as required for termination of conductors as shown on the drawings.

J. Identify transformers in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA STD ATS, except Section 4.

B. Perform inspections and tests listed in NETA STD ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.

3.04 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lighting and appliance panelboards.

B. Overcurrent protective devices for panelboards.

1.02 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision D, 2006.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; National Electrical Contractors Association; 2009.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

E. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2007.

G. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

H. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 67 - Panelboards; Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   2. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Panelboard Keys: Two of each different key.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 ALL PANELBOARDS

A. Provide products listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose indicated.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   3. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 264300, list and label panelboards as a complete assembly including surge protective device.

2.02 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Aluminum.
   3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted enclosures as indicated.
   2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

F. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

G. Enclosure: NEMA PB 1, Type 1, as required.

2.03 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
         1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
   6. Provide the following circuit breaker types where indicated:
      a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
      b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.

7. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
8. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
9. Do not use tandem circuit breakers.
10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. Provide the following features and accessories where indicated or where required to complete installation:
    a. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 260529.

E. Install panelboards plumb.

F. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 260526.

H. Install all field-installed branch devices, components, and accessories.

I. Provide filler plates to cover unused spaces in panelboards.

J. Identify panelboards in accordance with Section 260553.

K. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA STD ATS, except Section 4.

B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA STD ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 50 amperes. Tests listed as optional are not required.

C. Test GFCI circuit breakers to verify proper operation.

D. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metering transformer cabinets.

B. Meter bases.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 SYSTEM DESCRIPTION

A. System Characteristics: 480Y/277 volts, three phase, four-wire, 60 Hertz.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section. Review service entrance requirements and details with Utility Company representative.

1.05 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide ratings and dimensions of transformer cabinets and meter bases.

C. Submit utility company-prepared drawings.

1.06 QUALITY ASSURANCE

A. Utility Company: University of Virginia Utilities Department.

B. Perform work in accordance with utility company written requirements and NFPA 70.

C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Metering Transformer Cabinets: Sheet metal cabinet with hinged door, conforming to utility company requirements, with provisions for locking and sealing. Provided by Utility Company.
   1. Size: As required by utility.

B. Meter Base: Furnished by utility company.

C. Utility Transformer Pad: Prefabricated or cast-in-place, size per Utility Company requirements.

D. Other Components: As required by utility company.

PART 3 EXECUTION

3.01 PREPARATION

A. Arrange with utility company to obtain permanent electric service to the Project.

3.02 INSTALLATION

A. Install transformer pad, metering transformer cabinets, and meter base as required by utility company.

B. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

END OF SECTION

SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surge protective devices for service entrance locations.

1.02 ABBREVIATIONS AND ACRONYMS

A. EMI/RFI: Electromagnetic Interference/Radio Frequency Interference.

B. SPD: Surge Protective Device.

1.03 REFERENCE STANDARDS

A. MIL-STD-220 - Method of Insertion Loss Measurement; Revision C, 2009.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

E. NFPA 70 - National Electrical Code; 2008.

F. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.

G. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to ordering equipment.

1.05 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

D. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
   1. UL 1449.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.

H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

I. Project Record Documents: Record actual connections and locations of surge protective devices.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. Manufacturer's Warranty: Provide minimum ten year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

B. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

PART 2 PRODUCTS

2.01 ALL SURGE PROTECTIVE DEVICES

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service, listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated; system voltage as indicated on the drawings.

B. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

C. UL 1449 Voltage Protection Ratings (VPRs):
   1. 480Y/277V System Voltage: Not more than 1,200 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.

D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

E. Enclosure Environment Type per NEMA 250: As indicated on the drawings.

F. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
   1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.

G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
   1. Panelboards: See Section 262416.

2.02 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

A. Unless otherwise indicated, provide field-installed, externally mounted or factory-installed, internally mounted SPDs.

B. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.

D. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.

E. UL 1449 Nominal Discharge Current (I-n): 20 kA.

F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.

G. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
   1. Noise Attenuation: Not less than 40 dB at 100 kHz using MIL-STD-220 insertion loss test method.

H. Diagnostics:
   1. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
   2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
   3. Remote Status Monitoring: Provide two Form C dry type contacts (normally open and normally closed) for remote annunciation of status.
   4. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.

I. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.

C. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of the drawings and manufacturer's instructions.

D. Verify system grounding and bonding is in accordance with Section 260526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Install SPD in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.

E. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.

F. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably be rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.

G. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 260526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

H. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA STD ATS, except Section 4.

B. Perform inspections and tests listed in NETA STD ATS Section 7.19.1.

C. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

3.04 CLEANING

A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Lamps.

C. Poles and accessories.

1.02 REFERENCE STANDARDS

A. IESNA RP-8 - American National Standard Practice for Roadway Lighting; Illuminating Engineering Society of North America; 2000(R2005) (ANSI/IES RP8).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; 2006.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

E. UL 1598 - Luminaires; Current Edition, Including All Revisions.

F. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Coordination: Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.04 SUBMITTALS

A. Refer to Division 01 requirements.

B. Shop Drawings:
   1. Provide photometric calculations where luminaires are proposed for substitution upon request.
   2. Provide structural calculations for each pole proposed for substitution.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. Lamps: Include rated life and initial and mean lumen output.
   2. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with documented experience.

C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the Drawings.

B. Substitutions: Refer to Division 01 requirements

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

H. LED Luminaires: Listed and labeled as complying with UL 8750.

2.03 LAMPS

A. All Lamps:
   1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
   2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.

3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect/Engineer to be inconsistent in perceived color temperature.

2.04 POLES

A. All Poles:
1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
2. Material: As indicated on drawings.
3. Shape: As indicated on drawings.
4. Finish: Match luminaire finish, unless otherwise indicated.
5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
6. Unless otherwise indicated, provide with the following features/accessories:
   a. Handhole, scheduled size.
   b. Anchor bolts with leveling nuts or leveling shims.
   c. Anchor base cover.

B. Metal Poles: Provide ground lug, accessible from handhole.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Pole-Mounted Luminaires:
   1. Foundation-Mounted Poles:
      a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
         1) Install anchor bolts plumb per template furnished by pole manufacturer.
         2) Position conduits to enter pole shaft.
      b. Install foundations plumb.
      c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
      d. Tighten anchor bolt nuts to manufacturer's recommended torque.
      e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
      f. Install anchor base covers or anchor bolt covers as indicated.
   2. Grounding:
      a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
      b. Provide supplementary ground rod electrode as specified in Section 260526 at each pole bonded to grounding system as indicated.
   3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.

F. Install accessories furnished with each luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect/Engineer.

3.04 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect/Engineer, and correct deficiencies or make adjustments as directed.

3.06 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

3.07 SCHEDULE - SEE DRAWINGS

END OF SECTION

EXTERIOR ATHLETIC LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.

B. The purpose of these specifications is to define the performance and design standards for the athletic field sports lighting for the project. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth by the criteria in these specifications.

C. The sports lighting will be for the following fields:
   1. 1. Baseball #1 - #4
   2. Soccer #1 - #2

D. The primary goals of this sports lighting project are:
   1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore the lighting system shall be designed such that the light levels are guaranteed for a period of 25 years.
   2. Environmental Light Control: It is a primary goal of this project to minimize spill light and glare.
   3. Life Cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated, and the field(s) shall be proactively monitored to detect fixture outages over a 25 year life cycle. To allow for optimized use of labor resources and avoid unneeded operation of the facility, the customer requires a remote on/off control system for the lighting system.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.03 SUBMITTALS

A. Refer to Division 01 requirements.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

C. Provide a table of contents listing of all information being submitted. List the name of the manufacturer's local representative and his/her phone number. A submittal checklist signed by the manufacturer's representative shall be included.

D. On-Field Lighting design drawing(s) showing:
   1. Field Name, date, file number, prepared by, and other pertinent data
   2. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing of 30' x 30'.
   3. Pole height, number of fixtures per pole, as well as luminaire information including wattage, lumens and optics
   4. Height of light test meter above field surface
   5. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance and uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.
   6. Alternate manufacturers shall provide both initial and maintained light scans using a maximum Recoverable Light Loss Factor (RLLF) as specified in 1.08 B.
   7. Field lighting calculations to be submitted for review by A/E and University Building Official's office. Review and approval to occur prior to installation.

E. Off Field Lighting Design drawing showing initial vertical spill light levels along the boundary line in footcandles. Vertical levels shall be at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank lights.

F. Life Cycle Cost Calculation:
   1. Document life cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires, maintenance cost for the system including spot lamp replacement, and group relamping costs. All costs shall be based on 25 Years.

G. Luminaire Aiming Summary
   1. Document showing each luminaire's aiming angle and the poles on which the luminaries are mounted. Each aiming point shall identify the type of luminaire.

H. Structural Calculations

1. Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer registered in the state of Virginia.

I. Control and Monitoring
   1. Manufacturer shall provide written definition and schematics for automated control system to include monitoring. They will also provide examples of system reporting and access for numbers for personal contact to operate the system.

J. Electrical Distribution Plans
   1. If bidding an alternate system, manufacturer shall include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Virginia.

K. Performance Guarantee
   1. Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the Owner. Light levels shall be guaranteed per specification for 25 years.

L. Warranty: Provide written warranty information including all terms and conditions.

M. Independent Testing Report
   1. Manufacturer bidding any form of a constant light system is to provide an independent test report certifying the system meets the lumen maintenance control strategy defined in LIGHTING PERFORMANCE herein, verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer, in the state of Virginia, with outdoor lighting experience.

N. Project References
   1. Manufacturer to provide a list of projects where the technology proposed for this project has been installed in the state of Virginia. If any form of a constant light system is bid, a minimum of five (5) project references completed within the last calendar year is required. For a depreciating light system a full list of projects completed within the past three (3) years is required. Reference list shall include project name, project city, and if requested, contact name and contact phone number.

O. Product Information: Complete set of product brochures for all components, including a complete parts list and UL Listings.

P. Non-Compliance: Manufacturer shall list all items that do not comply with the specifications.

Q. Compliance: Manufacturer shall warranty that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in "Non-Compliance" above.

1.04 LIGHTING PERFORMANCE

A. Performance Requirements: Playing surfaces shall be lit to an average constant light level and uniformity as specified below. Light levels shall be held constant for 25 years. The manufacturer shall develop lighting calculations and take field measurements on the grid spacing with the minimum number of grid points specified below. Measured average illumination level shall be +/- 10% of predicted mean in accordance with IESNA RP-6-01, and measured at the first 100 hours of operation.

1. Area of Lighting
   a. Average Constant Light Levels
   b. Maximum to Minimum Uniformity Ratio
   c. Grid Spacing
2. Field #1 - 4, Infield
   a. 50 footcandles
   b. 2.0:1.0
   c. 20' x 20'
3. Field #1 - 4, Outfield
   a. 3050 footcandles
   b. 2.5:1.0
   c. 20' x 20'
4. Soccer #1
   a. 30 footcandles
   b. 3.0:1.0
   c. 30' x 30'
5. Soccer #2
   a. 30 footcandles
   b. 2.5:1.0
   c. 30' x 30'
6. Lumen maintenance control strategy: A constant light system shall use automatic power adjustments to achieve a lumen maintenance control strategy as described in the IESNA Lighting Handbook 10th Edition, Lighting Controls Section, page 16-8: "Lumen maintenance involves adjusting lamp output over time to maintain constant light output as lamps age, and dirt accumulation reduces luminaire output. With lumen maintenance control, either lamps are dimmed when new, or the lamp's current is increased as the system ages."

7. Independent Test Report: Manufacturers bidding any form of a constant light system must provide an independent test report certifying the system meets the lumen maintenance control strategy above and verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer, in the state of Virginia, with outdoor lighting experience.
    a. If report is not provided at least 10 days prior to bid opening, the manufacturer shall provide the initial and maintained designs called for in this specification under ALTERNATE SYSTEM REQUIREMENTS.
8. Project References: Manufacturers bidding any form of a constant light system must provide a minimum of five (5) project references within the state of Virginia that have been completed within the last calendar year utilizing this exact technology. Manufacturer will include project name, project city, and if requested, contact name and contact phone number for each reference.

1.05 LIFE CYCLE COSTS

A. Energy Consumption: The average kWh consumption for the field lighting system shall be no greater than follows.
    1. Field #1 - 4: 56.3 kW or less
    2. Soccer #1: 71.94 kW or less
    3. Soccer #2: 50.05 kW or less

B. Complete Lamp Replacement: Manufacturer shall include all group lamp replacements required to provide 25 years of operation based upon 300 usage hours per year.

C. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual lamp outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

D. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The manufacturer shall notify the Owner of outages within 24 hours, or the next business day. The controller shall determine switch position (Manual or Auto) and contactor status (open or closed).

E. E. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

F. Management Tools: Manufacturer shall provide a web-based database of actual field usage and provide reports by facility and user group.
   1. Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the Owner.
      a. Cumulative hours: Shall be tracked to show the total hours used by the facility.
      b. Current lamp hours: Shall be tracked separately to reflect the amount of hours on the current set of lamps being used, so relamping can be scheduled accurately.

G. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

H. 25-Year Life Cycle Cost: Manufacturer shall submit 25-year life cycle cost calculations as follows. Equipment price and total life cycle cost shall be entered separately on bid form.

1.06 WARRANTY AND GUARANTEE

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years OR for the maximum hours of coverage based on the estimated annual usage, whichever occurs first. Warranty shall guarantee light levels; lamp replacements; system energy consumption; monitoring, maintenance and control services, spill light control, and structural integrity. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations. Group lamp replacements for constant light systems must occur in accordance with the independent test report provided by the manufacturer; alternate systems must relamp every 2100 hours.

1.07 DELIVERY TIMING

A. Equipment On-Site: The equipment must be on-site 4-6 weeks from receipt of approved submittals and receipt of complete order information.

1.08 ALTERNATE SYSTEM REQUIREMENTS

A. Compliance to Specifications: Acceptance of a bid alternate does not negate the contractor and lighting manufacturer's responsibility to comply fully with the requirements of these specifications. Any exceptions to the specifications must be clearly stated in the prior approval submittal documents.

B. Light Level Requirements: Manufacturer shall provide computer models guaranteeing light levels on the field over 25 years. If a constant light level cannot

be provided, the specified maximum Recoverable Light Loss Factor and maintenance/group relamping schedule shall be provided in accordance with recommendations in the Pennsylvania State University report “Empirical Light Loss Factors for Sports Lighting”, presented at the 2009 IESNA Annual Conference.

1. Lamp Replacement Interval, hours: 2100.
    a. Recoverable Light Loss Factor (RLLF): 0.69
    b. For alternate systems, scans for both initial and maintained light levels shall be submitted.

C. For alternate systems, scans for both initial and maintained light levels shall be submitted.

1. Area of Lighting
    a. Average Initial Light Levels
    b. Average Target/Maintained Light Levels: For each Area of Lighting, this shall be equal to "Average Constant Light Levels" indicated in LIGHTING PERFORMANCE above, unless noted otherwise.
    c. Maximum to Minimum Uniformity Ratio: For each Area of Lighting, this shall be equal to "Maximum to Minimum Uniformity Ratio" indicated in LIGHTING PERFORMANCE above, unless noted otherwise.
    d. Grid Spacing: For each Area of Lighting, this shall be equal to "Grid Spacing" indicated in LIGHTING PERFORMANCE above, unless noted otherwise.
    e. Field #1 - 4, Infield:
        1) 72.5 fc
        2) 50fc
        3) 2.0:1.0
        4) 20' x 20'
    f. Field #1 - 4, Outfield:
        1) 43.5 fc
        2) 30 fc
        3) 2.5:1.0
        4) 20' x 20'
    g. Soccer #1
        1) 43.5 fc
        2) 30 fc
        3) 3.0:1.0
        4) 30' x 30'
    h. Soccer #2:
        1) 43.5 fc
        2) 30 fc
        3) 2.5:1.0
        4) 30' x 30'

D. Revised Electrical Distribution: Manufacturer shall provide revised electrical distribution plans to include changes to service entrance, panel, and wire sizing.

PART 2 - PRODUCTS

2.01 LIGHTING SYSTEM CONSTRUCTION

A. System Description: Lighting system shall consist of the following.
   1. Galvanized steel poles and cross-arm assembly.
   2. Pre-stressed concrete base embedded in concrete backfill allowed to cure for 12-24 hours before pole stress is applied. Alternate may be an anchor bolt foundation designed such that the steel pole and any exposed steel portion of the foundation is located a minimum of 18 inches above final grade. The concrete for anchor bolt foundations shall be allowed to cure for a minimum of 28 days before the pole stress is applied.
   3. All luminaires shall be constructed with a die-cast aluminum housing or external hail shroud to protect the luminaire reflector system.
   4. Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall include ballast, capacitor and fusing for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.
   5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
   6. Controls and Monitoring Cabinet to provide on-off control and monitoring of the lighting system, constructed of NEMA Type 4 aluminum. Communication method shall be provided by manufacturer. Cabinet shall contain custom configured contactor modules for 30, 60, and 100 amps, labeled to match field diagrams and electrical design. Manual Off-On-Auto selector switches shall be provided.

B. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, ballast and other enclosures shall be factory assembled, aimed, wired and tested.

C. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated for protection against

corrosion and stress corrosion cracking. All wiring shall be enclosed within the crossarms, pole, or electrical components enclosure.

D. Lightning Protection: All structures shall be equipped with lightning protection meeting NFPA 780 standards. Contractor shall supply and install a ground rod of not less than 5/8" in diameter and 8' in length, with a minimum of 10' embedment. Ground rod should be connected to the structure by a copper main down conductor with a minimum size of #2 for poles with less than 75' mounting height and 2/0 for poles with more than 75' mounting height.

E. Safety: All system components shall be UL Listed for the appropriate application.

F. Electric Power Requirements for the Sports Lighting Equipment:
   1. Electric power: Voltage/phasing per the site requirements.
   2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

2.02 STRUCTURAL PARAMETERS

A. Support Structure Wind Load Strength: Poles and other support structures, brackets, arms, bases, anchorages and foundations shall be determined based on the 2009 IBC Building Code, wind speed of 90, exposure category C and an importance factor of 1.0. Luminaire, visor, and crossarm shall withstand 150 mph winds and maintain luminaire aiming alignment.

B. Structural Design: The stress analysis and safety factor of the poles shall conform to AASHTO 2009 (LTS-5) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

C. Soil Conditions: The design criteria for these specifications are based on soil design parameters as outlined in the geotechnical report. If a geotechnical report is not provided by the owner, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2009 IBC.
   1. It shall be the contractor's responsibility to notify the owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the owner's approval / payment for additional costs associated with:
      a. Providing engineered foundation embedment design by a registered engineer in the State of Virginia.
      b. Additional materials required to achieve alternate foundation.
      c. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Refer to other Division 26 specification Sections.

3.02 ELECTRICAL SYSTEM

A. All materials and installations shall comply with NEC and any other applicable codes.

B. The electrical wiring system shall consist of a main control cabinet for field lighting with underground feeder or branch circuits to a safety disconnect device located in the electrical component enclosure on each luminaire pole.

C. Each pole shall have a grounding electrode connected to the system circuit grounded conductor.

D. A neutral conductor connecting to the main panelboard ground shall be run from the circuit breaker panelboard to all safety disconnect devices and luminaire assembly equipment.

E. Underground wiring for feeder circuits shall run from the circuit breaker panelboard to the branch circuit safety disconnect device mounted in the electrical component enclosure on each luminaire pole.

3.03 GROUNDING

A. Grounding at Each Luminaire Pole:
   1. Grounding Electrode: See requirements above.
   2. Equipment Ground: Each luminaire pole shall have a properly sized and continuous equipment ground from the service entrance equivalent to the electrical component enclosure on the pole.

3.04 TRENCHING

A. Trenching depth and width shall be adequate to install underground conduit with minimum cover of 24 inches.

B. Trenching shall be backfilled with excavated soil and compacted to the same density of surrounding soil to eliminate settlement. Backfill may be accomplished by tamping until full settlement has been reached.

3.05 MANUFACTURER'S REPRESENTATIVE ON-SITE VISIT

A. Manufacturer shall provide a qualified, factory trained, representative on-site after the completion of the project installation. The manufacturer shall make any necessary adjustments to the aiming in order to ensure that the specified lighting performance is met. This service is to be provided free of charge provided the lighting equipment was installed in accordance with the manufacturer's design and specifications.

3.06 INSPECTION AND VERIFICATION

A. Test and Measurement Procedures
   1. For final approval of the project the manufacturer shall provide a final report from the test results that shall provide the following items:
      a. Identification of number and location of the test stations, that shall agree in number and location with description provided in POINT BY POINT ANALYSIS.
      b. Actual horizontal footcandle readings taken at each test station.
      c. Actual maximum footcandle readings taken at each spill/glare test station.
      d. Number of hours of operation and number of system starts.

3.07 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.

B. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be liable to any or all of the following:

1. Manufacturer shall at his expense provide and install any necessary additional fixtures to meet the minimum lighting standards. The Manufacturer shall also either replace the existing poles to meet the new wind load (EPA) requirements or verify by certification by a licensed structural engineer that the existing poles will withstand the additional wind load.
2. Manufacturer shall minimize the Owner's additional long term fixture maintenance and energy consumption costs created by the additional fixtures by reimbursing the Owner the amount of $1,000 (one thousand dollars) for each additional fixture required.
3. Manufacturer shall remove the entire unacceptable lighting system and install a new lighting system to meet the specifications.

END OF SECTION

ATTACHMENT

CONSTRUCTION QUALITY ASSURANCE MANUAL FOR THE RAMBLEWOOD PARK IMPROVEMENTS HARRISONBURG, VIRGINIA

Note: This manual is provided for the Contractor's information. The manual will be used by the Owner's Construction Quality Assurance Personnel.

This page intentionally blank

INDEX

Part 1 General 1
1.01 Quality Assurance 1
1.02 Quality Control 2
1.03 Related Requirements 2
1.04 Organizations 2
A City of Harrisonburg 3
B. Design Engineer 3
C. Quality Assurance Engineer 3
D. Quality Assurance Officer 4
E. Soils QC Personnel 5
F. Contractor 5
1.05 Communications 5
A. Preconstruction Meeting 5
B. Progress Meetings 6
C. Problem or Work Deficiency Meetings 7

Part 2 Earthwork 8
2.01 Laboratory Testing - Soils 8
2.02 Field Testing - Soils 9
2.03 Quality Assurance Observations 9
A. Cap Foundations 9

Part 3 Landfill Gas System HDPE Piping, Fittings, and Vents 11
3.01 Manufacturing Quality Control 11
A. Physical Properties 11
B. Pipe and Pipe Fittings 11
C. Gravel Pack 12
D. Geotextile Fabric 12
E. Bentonite 12
3.02 Field Quality Assurance Observations 12
3.03 Pipe Installation 13
A. Heat Fusion of Pipe 13
B. Flange Jointing 14
C. Pipe Placement 14
3.04 Pipe Testing 15
A. Procedure 15
B. Test Failure 16
3.05 HDPE Landfill Gas Vents 16
3.06 HDPE Gas Condensate Drain 17

Part 4 Geosynthetics 18
4.01 Manufacturing Quality Control Testing – Geoynthetics 18
A. Geomembranes 18
B. Geotextiles 18
C. Geocomposites 18
D. Frequencies 18
4.02 Field Testing – Geomembranes (by the Installer) 19
4.03 Vacuum Testing 20
4.04 Air Testing 21
4.05 Quality Assurance Observation 22
A. Installer Experience Verification 22
B. Materials 23
C. Conformance Testing 24
D. Damage 25
E. Protection from Weather 25
F. Cap Bedding 25
H. Cap Membrane Placement 26
I. Geomembrane Seams 26

Part 5 General Construction 28
5.01 General 28
5.02 Sitework 28
5.03 Capping 28
5.04 Miscellaneous 29

Part 6 Documentation 30
6.01 Field Documentation 30
6.02 Record Drawings 31
A. Scope 31
B. Geomembrane Panel Layout 31
C. Construction Staking 31
D. Marked Up Drawings 31
6.03 Final Documentation 31

Part 7 Reference 33

PART 1
GENERAL

1.01 Quality Assurance

A. Quality Assurance (QA) is defined as independent qualitative observations, monitoring and documentation to verify that the Quality Control (QC) program is implemented correctly.

B. The purpose of Quality Assurance is to establish standards that must be followed by the Resident Engineer or Resident Engineering Technician in order to confirm that the construction of the containment facility and its components meet the specifications given in the design. The principle objects of an effective Quality Assurance program include:

- **Verification** of the implementation of the QC program.
- **Mitigation** of potential long-term problems and failures.
- **Documentation** of construction and QC testing.
- **Preservation** of completed work during subsequent construction activities.

C. The principle methods with which objectives are achieved are as follows:

- **Visual Inspection** of materials upon delivery to identify damaged materials, cross check lot numbers with manufacturer test data and obtain conformance test samples.

- **Conformance Testing** of delivered materials to verify physical characteristics of material. Conformance testing should be completed prior to installation.

- **Construction Observation** of installation and testing. Continuous inspection on site to observe the QC program such as weld testing (destructive and nondestructive), maintaining record drawings, verifying patches and retests, and preparation of daily reports.

- **Accountability** of QC personnel. The QA program will require accountability of QC personnel by means of "signing off" on test sections and repaired sections.

1.02 Quality Control

A. A QC program shall be maintained for Project construction activities. The Quality Control Officer (QCO) shall be on site as required for representative testing. The QCO shall be responsible for the implementation of the quality control program.

B. The QC program shall consist of construction and administrative activities related to the Project to control the overall quality of the Project. Quality shall be defined as the level of effort, materials, means or methods used which meet the minimum requirements as specified in the Project Documents. Administrative items included in the QC program include project schedules, project submittals, schedule of values, field logs, and record drawings and surveys.

C. Minimum testing requirements are included in applicable specification sections. Tests that fail to comply with the minimum requirements shall be retested at the Contractor's expense. The Owner reserves the right to direct additional testing and sampling.

D. A qualified testing laboratory shall perform soils testing. Laboratory shall obtain certificate of calibration in accordance with ASTM E-4 or National Institute for Science and Technology (NIST) Handbook 44 standards for equipment used for soils testing. A soils testing laboratory representative shall be present on site during fill and backfilling operations that require quality control testing.

E. Results of analysis shall be submitted to the Engineer as soon as they are available. Should the analyses show that the product tested does not comply with the specifications, the Contractor shall remove, repair or replace the product at no expense to the Owner. The Contractor may, at his option and expense, perform additional testing to substantiate the claim that the product complies with the specification requirements.

1.03 Related Requirements

Section 02300	Earthwork
Section 13300	Geotextile Fabrics
Section 13306	LLDPE Geomembrane Cap
Section 15060	Pipe and Pipe Fittings

1.04 Organizations

The organizations involved in the project include the Owner (City of Harrisonburg), the Design Engineer (Draper Aden Associates), QA Personnel, QC Personnel, and the Contractor and subcontractors. Responsibilities of the principal organizations are described below.

A. City of Harrisonburg

1. The City of Harrisonburg, the Owner, is responsible for the design, construction, operation, and closure of the permitted facility. The Owner has ultimate responsibility for complying with State regulations assuring that the landfill capping work has been constructed in accordance with the plans and specifications. This assurance is through the Quality Assurance Plan and subsequent documentation.

2. The Owner is responsible for construction contract administration. The Owner shall be responsible for obtaining construction inspection services and, for specific construction items such as soil testing and membrane installation, shall retain the services of a Consulting Engineer (Consultant) that is independent of other Contractors involved in the construction on the site, including earthwork Contractors and geomembrane installers. The QA plan performed by the Consultant is in addition to the QC requirements implemented by others.

B. Design Engineer

The Design Engineer, Draper Aden Associates', primary responsibility is to design the facility, including specifications, in accordance with State regulations that meets the needs of the Owner for its solid waste management. These design responsibilities will include clarification or interpretation of the plans during construction, and changes necessitated by unforeseen site conditions.

C. Quality Assurance Engineer

1. The Quality Assurance Engineer (QAE) shall be a registered professional engineer certified in the Commonwealth of Virginia and experienced in landfill construction. He shall be employed by the firm retained as the QA Consultant by the Owner. He shall have the responsibility to inform the Owner, Engineer and Contractor of construction that does not meet the design specifications. Parties must agree on the actions needed to bring the construction into compliance with the specifications.

2. The QAE shall review the design plans and specifications for constructability and clarity. If the design or specifications are unclear to the QAE, he shall request in writing clarification from the Design Engineer.

3. The QAE shall be responsible for:

   - Training the QAO on requirements and procedures
   - Scheduling and coordinating QA activities

- Confirming that testing equipment, personnel, and procedures do not change over the length of the project without written documentation
- Confirming that test data are accurately documented
- Notify Owner of construction quality problems
- Recommends testing acceptance or rejection

4. The Quality Assurance Engineer shall inspect the site on a periodic basis and review test data and QAO logs in order to maintain control over the QA program. He shall respond promptly to items needing attention or approval in order to expedite work. He shall be responsible for the approval or disapproval of landfill construction work. Approval shall be based on conformance to the design specifications, conformance to the QA plan, and sound engineering judgment. In no case shall the QAE change or modify the landfill design prior to notifying the Engineer in writing of the specific changes or modifications.

5. The final construction documentation report will be prepared, signed and sealed by the Quality Assurance Engineer.

E. Quality Assurance Officer

1. The Quality Assurance Officer (QAO) shall be employed by the Consultant and answer directly to the Quality Assurance Engineer. The QAO shall be experienced in earthwork construction, inspection procedures, and be familiar with the tests, processes, and materials involved in the construction of solid waste disposal facilities. He shall provide continuous on-site monitoring of appropriate construction operations and oversee that Quality Control sampling, testing and reporting mandated by these specifications are implemented by the Quality Control Officer (QCO). Appropriate construction operations that will require continuous on-site monitoring include cap foundation placement if applicable, geomembrane cap placement, and placement of the cap controlled fill. Other construction operations will require periodic monitoring.

2. The QAO shall maintain logs and test records and certificates on site in a well-organized, tabulated manner. Copies of logs, test records and certificates shall be provided to the QAE for review. The QAO shall notify the QCO immediately of non-complying test results and shall be available to verify remediation and retesting of non-complying work. The QAO shall maintain an awareness of the project and detect conditions that may directly or indirectly jeopardize the integrity of the field testing.

3. The QAO shall verify that the equipment used in the testing meets the specification requirements and that the tests are conducted in accordance with the standard procedures specified.

F. Soils QC Personnel

The Soils Quality Control firm shall be employed by the City and shall conduct soil testing as required by the project specifications.

G. Contractor

The Contractor (to be selected) shall be responsible for constructing the facility in strict compliance with the plans and specifications. The Contractor shall be responsible for his subcontractors retained to perform work on this project. The Contractor shall be responsible for QC Testing (other than soils) performed by subcontractors and the Contractor shall further be responsible for submittals of QC documentation completed by the Contractor or subcontractors.

1.05 Communications

A. Preconstruction Meeting

1. A preconstruction meeting shall be held after award of the contract to the successful Contractor. Present at the preconstruction meeting shall be the Owner, the Contractor, the Engineer, and QA personnel. The discussion at this meeting shall include, but not be limited to, the following:

    a. Providing each organization with relevant QA documents and supporting information.

    b. Familiarizing each organization with the QA plan and its role relative to the plans and specifications.

    c. Reviewing the responsibilities of each organization.

    d. Reviewing lines of authority and communication for each organization. Communications will to be strictly documented. Copies of communications will be distributed in a timely manner to each organization.

    e. Discussing the established procedures or protocol for observations and tests including sampling strategies.

    f. Discussing the established procedures or protocol for handling construction deficiencies, repairs, and retesting.

    g. Reviewing methods for documenting and reporting inspection data.

h. Reviewing methods for distributing and storing documents and reports.

i. Reviewing work area security and safety protocol.

j. Discussing procedures for the location and protection of construction materials and for the prevention of damage of the materials from inclement weather or other adverse events.

k. Conducting a site walkover to review construction material and inspection equipment storage locations.

2. The QA personnel will document the Preconstruction Meeting. Copies of the documentation will be forwarded to each organization.

B. Progress Meetings

1. Progress Meetings will be held periodically, usually every other week at the work area, unless otherwise directed by the Owner. Attending the meeting will be the Owner, Contractor, the Engineer, and the QA Personnel. The purpose of the meeting is to:

   a. Review the previous week's activities and accomplishments.

   b. Review the work location and activities for the upcoming week.

   c. Identify the Contractor's personnel and equipment assignments for the upcoming week.

   d. Discuss potential construction problems.

2. The QA personnel will document the Progress Meetings. Copies of the documentation will be forwarded to each organization.

C. Problem or Work Deficiency Meetings

1. If a problem or deficiency is present, or likely to occur, a special meeting will be held. This meeting will be attended by the Contractor, the Owner, the QA Personnel, and the Engineer, if necessary.

2. The purpose of the meeting will be to define and resolve the problem or problems, or recurring work deficiency, in the following manner:

   a. Define and discuss the problem or deficiency.

b. Review alternative solutions.

c. Implement a plan to resolve the problem or deficiency.

3. The QA personnel will document the Problem or Work Deficiency Meetings. Copies of the documentation will be forwarded to each organization.

This Page Intentionally Blank

PART 2
EARTHWORK

2.01 Laboratory Testing - Soils

A. The City's QC firm shall provide personnel, materials, and equipment to determine field and laboratory density of soil materials.

B. The following tests and minimum testing frequencies are required to be performed on soils being used for construction. Material shall be sampled from the site or taken from stockpiles in an accepted and representative manner. One additional test will be required for each borrow source, and for each material change at a borrow source.

1. Moisture-Density Relationships shall be performed in accordance with ASTM D698 (Standard Proctor) or ASTM D1557 (modified Proctor) as specified.

2. Soil Classification tests shall include a sieve analysis (ASTM D422), a natural moisture content (ASTM D2216), and an Atterberg Limit determination (ASTM D4318). Soil classifications shall be performed in conjunction with a moisture-density relationship and whenever a change in material occurs.

C. The minimum frequency of testing shall be as follows:

1. For soil borrow source:

Test	*ASTM Designation or Other Test Method*	*Frequency*
Grain Size Analysis	D422 and D1140	1 per 10,000 cy
Natural Moisture Content	D2216	1 per 10,000 cy
Specific Gravity	D854	1 per 10,000 cy
Classification	D2487	1 per 10,000 cy
Atterberg Limits	D4318	1 per 10,000 cy
Moisture-Density Relationship	D698 or D1557	1 per 10,000 cy and changes in material

2.02 Field Testing - Soils

Test	*ASTM Designation or Other Test Method*	*Frequency*
Compacted Density	D2922, D1556, or D2937	1 per 500 cubic yards
Compacted Moisture Content	D3017 or D2216	1 per 500 cubic yards
Classification	D2487	1 per 10,000 cubic yards
Atterberg Limits	D4318	1 per 10,000 cubic yards
Compacted Density - Trench Backfill	D2922, D1156, or D2937	1 per 100 linear feet per lift
Compacted Moisture Content – Trench Backfill	D3017 or D2216	1 per 100 linear feet per lift
Backfill Placement	Observation, Field Measurement	Continuous observation

Notes: a. Every fifth sample tested with ASTM D2922 shall be verified by ASTM D1556, Sand Cone or ASTM D2937, Drive Cylinder.

b. Every fifth sample tested with ASTM D3017 shall be verified with ASTM D2216, Laboratory Determination of Water Content of Soil, Rock, and Soil-Aggregate Mixtures.

c. Test locations shall be identified by the Contractor by horizontal and vertical control and presented on drawing or sketch indicating dimensions.

d. If a test fails to meet the required compaction level, or moisture content, then the area represented by that test shall be reworked and retested at the Contractor's expense. Corrective measures shall be documented in the Quality Control and Quality Assurance reports.

2.03 Quality Assurance Observations

A. Cap Foundations

The QAO shall include verification that an appropriate subgrade is established for cap membrane placement. This may include the placement and compaction of fill. (Section 02300). The verification shall include the following:

1. Observations of soil and rock surfaces for adequate filling of rock joints, clay fractures, or depressions, and removal and filling of sand seams. Document

in written form and with photographs the condition of the subgrade prior to cap membrane placement.

2. Measurements of the depth and slope of the excavation or fill to verify that it meets design requirements. Document the depths of structural fill placed.

3. Observations to verify proper placement of recessed areas for collection pipes.

4. Observations to verify the quality of compacted fill. Observe and document that Quality Control Testing was performed on compacted fill. Verify that QC testing includes density, moisture content, Atterberg limits, soil classifications, and maximum clod size. Compile documentation of QC testing on compacted fill. Compile documentation of locations of QC testing on compacted fill.

5. Observations of stripping and excavation to verify that there are no moisture seeps and that soft, organic, and otherwise undesirable materials are removed. Proof-rolling with heavy equipment can be used to detect soft areas likely to cause settlement. Document in written form and photographs removal of undesirable materials.

6. Observations to verify the removal of objects such as roots or objects that could penetrate the cap membrane.

7. Observations to verify that the surface is properly compacted, smooth, uniform, and consistent with design grades. Document in written form and with photographs the surface of the cap foundation.

This Page Intentionally Blank

PART 3
LANDFILL GAS SYSTEM HDPE PIPING, FITTINGS AND VENTS

3.01 Manufacturing Quality Control

A. Physical Properties

1. Materials shall be in accordance with manufacturer's specifications for PE 3408 pipe.

2. There shall be no evidence of splitting, cracking or breaking when the pipe is tested in accordance with Section 3.03.

3. Ring Stiffness Constant (RSC) values for the pipe can be directly related to the pipe's class designation. (Nominal RSC of Class 40 pipe = 40, etc.). The minimum RSC is 90% of the nominal.

4. The pipe and fittings shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.

5. Clean rework or recycled material generated by the manufacturer's own production may be used so long as the pipe or fittings produced meet all the requirements of this specification.

B. Pipe and Fittings

1. Where possible, pipe and fittings should be produced from identical materials meeting the requirements of this specification.

2. Pipe and pipe fittings shall be 6 inch diameter HDPE DR-17 or 2 inch HDPE DR-17 (as shown on plans) and transition from solid to perforated when required.

3. All HDPE pipe and pipe fittings shall be joined as in accordance with section 3.02.A.

4. Fittings such as coupling, wyes, tees, adapters, etc. for use in laying pipe shall have standard dimensions that conform to ASTM D3261.

5. Pipe and fittings shall be pressure rated at 100 psi. Whether molded or fabricated, fittings shall be fully pressure rated to at least the same service pressure rating as the pipe to which joining is intended.

6. Molded fittings shall meet the requirements of ASTM D-3261. At the point of fusion, the outside diameter and minimum wall thickness of fitting butt fusion outlets shall meet the diameter and wall thickness specifications of the mating system pipe. Fitting markings shall include a production code from which the location and date of manufacture can be determined. Upon request, the manufacturer shall provide an explanation of his production code.

7. Marking:

   i. Each standard and random length of pipe and fitting in compliance with this standard shall be clearly marked with the following information:

      a. ASTM Standard Designation
      b. Pipe Size
      c. Class & Profile Number
      d. Production Code
      e. Standard Dimension Ratio

C. Gravel Pack

Gravel pack, if necessary as shown by drawings, shall be VDOT #57 stone. Stone shall have a calcium carbonate content no greater than 15 percent.

D. Geotextile Fabric

Geotextile fabric shall be non-woven, needlepunched polypropylene. Refer to Section 13330 of Specifications for geotextile characteristic requirements.

E. Bentonite

Bentonite shall be suitable commercially processed bentonite pellets or chips that range from 0.25 to 0.5 inches in diameter. Bentonite shall be high-swelling sodium montmorillonite clay free of additives, produced by WyoBen, American Colloid Co., or N.L. Baroid Company or approved equal.

3.02 Field Quality Assurance Observations

A. Pipe may be rejected for failure to conform to Specifications or following:

1. Fractures or cracks passing through pipe wall, except single crack not exceeding 2 in. in length at either end of pipe which could be cut off and discarded. All pipes within one shipment shall be rejected if defects exist in more than 5% of shipment or delivery.

4. Cracks sufficient to impair strength, durability or serviceability of pipe. Defects indicating improper proportioning, mixing, and molding.

5. Defects indicating improper proportioning, mixing, and molding.

4. Damaged ends, where such damage prevents making satisfactory joint.

B. Acceptance of fittings, stubs or other specifically fabricated pipe sections shall be based on visual inspection at job site.

C. Notify Owner prior to backfilling trench to allow Owner to obtain as-built top of pipe coordinates and elevations.

3.03 Pipe Installation

A. Heat Fusion of Pipe:

1. Weld in accordance with manufacturer's recommendation for butt fusion methods. Provide fusion operators certified by the pipe manufacturer.

2. Butt fusion equipment for joining procedures shall be capable of meeting conditions recommended by pipe manufacturer including, but not limited to, temperature requirements, alignment, and fusion pressures.

3. For cleaning pipe ends, solutions such as detergents and solvents, when required, shall be used in accordance with manufacturer's recommendations.

4. Do not bend pipe to greater degree than minimum radius recommended by manufacturer for type and grade.

5. Do not subject pipe to strains that will overstress or buckle piping or impose excessive stress on joints.

6. Branch saddle fusions shall be joined in accordance with manufacturer's recommendations and procedures. Branch saddle fusion equipment shall be of size to facilitate saddle fusion within trench.

7. Before butt fusing pipe, inspect each length for presence of dirt, sand, mud, shavings, and other debris or animals. Remove debris from pipe.

8. Cover at end of each working day open ends of fused pipe. Cap to prevent entry by animals or debris.

10. Use compatible fusion techniques when polyethylenes of different melt indexes are fused together. Refer to manufacturer's specifications for compatible fusion.

B. Flange Jointing:

5. Use on flanged pipe connection sections.

6. Connect slip-on carbon steel backup flanges with galvanized nuts and bolts.

7. Butt fuse fabricated flange adapters to pipe.

8. Observe following precautions in connection of flange joints.
   a. Align flanges or flange/valve connections to provide tight seal. Require 1/8-inch EPDM flat ring gaskets if needed to achieve seal. Gaskets are required for flange/valve connections.
   d. Place U.S. Standard round washers as may be required on some flanges in accordance with manufacturer's recommendations. Bolts shall be lubricated in accordance with manufacturer’s recommendations.
   e. Tighten flange bolts in sequence and accordance with manufacturer's recommendations. CAUTION: Do not over-torque bolts.

5. Pull bolt down by degrees to uniform torque in accordance with manufacturer's recommendation.

8. Protect below grade bolts and flanges by covering with a 5 mil polyethylene wrap. Duct tape wrap to HDPE pipe.

9. Electrofusion couplings, where used, shall be installed per manufacturer's specifications.

C. Pipe Placement:

3. Grade control equipment shall be of type to accurately maintain design grades and slopes during installation of pipe. A positive grade shall be maintained from the well heads through the flex hose and through the entire length of gas header piping.

4. Dewatering: Remove standing water in trench before pipe installation.

3. Unless otherwise specifically stated, install pipe, fittings and well heads in accordance with manufacturer's recommendations.

4. Maximum lengths of fused pipe to be handled as one section shall be placed according to manufacturer's recommendations as to pipe size, pipe SDR, and topography so as not to cause excessive gouging or surface abrasion.

5. Cap pipe sections longer than single joining (usually 40 ft.) on both ends during placement except during fusing operations.

6. Notify ENGINEER prior to installing pipe into trench and allow time for ENGINEER'S inspection. Correct any irregularities found during inspection.

7. Complete tie-ins within trench whenever possible to prevent overstressed connections.

8. Allow pipe sufficient time to adjust to trench temperature prior to testing, segment tie-ins or backfilling activity.

9. Install reducers adjacent to laterals and tees.

10. To reduce branch saddle stress, install saddles at slope equal to and continuous with lateral piping.

11. Place in trench by allowing minimum 12 in./100 ft. for thermal contraction and expansion.

3.04 Pipe Testing

A. Procedure

1. All PE header pipes shall be tested to detect any leaks in the piping. Testing shall be performed below grade (inside the trench). The CONTRACTOR shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing. Air testing shall be used. All testing shall be conducted in accordance with the manufacturer’s specifications.

2. Like sizes of polyethylene piping shall be butt welded together into testing segments not to exceed 800 feet. Segments shall be connected to a testing apparatus on one end and fitted with caps on all openings.

3. The segment to be tested shall be allowed time to reach constant and/or ambient temperature before initiating the test.

4. The test should be performed during a period when the pipe segment will be out of direct sunlight when possible; i.e., early morning, late evening, or cloudy days. This will minimize the pressure changes which will occur during temperature fluctuations.

5. The test pressure shall be 5 psig.

6. Pressure drop during the test shall not exceed one percent of the testing gauge pressure over a period of one hour. This pressure drop shall be corrected for temperature changes before determining pass or failure.

7. The Engineer shall be notified prior to commencement of the testing procedure and shall be present during the test.

B. Test Failure

D. The following steps shall be performed when a pipe segment fails the test.

4. The pipe and all fusions shall be inspected for cracks, pinholes or perforations.
5. All blocked risers and capped ends shall be inspected for leaks.
6. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

E. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and re-fusing the pipe.

F. After all leaks are repaired, a retest shall be performed in accordance with Section 3.03.

3.05 HDPE Landfill Gas Vents

A. The vent piping shall be installed first and held vertical. Piping for vents shall be 6” solid HDPE DR17 and transition to perforated 6” HDPE DR17.

B. The piping for each vent shall be assembled prior to installation to ensure that the joints are properly set and are secure.

C. Layers above the cap shall be installed identical to the landfill cap design around the vents. The top of the vents shall be capped as shown in the plans. Grade the area to drain.

D. A boot, of the same material as the cap, shall be provided.

E. Backfill gas vent as shown on drawings.

3.06 HDPE Gas Condensate Drain

A. The vent drain piping shall be installed first and held vertical. The gravel pack shall be installed carefully so as to avoid damaging the piping. If the piping is damaged, the stone and piping shall be removed and reinstalled. The gravel pack shall be installed so as to provide a uniform blanket of stone around the central well piping.

B. The piping for each drain shall be assembled prior to installation to ensure that the joints are properly set and are secure. Header pipe shall be 6” solid HDPE DR17. Connected to the header pipe shall be a 2” solid portion of HDPE DR17 pipe approximately 3’ in length, transitioning to a 2” perforated portion of HDPE DR17 pipe approximately 2’ in length, as shown on the drawings.

C. Backfill for the drain shall be approximately 2.5 feet of VDOT #57 stone, followed by 12 inches of 50% soil/50% bentonite and finally 2 feet of soil backfill.

This Page Intentionally Blank

PART 4
GEOSYNTHETICS

4.01 Manufacturing Quality Control Testing – Geosynthetics

A. Geomembranes

1. Certification of geomembrane material shall be submitted by manufacturer prior to installation of material. Certification requirements are included in subsequent specification sections…

2. Compound ingredients of the geomembrane materials shall be randomly sampled on delivery to the geomembrane manufacturing plant to verify compliance with specifications. The certification shall certify that the resin used are of the same type and meet the manufacturer's and this project's specified performance requirements.

B. Geotextiles

Certification of geotextiles shall be submitted by the manufacturer prior to installation of material. Certification shall demonstrate that the property values of the material meet the project specifications.

C. Geocomposites

Prior to installation of material, the manufacturer or installer shall provide the QAO with quality control certifications for the geocomposite. The certification shall demonstrate that the material meets the project specifications.

D. Frequencies

Perform Quality Control testing at the following minimum frequencies:

1. Geomembranes: one test per 50,000 square feet of material for roll material tests per Specification Section 13306.2.01.C.

2. Geotextiles: one test per 40,000 square feet of material for:
   a. Weight
   b. Grab Tensile
   c. Grab Elongation
   d. Puncture

   Geotextiles: one test per 540,000 square feet of material for:
   e. AOS

f. Coefficient of Permeability

3. Geocomposites: one test per 90,000 square feet of material for:
   a. Specific Gravity (geonet)
   b. Carbon Black Content (geonet)
   c. Thickness (geonet)
   d. Tensile Strength at Break (geonet)
   e. Ply Adhesion (geocomposite)

   Geocomposites: one test per 540,000 square feet for:
   f. Transmissivity

   Geocomposites: one test per every resin lot for:
   g. Melt Index (geonet)

4.02 Field Testing - Geomembranes (by the Installer)

A. The geomembrane installer shall provide for field quality control testing of geomembranes used in the construction of the cap. The installer shall employ on-site physical nondestructive testing on welds or seams to verify watertight homogeneous welds and strength of seams. Tests must include visual inspection of welds and seams. A detailed test protocol must be submitted for approval prior to installation of the geomembrane.

B. The installer's quality control technician shall inspect each weld or seam. Areas showing a defect shall be marked and repaired in accordance with applicable repair procedures.

C. The OWNER or its representative reserves the right of access for inspection of this installation.

D. CONTRACTOR shall install membrane at a rate that does not exceed his capacity for patching and testing field welds each day. Patches and repairs shall be completed and tested (including visual, air pressure and vacuum) each day on the material installed. Destructive test samples shall be obtained daily on the material installed. The destructive test samples for the geomembrane shall be spaced at a maximum distance of 500 feet.

E. Individual panels of membrane material shall be laid out and overlapped by a minimum of 4 inches prior to welding. Extreme care shall be taken by the installer in the preparation of the areas to be welded. The area to be welded shall be cleaned and prepared according to the procedures laid down by the material manufacturer. Sheeting shall be welded together by means of integration of the extrudate bead with the membrane material (extrusion method), or the hot-wedge fusion method. The composition of extrudate used shall be identical to the

membrane material.

F. Wedge seams shall be double track wedge seams. If extrusion seams are used, trained technicians shall only do grinding. Areas that show gouges or excessive wear due to grinding shall be removed and replaced using the procedure for replacement of damaged material.

G. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the membrane material so as to determine that changes in environmental conditions will not affect the integrity of the weld. Equipment, rolls of material or other heavy loads and points of potential movement against a fixed object shall be guarded with a scuff pad of a second layer of material.

H. No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped, and an overlap weld shall be applied. Welds on completion of the work shall be tightly bonded. Membrane areas showing injury due to excessive scuffing, puncture, or distress shall be replaced or repaired with an additional piece of membrane.

I. Membrane shall not be installed when wind is great enough to get the membrane airborne or the air temperature is less than 33°F, unless otherwise authorized by the QAE.

J. The installer shall employ on-site physical nondestructive testing on welds to verify watertight homogeneous seams. The methods of testing considered shall be the vacuum box test, the air pressure test and the visual inspection. Tests must include visual inspection of seams. A detailed test protocol must be submitted for approval prior to installation of the cap.

4.03 Vacuum Testing

A. The equipment shall be comprised of the following:

A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a gauge to indicate chamber vacuum, or approved equivalent; a vacuum tank and pump assembly equipped with a pressure controller and pipe connections; a rubber pressure/vacuum hose with fittings and connections; a bucket and wide brush or spray assembly; a soapy solution.

B. The following procedures shall be followed:

Energize the vacuum pump and reduce the tank pressure to approximately 5 psi (10 inches of Hg.) gauge; wet a strip of geomembrane approximately 12 inches by

48 inches (0.3 m by 1.2 m) with the soapy solution; place the box over the wetted area; close the bleed valve and open the vacuum valve; confirm that a leak tight seal is created; for a period of approximately 5 to 10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles; if no bubble appears after 10 to 15 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches (75 mm) overlap, and repeat the process; all areas where soap bubbles appear shall be marked and repaired in accordance with Part 3.06.

4.04 Air Testing

A. The equipment shall be comprised of the following:

An air pump (manual or motor driven) equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi (160 and 200 kPa); a rubber hose with fittings and connections; a sharp hollow needle, or other approved pressure feed device.

B. The following procedures shall be followed:

Seal both ends of the seam to be tested; insert needle or other approved pressure feed device into the tunnel created by the fusion wield; energize the air pump to a pressure between 25 and 30 psi (160 and 200 kPa), close valve, and sustain pressure for approximately five minutes; if loss of pressure exceeds 2 psi (15 kPa), or does not stabilize, locate faulty area and repair in accordance with Part 3.05.H; remove needle or other approved pressure feed device and seal.

C. Tests must include visual inspection of seams. A detailed test protocol must be submitted to the ENGINEER for approval a minimum of 30 days prior to installation of the membrane.

D. The installer’s quality control technician shall inspect each seam. Areas showing a defect shall be marked and repaired in accordance with repair procedures. In addition the QCO and QAO shall review the seams.

E. A test weld three (3) feet long from each welding machine shall be run each day prior to membrane welding and at least once every five hours under the same conditions as exist for the membrane welding. The test weld shall be marked with date, ambient temperature, and welding machine number. Samples of weld 1" wide shall be cut from the test weld and tested for shear and peel. Seams shall be stronger than the material as determined by Film Tear Bond failure. The weld sample shall be kept for subsequent testing on laboratory tensiometer equipment in accordance with the applicable ASTM Standards. Random weld samples may be removed from the installed welded sheeting at a frequency determined by the QAO. If a specimen fails, the entire test seam operation shall be repeated. If the

additional specimen fails, the seaming apparatus and operator shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful test seams are achieved.

F. Destructive testing of machine seams will be required at a maximum average 500-foot frequency for each machine. In addition, one destructive sample will be required for an extruded seam in excess of 150 lineal feet. The QAO will specify the location of the tests. Additional samples may be required at the QAO discretion in areas of contamination, visual variations, or other suspicious observations. A sample of the weld will be removed and tested a specified for test welds. For each test, a three-foot section shall be removed. The three-foot section shall be divided into three 1-foot samples. Each sample shall include at least 5 test coupons. One sample will be tested by the Installer, one sample will be retained for optional laboratory testing by the OWNER, and the third will be retained by the QAO for the archival record of the weld and/or testing.

G. A non-FTB or weld delamination constitutes a failure for each coupon. A seam destructive test with more than one failing coupon will constitute a seam failure and seam retesting or repair procedures will be required.

H. If a weld sample fails a test, the testing must be repeated at a point 10 feet away along each direction of the same seam. If the second test passes, the failed portion of the seam must be repaired by cap strips or extrusion welding flaps. . If the second test fails, the above procedure must be repeated until a passing section of seam is found. The failed seam must be reseamed. Seams must be bounded on both ends by passing tests. Upon completion of the test, the area of the test shall be patched as described in the section on patching of defects. Patches shall be vacuum tested if less than 150 feet. Cap strips and extrusion welded flaps 150 feet or longer shall require destructive tests.

I. The OWNER or his designated representative reserves the right of access for inspection of this installation.

4.05 Quality Assurance Observation

A. Installer Experience Verification

1. The QAO shall verify and document that the installer meets the minimum project experience. Project experience listing shall include project name, location, OWNER, OWNER contact, ENGINEER, ENGINEER contact, product installed, amount of material installed, and date of installation.

2. The QAO shall verify that the installer has submitted a Quality Assurance Manual (QA) for installation of the material and shall approve the contents of

the QA Manual. The QA Manual and the approval by the QAO or ENGINEER shall be included in the final QA documentation.

3. The QAO shall verify and approve the submittal by the installer of a proposed panel layout and installation details. The proposed panel layout and details, and the approval by the QAO or the ENGINEER, shall be included in the final QA documentation.

B. Materials

1. Geomembranes

The QAO shall verify and document that cap material is certified by the installer for geomembranes. The QAO shall verify and document that supplier's material property characteristics are in accordance with Section 13306. The QAO shall verify and document that the installer supplies finished product certification in accordance with Sections 13306 for:

a. Thickness
b. Specific Gravity
c. Melt Index
d. Percent carbon black
e. Carbon black dispersion
f. Tensile Strength
g. Elongation
h. Puncture Resistance
i. Shear Test
j. Peel Test
k. Density
l. Asperity

Installer's certifications shall be compiled and tabulated by the QAO in the final QA documentation.

The QAO shall inspect and verify that the material is delivered, handled, and stored in accordance with the manufacturer's instructions. The QAO shall confirm that the rolls of material, when delivered, are protected with a covering material. Each roll shall be labeled identifying the name of manufacturer, product type, thickness, length, width, and manufacturer's mark number. The roll shall also indicate the date, lot and batch number of the roll, the square feet in the roll, and the total roll weight as measured after manufacture. The QAO shall prepare a tabulation of roll information and include the tabulation with the manufacturer's data in the final QA report.

2. Geocomposite

The QAO shall verify and document that cap membrane material is certified by the installer for synthetics. The QAO shall verify and document that material property values meet the specifications. Quality control certificates shall be provided at the specified frequency and shall identify the related rolls of geocomposite. The QAO shall verify that the rolls are properly labeled.

C. Conformance Testing

1. The QAO shall collect samples of the materials for confirmation testing. The QAO shall tabulate the results of the confirmation testing. The tabulated results shall be included with the confirmation testing in the final QA report.

2. Frequency

Conformance testing shall be performed at the following minimum frequencies.

Test	*Frequency*
Geomembrane	1 per 45,000 square feet
Geotextile	1 per 100,000 square feet
Geocomposite	1 per 100,000 square feet

3. Sample Collection

Samples shall be collected for conformance testing as follows.

a. Geomembrane

The first three feet on selected rolls shall be used for confirmation testing. The sample shall be taken across the entire width of the roll. The QAO shall randomly select the rolls used for conformance testing. If differing lot runs are identified by the manufacturer, the samples shall be taken to represent each lot.

Conformation testing shall include the minimum standards listed in Specification Section 13306, Part 2.01.C.

b. Geotextile fabrics

The first three feet on selected rolls shall be used for confirmation testing. The sample shall be taken across the entire width of the roll. The QAO shall randomly select the rolls used for conformance testing.

Conformation testing shall include the minimum standards listed in Specification Section 13300, Part 2.02.A.

c. Geocomposite drainage material

The first three feet on selected rolls shall be used for confirmation testing. The sample shall be taken across the entire width of the roll. Samples shall not be taken from damaged material. The QAO shall randomly select the rolls used for conformance testing. If differing lot runs are identified by the manufacturer, the samples shall be taken to represent each lot. Conformance testing shall be performed on the composite (finished) material only.

Conformance testing shall include the minimum standards listed in Specification Section 13302, Part 2.03.D.

D. Damage

1. The QAO shall inspect the material to verify that it is not damaged and to confirm that damage is corrected. Damage may include:

   a. Puncture from nails or splinters
   b. Tears from operation of equipment or inadequate packaging
   c. Exposure to temperature extremes resulting in unusable material
   d. Blocking: the bonding together of adjacent membrane layers, which may be caused by excessive heat
   e. Crumpling or tearing from inadequate packaging support.

2. When damage to a roll is observed by the QAO, the QAO shall carefully examine the underlying material for damage. If damage is extensive, the QAO shall reject the entire roll.

E. Protection from Weather

1. On-site storage shall be in a secure area with provisions from adverse weather. LLDPE, geocomposite, and geotextile materials shall be protected from:

   a. UV light
   b. Heavy winds or precipitation
   c. Temperature extremes
   d. Vandals

2. The QAO shall document damage and rejection/replacement of rolls.

F. Cap Bedding

The QAO shall observe, verify, and document that the geomembrane bedding (Part 4.04) has been placed, compacted, and tested by the Contractor and that the bedding has been accepted by the manufacturer's representative. The QAO shall visually inspect the bedding surface to confirm that it is free from clods of soil, rocks, roots, sudden or sharp changes of grade, and standing water.

H. Cap Geomembrane Placement

1. The QAO shall observe the placement of rolls of membrane. The QAO shall document placement and location of each roll of membrane. Documentation may be through verification of installer daily progress report and tabulation by the QAO of the daily progress reports, or by separate daily progress reports completed by the QAO. The QAO shall document weather conditions (temperature, humidity, precipitation, wind) to verify that they are acceptable for membrane placement and seaming. The QAO shall observe, measure, and document construction of anchor trenches for compliance with plans. The QAO shall verify that trench corners are rounded to reduce stressing the membrane. The QAO shall verify backfilling of the anchor trenches as specified.

2. The QAO shall observe and document tests to confirm that membrane penetrations, if any, and membrane connections are installed as specified. Membrane penetrations, if any, shall be verified for appropriate clamp use, for appropriate material, for good seaming, and for good housekeeping practices.

3. The QAO shall measure and confirm that required overlaps of adjacent membrane sheets are achieved. The QAO shall verify that proper temporary anchorage is used (sand bags) and that sheet is placed in nonstressed state.

4. The QAO shall visually inspect each panel for tears, punctures, and thin spots. Defects shall be marked on the membrane for repair.

I. Geomembrane Seams

1. The QAO shall inspect and document seaming operations to include:

    a. Observations to confirm that the membrane is free from dirt, dust, and moisture
    b. Observations to confirm that the seaming materials and equipment are as specified by the manufacturer

c. Observations to verify that a firm foundation is available for seaming
d. Observations of weather conditions to confirm that they are acceptable for seaming
e. Measurements of temperatures, pressures, and speed of seaming, when applicable, to verify that they are as specified (e.g., gauges and dials shall be checked and reading recorded)
f. Observations to verify that the membrane is not damaged by equipment or personnel during the seaming process.

2. The QAO shall verify that appropriate destructive and nondestructive tests are performed and that horizontal and vertical control is maintained. The QAO shall verify that test welds are conducted each day prior to membrane seaming. The QAO shall document that 100 percent of seams are tested using nondestructive methods. The QAO shall verify and record that repairs are made in accordance with the specifications and repairs are retested. The QAO shall verify that destructive tests are conducted at least every 500 feet of seams. The QAO shall require additional destructive tests in areas on contamination, visual variations, or other suspicious observations. The QAO shall document destructive test samples as to location, time, crew, and technique. The QAO shall prepare a tabulation of nondestructive and destructive testing. The tabulation shall be included with the QC testing in the final QA report.

3. Prior to placement of geocomposite drainage net, or temporary covers, the QAO shall visually inspect the membrane for damage that may have occurred during installation. If damaged areas are located, they shall be marked and patched using approved repair methods. Repairs shall be nondestructively tested. The QAO shall document damaged areas and the repairs. The documentation shall be included in the final QA report.

4. The QAO shall verify and document that the geotextile fabric is placed on the geomembrane prior to placement of the stone drainage layer.

PART 5
GENERAL CONSTRUCTION

5.01 General

A. The Contractor and QA Personnel shall review the plans and specifications for clarity. If needed, the Engineer will provide further clarification or modification so that the plans and specifications are understandable to involved parties.

B. The QAO and QAE shall verify that the minimum testing is performed and results documented or certificates provided in conjunction with the following construction items.

5.02 Sitework

The QAE and QAO shall review site investigation information to familiarize themselves with the expected site conditions upon which the facility designs were based. This will assist with identifying unexpected site conditions that may be encountered during construction.

5.03 Capping

A. The QAO shall verify and document that cap material is certified by the manufacturer for synthetic materials and that a borrow area is approved for the soil component of the cap. The QAO shall verify and document that appropriate destructive and nondestructive tests are performed for membranes and that horizontal and vertical control is maintained.

B. QA for the landfill cap shall include appropriate verification and documentation for landfill caps as detailed in Part 3. In addition, QA shall include:

1. Verification that topsoil layer is spread uniformly, that thickness are achieved, that slopes are as specified, and that the soil is not overly compacted.

2. Verify that the seeding method is as specified. Verify and document seed mixtures, fertilizer and lime content, and mulch application. Verify that seeding occurs during favorable weather and is not placed during high wind or rain or when the soil is frozen.

3. Visually inspect the completed cover to verify that it meets the specified design. Depressions or deficiencies shall be noted and corrected. The perimeter configuration, including drainage conduits, shall be examined for conformance to design specifications. Visually inspect cover until vegetation is established.

5.04 Miscellaneous

The QAO shall verify and document that fill placement is compacted and tested; that utility trenches are backfilled and tested; that gravity, pressure lines and manholes are leak tested and grades are verified; that subgrades are maintained and pavements constructed as specified; that structures are constructed as specified; that landscaping conforms to the plans and specifications; that fencing, gates, and signs are installed in the locations specified.

PART 6
DOCUMENTATION

6.01 Field Documentation

A. Logs will be prepared by the QAO presenting detailed descriptions of construction events. Logs shall include, but are not limited to:

1. Date, project name, location, and other identification
2. Unique sheet numbering for document control
3. Reports on meetings held and their results
4. Construction operation and their locations.
5. Operations and locations of Quality Control personnel.
6. QC tests performed, their designation and location.
7. Description of off-site materials received, including quality verification (vendor certification) documentation
8. Locations and designations of samples obtained.
9. Meteorological data and conditions.
10. Decisions made regarding approval of unit of material or of work, and/or corrective actions to be taken in instances of substandard quality
11. Unique identifying sheet numbers of inspection data sheets and/or problem reporting and corrective measures reports used to substantiate the decisions described in the preceding item.
12. General comments and observations.

B. A copy of logs shall be kept on site and made available to the Owner, Engineer, and QAE.

C. Field and laboratory test data shall be identified and maintained in an easily referenced manner on the site.

D. Corrective measures taken to bring the unsuitable work into conformance with the design specifications must be documented. This documentation shall describe the

non-conformity, the exact location (both horizontal and vertical extent), test designations indicating non-conformity, the corrective active agreed upon, and test results indicating the remedial action is acceptable.

E. Photographic reports shall also be maintained. These photographs will serve as a pictorial record of work progress, problems, and corrective measures. They will be kept in a permanent protective file in the order in which they were taken.

6.02 Record Drawings

A. Scope

Owner shall provide certified record drawings of work completed for construction of landfill cap layers and drainage features. The Contractor shall be responsible for construction stakeout. Membrane installer shall furnish panel layout.

B. Geomembrane Panel Layout

A record drawing presenting the final geomembrane (LLDPE) panel layout for each layer of the geomembrane cap system shall be prepared by the membrane installer and submitted to the Engineer. The panel layout shall present roll and panel identifications, dates of installation, seam identification with welder identified, destructive test locations, and patch locations.

C. Construction Staking

The Contractor shall be responsible for maintaining the integrity of construction stakes. Restaking shall be the Contractor's expense. The Contractor shall maintain adequate construction staking for reference by the QA personnel when locating work elements and test locations.

D. Marked-Up Drawings

The Contractor shall be responsible for maintaining an accurate set of marked-up drawings on the construction site. Marked-up drawings shall accurately reflect grades and locations and changes or modifications to the plans. Indicate changes and modifications by colored pencil on a set of project drawings. Upon completion of the project, the marked-up drawings shall be submitted to the Engineer.

6.03 Final Documentation

A. Upon completion of the project, final documentation will be organized and indexed to enable easy access and retrieval of original inspection, testing data sheets, material certification, reports and record drawings. During the construction period, originals of the documents shall be kept by the QAO at the site. At the completion of the

project, the QAE will compile the quality assurance data and assemble the certification report.

B. The final documentation shall include project correspondence pertaining to changes or clarifications to the work.

C. The final documentation shall include project submittals. Project submittals shall be numbered and tabulated in a submittal log.

This Page Intentionally Blank

PART 7
REFERENCE

Portions of this Quality Assurance Plan were based or excerpted from the EPA Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities, OSWER Report No. EPA/530-SW-86-031.

This page intentionally blank