PROJECT MANUAL

(Volume 1 of 1)

PROJECT NO. DMVA – 42210120/42220033

For

AREA 25 – TRAINING CORRIDOR
ASP FENCE, E&S, AND STORMWATER REPAIR
PHASE 1
FORT INDIANTOWN GAP
ANNVILLE, PA

EAST HANOVER TOWNSHIP
LEBANON COUNTY, PENNSYLVANIA

Date: 30 November 2023

DEPARTMENT OF MILITARY AND VETERANS AFFAIRS
BUREAU OF MILITARY CONSTRUCTION AND ENGINEERING
DIVISION OF ENGINEERING & ARCHITECTURE
BLDG, 0-10, FT. INDIANTOWN GAP, LEBANON COUNTY, ANNVILLE, PA
Phone: (717) 861-8804 Fax: (717) 861-8583

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CONSTRUCTION SPECIFICATIONS

DRAWINGS

NUMBER AND TITLE OF DRAWINGS

The drawings which form a part of this project are indicated in the following list:

G.1.1	COVER SHEET
C.1.0	OVERALL SITE PLAN & DRAINAGE
C.1.1	WESTERN PLAN AND DETAILS
C.1.2	CENTRAL PLAN AND NOTES
C.1.3	EASTERN PLAN AND DETAILS
C.1.4	FENCE PLAN
C.2.0	FENCE DETAILS
C.3.0	POND P57
C.3.1	POND P58
ES.1.1	ELECTRICAL SITE PLAN

The above is an exact list of the drawings included under Project No. DMVA – 42210120/42220033 and shall be considered a part thereof.

DMVA Division of Engineering and Architecture will furnish from time to time as the work progresses, such supplemental drawings as may be required for further illustrating the details of the work, but these supplemental drawings will not include the shop drawings, all of which are to be prepared by the Contractor and submitted as hereinafter specified for approval before the work is started.

SECTION 010100

SUMMARY OF WORK

PART 1 – GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions of the Construction Contract", "Special Conditions", and "Division 1 – General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

B. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof. Contractor shall note that reference to "Project Design Documents" refers to any and all documentation included within the Project Bid and/or Award Package. This includes, but is not limited to drawings, specifications, Government forms, contractual literature, etc.

1.2 LOCATION

A. Area 25 - ASP, Training Corridor, Fort Indiantown Gap, Annville, Lebanon County, PA

1.3 PROJECT DESCRIPTION

A. The project consists of construction of upslope diversion swales and storm drain piping; reconstruction and regrading of the stone pave perimeter road; repair and or replacement of the perimeter fence, gates, and appurtenances; installation of new motorized main entrance gate; patch bituminous pave; and seeding and stabilization of disturbed areas. The project also consists of rehabilitation of two existing stormwater basins – clear berms, replace outfalls, remove sediment, and stabilize.

1.4 PERFORMANCE PERIOD

A. One hundred and eighty (180) calendar days from Government granted Notice to Proceed.

1.5 WAGE SCALES

A. Wage Scales ARE REQUIRED to be paid on this Project.

1.6 QUESTIONS DURING BID PROCESS

A. Direct all questions pertaining to the project as shown and described in the contract documents to.

Ms. Tina Rebuck
Dept. of Military and Veteran Affairs
Bldg. 0-47, Ft. Indiantown Gap
Annville, PA 17003
Email: trebuck@pa.gov
Ph.: 717-861-2118

B. Should the contractor submit a RFI via email, the subject line shall appear as follows:

1. DMVA 42210120: AREA 25 ASP – FENCE, ROAD, AND STORMWATER REPAIRS – FORT INDIANTOWN GAP

2. Additional information can be included thereafter.

1.7 SUBMITTALS

A. See individual Sections and "SCHEDULE OF MATERIAL SUBMITTALS (AF FORM 66)" included within the project Design Documents

B. Submittals shall be forwarded to Department of Military & Veteran's Affairs; Division of Engineering and Architecture, Building 0-10, Fort Indiantown Gap, Annville, PA 17003.

C. Each submittal shall include the following:

1. Project number – **42210120/42220033**
2. Contract number
3. Related specification section
4. Contractor's approval stamp
5. Contractors initials and date
6. Area for Professional's review stamp

D. All submittals must be approved by the discipline responsible, Design Professional prior to incorporation into the project.

1.8 REQUIRED WARRANTIES

A. Contractor shall provide all required warranties as outlined within the Project Design Specifications and on all included Government AF Form 66's.

1.9 WORK INCLUDED

A. The Work of this Project consists of, but is not necessarily limited to, the following. Detailed requirements of the Work are described in the pertinent specification Sections and/or shown on the Drawing.

B. GENERAL CONSTRUCTION (.1)

1. Prepare and submit all necessary pre-construction documentation as outlined within the project Design Documents.
2. The project consists of construction of upslope diversion swales and storm drain piping; reconstruction and regrading of the stone pave perimeter road; repair and or replacement of the perimeter fence, gates, and appurtenances; installation of new motorized main entrance gate; patch bituminous pave; and seeding and stabilization of disturbed areas. The project also consists of rehabilitation of two existing stormwater basins – clear berms, replace outfalls, remove sediment, and stabilize.
3. Final Cleaning, Punch List Items, Close-Out Documents.

C. HVAC CONSTRUCTION (.2) N/A

D. PLUMBING CONSTRUCTION (.3) N/A

E. ELECTRICAL CONSTRUCTION (.4)

Electrical Construction to operate gate as shown on the plans.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 010400

COORDINATION AND CONTROL

PART 1 – GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions of the Construction Contract", and "Special Conditions", and "Division 1 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SECTION INCLUDES

A. This section includes the on-site provisions that govern the performance of the work to complete this project.

1.3 VISITS TO SITE

A. For access to the site during the bidding period, contact the Using Agency site personnel with phone number listed below:

James Goslin (Project Manager)
Ph: (717) 821-8100
Email: c-jgoslin@pa.gov

1.4 UNIDENTIFIED HAZARDOUS MATERIALS (CHEMICALS, ETC.)

A. The Contractor or Subcontractor must comply with all requirements of the General Conditions, including the maintenance of insurance up to the limit required under the General Conditions.

B. Should a hazardous material be encountered on the job, the Contractor shall comply with all statutes and regulations of the Commonwealth of Pennsylvania and all rules and regulations of the United States Environmental Protection Agency as they apply during construction and demolition work and the disposal of hazardous material.

C. The Contractor shall comply fully with the regulations of OSHA as they pertain to the protection of workers exposed to the emission of chemicals, etc. and shall take all steps necessary to protect its employees, as well as all other people engaged on site.

D. Whenever a hazardous material is to be removed or disposed of, the Contractor is required to make proper notification to the Bureau of Air Quality Control in the Department of Environmental Protections' Regional Office, PA Department of Labor and Industry and EPA as applicable, and is required to obtain and pay for any permits required. Disposal shall conform to all applicable regulations and documentation shall be required when, applicable.

1.5 TESTING OF EQUIPMENT

A. After any electrical systems and equipment have been installed or modified, it shall be the responsibility of the Contractor to operate the systems for a satisfactory period of time, as required by the Department for proper testing and instructing the operating personnel. Electricity required for proper testing of permanent equipment and for the period of instructing personnel, shall be paid for by the Contractor testing its equipment.

1.6 INSTRUCTIONS AND TRAINING

A. The project is located in a secure site within Fort Indiantown Gap. There may be more detailed requirements for access, working, parking, etc. to be clarified at the Initial Job Conference.

1.7 REUSE OF MATERIALS

A. No removed materials or equipment shall be reinstalled in the work, unless so noted on the Drawing or in these Specifications.

1.8 GENERAL

A. All construction trailers, offices, equipment and materials required to be on-site shall be located at the direction of the Department.

1.9 WORKING HOURS

A. The Contractor's available working hours shall be from **7:00 A.M**. to **4:00 P.M**., Monday through Friday.

B. Work during different hours, or work on Saturdays, Sundays, State and National Holidays or overtime work, must have the Departments written approval.

A. This shall not apply in those unforeseen isolated and/or emergency instances when a particular operation must be performed in a continuous sequence that extends the working day beyond the approved working hours. Coordinate with the Department and/or Using Agency in these instances.

B. The Departments failure to approve different working hours, weekend or holiday working hours, or overtime hours is not cause for a claim against the Department for delay.

E. Utility shut-downs required for tie-ins to existing systems shall be done in off-hours, weekends, and/or holidays to minimize the impact on the operations of the Using Agencies (and/ or surrounding buildings). These costs shall be anticipated and included in the Contractor’s bid.

1.10 DELIVERY, STORAGE AND HANDLING

A. Prefinished materials shall arrive at job site in their original unopened cartons or other protective packaging necessary to protect finishes. Materials should be stored in such packages until time of application. Flat materials such as panels shall arrive and remain on adequate support to ensure flatness and prevent damage.

B. Store all materials, equipment and bulk items prior to installation in clean, dry, well ventilated locations away from uncured concrete, masonry or damage of any kind.

C. Coordinate storage location with the Department.

D. Refer to each section for specific delivery, handling and storage instructions of items specified.

1.15 PARKING

A. All parking is subject to prior approval of the Department and Using Agency, unless otherwise noted.

1.16 TRAFFIC

A. The Lead Contractor shall establish at the Initial Job Conference a construction staging and traffic plan for the project which minimizes the construction interference with the Institution's operation. This plan is subject to the Department's and the Using Agency's review and acceptance. This acceptance does not relieve the Contractors of their responsibilities regarding safety coordination, and adherence to all traffic laws and ordinances.

1.17 SUBSURFACE INFORMATION (Not Used)

1.18 SITE FENCE (Not Used)

1.19 ENVIRONMENTAL QUALITY CONTROL

A. The Prime Contractor and its Subcontractors shall perform their work in a manner which shall minimize the possibility of air, water, land and noise pollution, in accordance with General Conditions Section 6.37.

1.22 SANITARY FACILITIES

A. The following conditions shall pertain:

1. Sanitary facilities will **not** be provided by the Using Agency. The Contractor will be required to provide their own sanitary facilities throughout the duration of the contract.

2. The existing facilities available for the Contractor's use will be assigned by the Department at the Initial Job Conference.

1.23 SMOKING POLICY

A. Smoking and use of smokeless-tobacco are strictly prohibited in all buildings and ASP area.

1.24 CONCRETE AND EARTHWORK

A. All Contractors shall perform concrete work and sitework required for their work, and shall comply with applicable Divisions/Sections, of the (.1) contract specifications therefore. If any specification section contains language conflicting with requirements of applicable (.1) contract specification sections, the most stringent requirements shall prevail.

1.25 QUALITY CONTROL TESTING

A. Structural-related testing and inspections required to be performed by the Contractor(s) are listed in Section 014000 – Quality Control Testing Services. If Quality Control testing or inspections required appear in Section 014000 and in a technical section, the most stringent requirements shall prevail. If Quality Control testing or inspections required appear in a technical section and not in Section 014000, they shall be required as if specified in Section 014000. Conditions pertaining to Quality Control testing and inspections may appear in the technical sections. Testing is to be by the Contractor, unless specifically stated to be "by the Department" or required by Section 014010 – Quality Assurance Testing and Inspection Services. Quality Assurance Services by the Department are for the purpose of oversight of the Contractor's Quality Control Testing.

B. Non-structural testing is in the technical specifications.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 012200
UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Section:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.2 DEFINITIONS

A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased during construction.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF PRICES

A. Lump Sum General Contract Overall Project:
   1. Part 1 – ASP 42220033 - General Contract as shown on sheets C.1.1 to C.2.0 and specifications - $ Lump Sum
   2. Part 2 – Basins 42210120 – General Contract as shown on sheet C.3.0 to C.3.1 and specifications - $ Lump Sum

B. Lump Sum Electrical Contract Overall Project:
   1. ASP 42220033 - Electrical Contract as shown on sheets ES.1.1 and notes on C.1.4 - $ Lump Sum

C. General Contract Unit Prices:

   1. Three Strand Barbed Wire Replacement $ / EA
   2. Full Fence Replacement $ / LF
   3. Bollards $ / EA
   4. Filter Sock $ / LF
   5. Slope Protection Fabric $ / SF
   6. R-5 Rip Rap $ / Ton
   7. R-4 Rip Rap $ / Ton
   8. R-3 Rip Rap $ / Ton
   9. AASHTO #3 $/Ton
   10. AASHTO #57 $/Ton
   11. 2A Stone $ / Ton

END OF SECTION 012200

SECTION 013000

SUBMITTALS

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SECTION INCLUDES/CONTENT

A. Included in this section of the specifications is a list of approvals required for all materials incorporated into the project. The Department reserves the right to require additional approvals if necessary. No material, equipment or supplies listed herein shall be incorporated into the work until the Contractor has obtained prior approval from the Department.

B. Submittals required by each prime contract are indicated within AF Form 66 “Schedule of Material Submittals” Attachement 1 of these specifications.

1.3 SUBMITTAL PROCEDURES

A. Refer to ‘Submittals’ of the General Conditions.

B. Comply with the following or resubmission will be required:

1. Indicate contract number, specification section and building number (as shown on the drawings) on each item submitted.

2. Signify approval by stamp, initialing and dating each item prior to submission to the Professional.

3. Submittals are preferred to be in electronic format, sent directly to the Departments contracting office.

C. Items requiring testing shall be forwarded directly to the approved laboratory. The Contractor shall pay all costs associated with testing.

D. Expedite critical materials, equipment and shop drawings, and other required submissions.

E. Incomplete submissions will be returned for resubmission.

F. Use of substitutions for materials or details shown on the contract drawings or called for in these specifications require written approval from the Department. See General Conditions.

1.4 PRODUCT DATA

A. Manufacturer's printed directions and manufacturer's standard specifications showing all dimensions, cuts, finishes, etc., as well as catalog cuts and ratings of all material will be required and shall be submitted in advance prior to application and/or installation.

1.5 TESTS

A. Refer to 'Tests' of the General Conditions.

B. Submit required reports listing items tested, tests conducted and results obtained as specified.

1.6 CERTIFICATIONS

A. Submit required certifications in written form identifying authorized representative, manufacturer, systems designer and other required data as specified.

1.7 WARRANTIES

A. Refer to Specifications for required warranties. Copies of proposed warranties specified for products shall accompany the designated submittal of that product.

1.8 OPERATION AND MAINTENANCE MANUALS

A. Manual Format (Use 3-ring binder):

1. Title page with the following information for each system covered:

a. Project Title and DMVA Contract Number (in capital letters)

b. Name of Company

c. Name of the individual to be called

d. Normal telephone numbers

e. Contractor's account number for project

2. Index listing all sections of the Manual.

3. Warranties for equipment furnished in contract. (Index tabbed)

4. Complete system circuit diagrams, block diagrams, copies of all approved shop drawings, which shall clearly illustrate how all the components relate and how they are interconnected and a point wiring diagram.

5. Reports, testing analysis.

6. Operating instructions and maintenance instructions for all equipment and finish materials furnished.

1.9 SUBMITTALS LIST

A. See attached AF FORM 66 “Schedule of Material Submittals” organized by prime contract.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SCHEDULE OF MATERIAL SUBMITTALS

General (.1) - Civil Submittals

PROJECT NUMBER
DMVA 4221012042220033

PROJECT TITLE
AREA 25 FENCE, E&S, STORMWATER REPAIR – Training Corridor – Fort Indiantown Gap

TO BE COMPLETED BY PROJECT ENGINEER														TO BE COMPLETED BY CONTRACT ADMINISTRATOR								
LINE NUMBER	ITEM OR DESCRIPTION OF ITEM, CONTRACT REFERENCE, TYPE OF SUBMITTAL	NUMBER OF COPIES REQUIRED											REQUIRED SUBMISSION DATE	DATE RECEIVED IN CONTRACTING	DATE TO CIVIL ENGINEERING	RETURN SUSPENSE DATE	SUBMITTAL NUMBERS	DATE CONTRACTOR NOTIFIED		CONTRACTOR RESUBMITTAL	FINAL APPROVAL	REMARKS
		CERTIFICATE OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS	Reports	Batch Slips	Steel Certifications						APPROVED	DIS-APPROVED			
1	321216 asphalt Material Mix Design, Sealer	**3**								**3**	**3**		**IJC +10 days**									
2	312000/321216 Stone Pave and Rip-Rap	**3**								**3**	**3**		**IJC +10 days**									
3	329200 Seed Mixes, fertilizers, soil amendments	**3**								**3**	**3**		**IJC +10 days**									
4	329200 Turf reinforcement matting	**3**				**3**	**3**	**3**		**3**			**IJC +10 days**									
5	323113 – fence, gates, and fence components	**3**	**3**			**3**	**3**	**3**	**3**				**IJC +10 days**									
6	323113 - concrete	**3**								**3**	**3**		**IJC +10 days**									
7	bollards	**3**			**3**			**3**					**IJC +10 days**									
8	Pipe culverts	**3**	**3**				**3**	**3**					**IJC +10 days**									
9	Motorized Gate	**3**	**3**			**3**	**3**	**3**	**3**				**IJC +10 days**									

SCHEDULE OF MATERIAL SUBMITTALS **General (.1) - Civil Submittals**	PROJECT NUMBER **DMVA** 4221012042220033	PROJECT TITLE **AREA 25 FENCE, E&S, STORMWATER REPAIR – Training Corridor – Fort Indiantown Gap**

TO BE COMPLETED BY PROJECT ENGINEER													TO BE COMPLETED BY CONTRACT ADMINISTRATOR								
LINE NUMBER	ITEM OR DESCRIPTION OF ITEM, CONTRACT REFERENCE, TYPE OF SUBMITTAL	NUMBER OF COPIES REQUIRED											REQUIRED SUBMISSION DATE	DATE RECEIVED IN CONTRACTING	DATE TO CIVIL ENGINEERING	RETURN SUSPENSE DATE	SUBMITTAL NUMBERS	DATE CONTRACTOR NOTIFIED		CONTRACTOR RESUBMITTAL	FINAL APPROVAL	REMARKS
		CERTIFICATE OF COMPLIANCE	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	MANUFACTURER'S WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS	Reports	Batch Slips	Steel Certifications						APPROVED	DIS-APPROVED			
10	Silt Sock	**3**				**3**	**3**	**3**					**IJC +10 days**									
11	Precast Concrete Structures	3	3										**IJC +10 days**									

SECTION 013100

SEQUENCE OF CONSTRUCTION AND MILESTONES

PART 1 – GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 GENERAL REQUIREMENTS

A. Before beginning work, the Contractor will be required to prepare a schedule in consultation with the Department. The work must be carried out in full accordance with the schedule. The Contractor shall arrange without any unnecessary interference with the Institution’s operation.

1.3 CRITICAL MATERIALS AND EQUIPMENT

A. The Contractor is cautioned that all necessary and required critical materials and equipment shall be ordered as quickly as possible, in order that the shipping will not delay the progress of the work or completion of the project.

1.4 CRITICAL ITEMS TO BE NOTED AS MILESTONES

A. Refer to the General Conditions regarding construction progress Milestones to be established by the Lead Contractor.

B. The Lead Contractor shall submit a construction schedule, for the total project, including all prime contractors critical path work items. The schedule shall be submitted at the pre-construction meeting. The schedule will be reviewed and approved by the designer and the using agency to confirm compliance with construction sequencing and Using Agency training schedule.

1. GENERAL CONSTRUCTION

a. Construction Sequencing

1) Submittals
2) Mobilization
3) Demolition
4) Excavation
5) Swales
6) Roads
7) Fences/gates
8) Misc.
9) Final Grading, Seeding
10) Final Cleaning, Punch List Items, Close-Out Documents

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 014000

QUALITY CONTROL TESTING

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 GENERAL

A. The Contractor is responsible for verifying and enforcing compliance with all requirements of the contract documents. Contractor's responsibility includes but is not limited to the following:

1. Supervision of field work to enforce contract compliance of all construction activity.

2. Performance of all necessary field testing to verify compliance with requirements of the plans or specifications requiring adherence to measurable standards of field performance.

3. Engaging an independent testing laboratory to perform tests as required by each specification section.

4. Providing support services for all Quality Control Testing, including cutting and patching and repair or replacement as required.

5. Verification of compliance with plans and specifications of all manufactured materials or equipment. Provide certificates of compliance, or other approved proof of compliance, by the manufacturers of same and submit to the professional whenever requested.

6. All activities noted heretofore and amplified hereafter shall be considered Quality Control Services.

7. Coordinate and schedule DMVA - Bureau of Design and Project Management - International Building Code Inspection Log. See attached Log identifying required inspections.

B. Work not included: Quality Assurance Testing by the Department. The Department reserves the right to perform tests under the Quality Assurance Testing program and to use those as the basis for approval or rejection at its sole discretion.

1.3 DESCRIPTION OF QUALITY CONTROL TESTING

A. Quality Control Services include inspections, tests and reports by an independent testing laboratory or other approved agency, hereafter referred to as the Quality Control Agency. All Quality Control Services shall be at the Contractor's cost, which shall be included proportionally in all items of payment or contained in any Base Bid or Unit Price on the

Proposal. Tests and Inspections are to include those specifically required by this section and the technical sections.

B. The Quality Control Agent shall submit a Testing and Inspection Plan to the Professional for its approval, and the approval of the Quality Assurance agent for structure and for soils. The Plan shall be organized according to the requirements of Chapter 17, and chapters referenced in Chapter 17 of the international Building Code (IBC). If any tests or inspections are required that are greater than those in the IBC, they shall be so noted. The approved Plan shall become the organizing document which the QC Agent shall use to develop a system of logging test report designations and dates. This continuous log document shall be regularly distributed by email to Department and contractual parties on the distribution list that receive test and inspection reports.

C. Quality Control Services by a Quality Control Agency or Agencies is intended to assist in the determination of probable compliance of the work with requirements specified or indicated and do not relieve the Contractor of the responsibility for compliance with Contract Document requirements.

D. Specific testing or inspections of a structural nature required to be performed by independent Quality Control Agencies for individual construction activities are specified in this Section only. If testing or inspection requirements appear in this section and a technical section, the most stringent requirements shall prevail. If Quality Control Testing or Inspection is specified in a technical section and not in this section, it shall be required as if specified in this section. If Contract Document test requirements are exceeded by IBC requirements, IBC requirements shall prevail. Non-structural tests and inspections are in the technical specifications.

E. Inspections, tests and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Documents requirements.

F. Quality Control Services required by the local municipality or other governing authorities are the responsibility of the Contractor, regardless of whether or not specified hereinafter or in the applicable specification section.

G. Unless specifically stated otherwise, all tests listed in the specifications shall be the responsibility of the Contractor. Statements such as “test as requested by” or “as directed by” the Department of the Professional shall not be construed to indicate that the test is the responsibility of the Department.

H. Each prime Contractor will pay for all costs in connection with its Quality Control Services. Whenever the word "Contractor" is used it shall be interpreted to mean Prime Contractor or Contractors as applicable. All Contractors performing work for which testing or inspection is required by this section are required to perform said tests/inspections appropriate for the quantity of work performed as indicated by this specification section and as required by all Contract Documents.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 RESPONSIBILITIES AND DUTIES OF CONTRACTOR

A. The Contractor shall engage Quality Control Agencies to provide all Quality Control Services required to comply with the Contract Documents. These services shall be at no cost to the Department.

B. The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and indicate non-compliance with Contract Document requirements. Likewise, the Contractor is responsible for retesting when the Department's Quality Assurance Test results prove unsatisfactory. If Quality Assurance Tests were in error, the Contractor shall be reimbursed for his retesting costs.

C. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility.

D. Provide the Quality Control Agency with preliminary representative samples of materials to be tested in quantities requested. If the source, quality or characteristics of an approved material changes or indicates lack of compliance with Contract requirements, submit additional samples of materials to the Quality Control Agency.

E. When requested by the Professional, the Department, or the Quality Control Agency, the Contractor shall immediately provide reports, cutting lists, material bills, shipping bills, time and place of shipment of materials to shop and field and any relevant data on previous testing and investigations of materials.

F. Provide casual labor and facilities:

1. To provide access to the work inspected or tested by any authorized party.
2. To obtain and handle samples at the site.
3. To facilitate inspections and tests by the QC or QA.
4. For security and protection of samples and test equipment at the project site.

G. To facilitate the timely sequence of inspection and testing, the Contractor shall give advanced notification to the Quality Control Agency and the Department that work has progressed to a point where inspection and testing may proceed.

H. Contractor shall pay for additional cost of Quality Control Agency services which, in the opinion of the Professional and the Department, are required because of the following:

1. Failure of materials or workmanship to meet Contract requirements.
2. Materials or practices not complying with the technical specifications which could possibly result in defective and unacceptable work.
3. Changes in source, quality or characteristics of materials.
4. Site cured cylinders requested by the Contractor.

I. The Quality Control Agency shall submit a certified written report of each inspection, test or similar service to the Design Professional, the Quality Assurance Agent, the Bureau of Construction Regional Director, the BOC Inspector Supervisor, the BOC Field, and the Contractor, with additional copies directly to any governing authority when that authority so directs. All reports shall be submitted within 24 hours of when the inspection, test or similar service was conducted.

J. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:

1. Date of issue.
2. Project title and number.
3. Name, address and telephone number of testing agency.
4. Dates and location of samples and tests or inspections.
5. Names of individuals making the inspection or test.
6. Designation of the Work and test method.
7. Identification of product and specification section.
8. Complete inspection or test data.
9. Test results and an interpretation of test results.
10. Ambient conditions at the time of sample taking and testing.
11. Comments or professional opinion as to whether inspected or tested work complies with Contract Document requirements.
12. Name and signature of Quality Control Agency inspector.

K. The QC Agent shall cooperate in using standard forms/procedures developed by the Department that assist in accomplishing the tasks required.

L. Engage independent testing laboratories, whose employees assigned to the Project and tests performed comply with ASTM E 329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction. The testing laboratory must be accredited and audited by a qualified national authority. The Contractor is to submit the name and credentials of the proposed QC Agent to the Design Professional and the Department for acceptance.

M. Upon completion of inspection, testing, sample taking and similar activities, repair the damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed finishes. Comply with the Contract Document requirements for "Cutting and Patching". Protect work exposed by or for Quality Control Testing activities, and protect repaired work.

3.2 RESPONSIBILITIES AND DUTIES OF QUALITY CONTROL AGENCIES

A. Quality Control Agencies engaged to perform inspections, sampling and testing of materials and construction shall cooperate with the Professional, the Quality Assurance Agent, the Department, Labor and Industry, and the Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests. If it is determined by the Department that the personnel provided are not qualified or are not working in the best interests of the Project for the tests performed, the Contractor, through their Quality Control Agent, shall immediately replace or supplement the subject personnel.

B. Quality Control Agencies shall notify the Department, the Quality Assurance Agent, the Professional, and the Contractor immediately of irregularities or deficiencies observed in the Work during performance of its services, and take all actions required by Chapter 17 of the IBC.

END OF SECTION

DMVA - BUREAU OF DESIGN AND PROJECT MANAGEMENT
INTERNATIONAL BUILDING CODE INSPECTION LOG

Project Name: AREA 25 ASP FENCE, E&S, STORMWATER REPAIR
Project Location: TRAINING CORRIDOR - FT. INDIANTOWN GAP

Project Manager: JAMES GOSLIN
Phone Number: 717-821-8100
Email: c-jgoslin@pa.gov

REQ.	INSPECTION	NOTICE (Business Days)	DEPARTMENT REPRESENTATIVE (SIGNATURE)	DATE ACCEPTED
☐	Demolition	72 hours		
☐	Footer Environment	48 hours		
☐	Underground Mechanical	72 hours		
☐	Underground/Overhead Electrical	72 hours		
☐	Underground Plumbing	72 hours		
☐	Foundation	48 hours		
☐	Under-Slab Mechanical	72 hours		
☐	Under-Slab Electrical	72 hours		
☐	Under-Slab Plumbing	72 hours		
☐	Concrete Under Slab/Floor	48 hours		
☐	Exterior Wall Construction	48 hours		
☐	Mechanical Rough-In	72 hours		
☑	Electrical Rough-In	72 hours		
☐	Plumbing Rough-In	72 hours		
☐	Framing (Interior)	48 hours		
☐	Insulation (Interior)	48 hours		
☐	Roofing:	-		
☐	a) Exposed Roof Substrate	72 hours		
☐	b) Insulation	72 hours		
☐	c) Membrane	72 hours		
☐	d) Metal Trim & Flashing	72 hours		
☐	e) Gutter and Downspout	72 hours		
☐	f) Final Completion of Roof	72 hours		
☐	Fire Protection	72 hours		
☐	Asphalt/Concrete Paving	72 hours		
☐	Final - Mechanical	5 days		
☑	Final - Electrical	5 days		
☐	Final - Plumbing	5 days		
☐	Final - Building	5 days		
☑	Final - Site/Grading	5 days		
☑	Final - E&S Control Features	5 days		
☑	Final - Site Improvements	5 days		

NO WORK MAY BE CONCEALED FROM VIEW, UNTIL THE DEPARTMENT HAS APPROVED IT.

Pennsylvania Department of Military & Veterans' Affairs
Bureau of Design & Project Management

INSPECTION PROCEDURES

1. **Footing Inspection**: Is to be performed after footing is dug with chairs and rods in place before concrete is poured.

2. **Underground/Overhead M.E.P Inspection**: All underground mechanical, electrical and plumbing trenching must be open and all piping, sleeves and/or conduit required for underground utilities shall be in place and provided with rodent-proofing.

3. **Foundation Inspection**: Is to be performed before framing work begins or backfill is placed. Grease traps, cleanouts, foundation and roof drains must be in place. Foundation coating must be applied, anchor bolts and top plates shall be installed. Post-pour footing inspection shall be conducted at this time and shall include verification of the depth of the footing, continuity of the footing, width of the footing and determining if the top of the footing is level.

   Note: Foundation inspection will not be approved until the plumbing, electrical and HVAC underground work has been approved by the Department.

4. **Under-Slab M.E.P. Inspection**: Shall be performed after any/all plumbing piping, mechanical piping and electrical conduit has been placed and properly sealed and tested. Required pressure testing of plumbing and HVAC piping shall be completed prior to the Under-Slab Inspection.

5. **Under-Slab Inspection**: Is to be performed prior to the pouring of the concrete and after the base course or sub-base is properly prepared, the vapor barrier (if required) is in place and reinforcing materials such as rebar or wire mesh is properly positioned.

6. **Exterior Wall Inspection**: Is to be performed after exterior perimeter walls (concrete, CMU, steel framing, etc.) have been erected. Top plates, bracing, lintels, spray-applied vapor/moisture barriers (if required) and rigid wall insulation shall all be installed prior to the inspection being conducted. Inspection shall be performed prior to the installation of interior framing and M.E.P. rough-ins.

7. **Electrical Rough-In Inspection**: Is to be performed after the roof, framing, fire blocking and bracing are in place and all wiring and other components to concealed are complete. This inspection is required prior the installation of wall and ceiling finishes.

8. **Plumbing Rough-In Inspection**: Is to be performed after the roof, framing, fire-blocking, fire-stopping, draft stopping, and bracing are in place and all sanitary, storm and domestic water piping is roughed-in. This inspection is required prior to the installation of wall and ceiling finishes.

9. **Mechanical Rough-In Inspection**: Is to be performed after the roof, framing, fire-blocking and bracing are in place and all ducting and other components to be concealed are complete. This inspection is required prior to the installation of wall and ceiling finishes.

10. **Framing Inspection**: Is to be performed before insulation is installed and after all plumbing, electrical and mechanical rough-in work is completed and inspected.

    Note: The framing may not be approved until all plumbing, electrical and HVAC rough-in work has been approved by the Department.

11. **Insulation Inspection**: Is to be performed after the framing work is approved by the Department and all insulation materials have been installed. This inspection is required prior to the installation of wall and ceiling finishes.

12. **Fire Protection Systems Inspection**: Is to be performed after fire alarm systems and/or fire suppression systems are installed and functioning. The Department has the option to accept installation and test certificates from the installing contractor(s) in lieu of witnessing the testing of fire protection systems.

13. **Final Electrical Inspection**: Is to be performed after all electrical work in the building has been completed.

14. **Final Mechanical Inspection**: Is to be performed after all HVAC work in the building has been completed.

15. **Final Plumbing Inspection**: Is to be performed after all plumbing work in the building has been completed.

16. **Final Building Inspection**: Is to be performed after all items contained within the project design documents have been completed and all prior inspections have been completed and approved. These items include, but are not limited to:

    a. General Building:

    - Interior and Exterior Finishes
    - Roofing Materials/Flashing
    - Egress
    - Accessibility (including site)
    - Final Grading
    - Site Plan Compliance – Erosion & Sediment Control Measures

    b. Electrical Work
    c. Plumbing Work
    d. Mechanical Work
    e. Fire Protection Systems
    f. Energy Conservation

17. **Department of Military & Veterans' Affairs (DoD) Special Inspections**: Certain facility types and specific components of the facility, may require additional inspections prior to the final acceptance of the facility by the Department. Components such as, but not limited to; weapons vaults, security monitoring, fuel distribution and/or storage, vehicle maintenance exhaust systems and secure communication rooms all may require special inspections. If not outlined within the project documents, the Department will notify contractors of any special inspections prior to the start of construction.

18. **Demolition Inspections**: Contractors responsible for demolition work where an entire structure is razed will be required to submit signed documentation that certifies that the vacant lot is filled to existing grade and that all service connections have been disconnected and properly capped. Demolition work being performed on an existing as part of renovation work or the erection of an addition may be subject to inspection by the Department. Contractors must ensure that pedestrian protective measures have been installed prior to the commencing of demolition work. Contractor shall not negatively impact existing means of egress until alternative egress routes have been established and approved.

NOTES

1. Contractors may not be subject to all the inspections as outlined herein. Contractors shall refer to the attached DMVA Inspection Form for all required inspections pertaining to a specific project.

2. Contractor shall contact the DMVA Project Manager and Government Design Professional prior to any and all required inspections. The DMVA Inspection Form includes required notification timeframes for each required inspection. These notifications shall be considered business days and not include weekends and/or observed Government Holidays.

3. The DMVA Inspection Procedures along with the DMVA Inspection Log, must be retained at the construction site until the completion of all work and must be made available to all Department Representatives upon request.

4. **At no time shall work of any type be concealed from view, until all required inspections have been conducted and the Department has approved it.**

SECTION 015000

TEMPORARY FACILITIES AND UTILITIES

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 TEMPORARY SERVICES DURING CONSTRUCTION

A. The designated Contractor shall install, operate, protect and maintain the respective temporary services as hereinafter specified during the construction of the entire project.

B. Temporary connections to new and/or existing permanent service lines shall be made at locations as directed by the Department, and when the temporary service lines are no longer required, they shall be removed by the Contractor. Any part or parts of the permanent service lines, grounds and building, disturbed and damaged by the installation and/or removal of the temporary service lines, shall be restored to their original condition by the Contractor responsible for the temporary installation.

C. If the Contractor fails to carry out its responsibility in supplying temporary services as set forth in this contract it is responsible for such failure and the Department may take such action as it deems proper for the protection and conduct of the work and shall deduct the cost involved from the amount due the Contractor. Only those temporary utilities required for construction need to be extended to the work area(s).

1.3 TEMPORARY WATER SUPPLY

A. The Using Agency will, within the limitations of its existing facilities, furnish water for construction purposes, free of charge to the Contractor(s). The Contractors shall make all temporary connections and necessary equipment to extend the existing water supply to locations where required.

1.4 CONSTRUCTION LIGHT AND POWER

A. The Using Agency will, within the limitations of its existing facilities, furnish electric light and power for construction purposes, free of charge to the Contractors. Each Contractor must extend existing power to meet its own requirements. All work must comply with NEC and OSHA. Connection to existing source shall be as determined by the Department.

1.5 TEMPORARY EROSION AND SEDIMENT CONTROL

A. The Contractor shall provide temporary erosion and sediment controls to prevent soil erosion and discharge of sediment-laden water runoff or airborne dust to adjacent areas and waterways according to the plans and the requirements of PA Code Chapter 102.

1.6 WELDING

A. Any Contractor using electrical power for welding on the site shall use self-contained engine generating units.

1.7 FIRE EXTINGUISHERS

A. Each Contractor shall provide UL listed, NFPA approved fire extinguishers, ten (10) lb. minimum, at the construction site during operations, suitable for all types of fires in accordance with OSHA.

1.8 INTERRUPTION OF SERVICES

A. Each Prime Contractor shall have all needed equipment and material to complete planned work at the site, prior to shutting down any system.

B. No additional compensation or time will be given to the Contractor, if work must be performed on State or National Holidays or on weekends or on overtime. See paragraph on 'Working Hours' under Section 010400.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

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

B. Additional Division 1 Specifications and Contractual Requirements included within the Project Package per the PA Department of Military and Veteran’s Purchasing Department.

1.3 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 2 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.4 SUBSTANTIAL COMPLETION (BENEFICAL OCCUPANCY)

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction, damage or settlement surveys, property surveys, and similar final record information.
4. Deliver tools, spare parts, extra materials, and similar items to location designated by

Owner. Label with manufacturer's name and model number where applicable.

5. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
6. Complete startup testing of systems.
7. Submit test/adjust/balance records.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Advise Owner of changeover in heat and other utilities.
10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
11. Complete final cleaning requirements, including touchup painting.
12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Department will either proceed with inspection or notify Contractor of unfulfilled requirements. The Contracting Officer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Design Professional and/or Inspector, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.5 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to the Departments "Payment Procedures."
2. Submit certified copy of Design Professional's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by the Design Professional. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Design Professional and Inspector will either proceed with inspection or notify Contractor of unfulfilled requirements. The Contracting Officer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first then proceeding on the interior from the Main Entrance clockwise throughout the facility.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date
c. Name of Contractor.
d. Page number.

1.7 WARRANTIES

A. Submittal Time: Submit written warranties on request of the Design Professional (per FORM 66's) for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents within the Project Operation and Maintenance Manuals.

PART 2 - PRODUCTS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other

foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction.
r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 017823
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

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

B. Additional Division 1 Specifications and Contractual Requirements included within the Project Package per the PA Department of Military and Veteran’s Purchasing Department.

1.3 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, sub-systems, and equipment.
   4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.

B. Related Sections include the following:
   1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
   2. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
   3. Divisions 2 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.4 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.5 SUBMITTALS

A. Final Submittal: Submit one copy of each manual in final form at least 14 days before final inspection. Government Design Professional will return copy with comments within 7 days after final inspection.
   1. Correct or modify each manual to comply with Design Proffesional's comments. Submit 3 copies of each corrected manual within 7 days of receipt of Design Proffesional's comments.

1.6 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Date of submittal.
4. Name, address, and telephone number of Contractor.
5. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents per CSI Specifications (Divisions 2-16). Within each organize each Division by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
   1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
   4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY INFORMATION

A. Content: Organize into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include

instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION INFORMATION

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Operating standards.
3. Operating procedures.
4. Operating logs.
5. Wiring diagrams.
6. Control diagrams.
7. Piped system diagrams.
8. Precautions against improper use.
9. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.

5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE

A. Content: Organize into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE INFORMATION

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard printed maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance information.

B. Emergency Informationl: Compile complete documantation of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Information: Compile complete documentation of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Information: Compile complete documentation of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
   1. Do not use original Project Record Documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

END OF SECTION

SECTION 017839

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

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

B. Additional Division 1 Specifications and Contractual Requirements included within the Project Package per the PA Department of Military and Veteran’s Purchasing Department.

1.3 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings in CAD Format.
2. Record Specifications.
3. Record Product Data.
4. Project Cost Analysis

B. Related Sections include the following:

1. Division 1 Section "Closeout Procedures" for general closeout procedures.
2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 2 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.4 SUBMITTALS

A. Record Drawings: Comply with the following:

1. One (1) Hard Copy of Contractor As-Built Drawings. Drawing Size to be 30”x42”.
2. One (1) CDRom or confirmed digital transmission containing CAD based Contractor As-Built Drawings.

B. Record Product Data: Submit as part of the Project Operation and Maintenance Manuals.

C. Project Cost Analysis: To be submitted when the Owner takes Benefical Occupancy.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Contractor to maintain one (1) red-lined set of drawings throughout the duration of the project construction phase. Prior to the substantial completion, contractor shall transfer all red-lined mark-ups to the Government provided CAD drawings.

1. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations.
d. Locations and depths of underground utilities.
e. Revisions and routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Changes made by Change Order or No Cost Field Change.
i. Changes made following Government Design Professional's written orders.
j. Field records for variable and concealed conditions.

B. Preparation: Contractor to transfer all construction red-line mark-ups from the record set onto the Government provided CAD drawings. Government drawings are AutoDesk (AutoCad) format and this format shall be maintained by the contractor.

1. Contractor to create a CAD layer within each Government provided CAD drawing and label it;
"CONTR_AS-BUILTS"
Note: All contractor related As-Built changes shall be contained to this layer.

C. Paragraph and subparagraphs below describe a procedure for assembling nearly correct reproducible Drawings. Add requirements for special printing methods on specific material, such as moisture-sensitive prints on mylar film. Delete if not required.

D. Record Plans: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Government Design Professional and/or Contracting Officer. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.

1. Refer instances of uncertainty to the Government Design Professional for resolution.

E. Format:

1. Record Prints: Contractor shall plot one (1) 30"x42" (min.) set of As-Built drawings to submit for review. As-Built set shall be organized and binded per the DMVA-BMCE Cover Sheet. Hardcopy set should contain an "AS-BUILT" stamp located in the lower right-hand corner of each sheet.
2. AutoDesk (AutoCad) Format, Release 2022 (or newer).

2.2 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Specifications and Record Drawings where applicable.

2.3 PROJECT COST ANALYSIS

A. Preparation: Each Prime Contractor shall maintain construction cost throughout the duration of the project. The following cost shall be submitted upon the Owner taking Benefical Occupancy of the facility.

B. Building Cost: Overall construction cost of the facility, excluding all site utilities. Cost shall incorporate all Change Order amounts into this breakout.

C. Site Utilities: Contractor shall provide an updated cost and total linear footage for the following site utility installations:

1. Domestic Water
2. Sanitary Sewer
3. Electrical Service
4. Gas/Propane Service

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submit in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Government Design Professional, Government Inspector and/or Contracting Officer’s reference during normal working hours.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions of the Construction Contract," "Special Conditions," and "Division 1 – General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

A. This Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Slab-on-grade.

1.3 REFERENCES/ACRONYMS

A. The following referenced material shall apply to this specification and have the same force and effect as if printed in full herein:
1. ACI = American Concrete Institute
2. CRSI = Concrete Reinforcing Steel Institute
3. ASTM = American Society of Testing and Materials
4. PennDOT = Pennsylvania Department of Transportation

ACI 301-89	Specifications for Structural Concrete for Buildings.
ACI 318	Building Code Requirements for Reinforced Concrete
ACI 347	Recommended Practice for Concrete Formwork
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 302	Recommended Practice for Concrete Floor and Slab Construction
ACI 315	Detail Manual
ACI 308	Standard Practice for Curing Concrete
CRSI	Manual of Standard Practice
CRSI	Recommended Practice for Placing Reinforcing Bars
PennDOT	Publication 408 (latest edition) with supplements
ASTM C 94	Standard Specification for Ready-Mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM A 497	Standard Specification for Steel Welded Fabric, Deformed for Concrete Reinforcement
ASTM A 185	Specification for Steel Welded Wire Fabric, Plain, for Concrete

	Reinforcement
ASTM A 615	Standard Specification for Deformed and Plain Billet Steel bars for
A 615M	Concrete Reinforcement
ASTM C 260	Standard Specification for Air-Entrained Admixtures for Concrete
ASTM C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

1.4 SUBMITTALS

A. Make submissions in accordance with Division 1 Specifications and 'SCHEDULE OF MATERIAL SUBMITTALS', attached at the end of the Specifications.

B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.

C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

1.5 QUALITY ASSURANCE

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

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Only concrete obtained from PennDOT approved/certified batch plant shall be used in conjunction with this project.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Prior to each pour, contractor shall provide a Concrete Plant Batch Slip for each batch utilized for the given pour. The Batch Slip shall be submitted to the Inspector by the first delivery truck for each batch. The Batch Slip shall contain the following information (at a minimum):

1. Date.
2. Plant Name and Location.
3. Batch Number.
4. Batch Time.
5. Dry materials and weights.
6. Liquids and volumes.

7. Admixtures and volumes.

F. Prior to the starting of a pour, concrete delivery drivers shall provide the on-site Inspector with a delivery slip. Delivery slips shall denote the following information:

1. Truck No., Driver's Name, and Batch Plant.
2. Time stamp for batch and/or time driver left plant.
3. Concrete Mix.
4. Batch Slump.
5. Admixtures.
6. Time Mixer arrived at Site.

Note: At no time will a driver be granted permission to off-load if a valid delivery slip is not provided.

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, Bollards and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized-steel wire into flat sheets.

E. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A coated, Type 1, steel wire, with less than 2 percent damaged coating in each 12-inch wire length. (Exterior locations).

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated. (Exterior locations)

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follow:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

2.5 ADMIXTURES

A. No admixtures will be permitted without prior notification and approval of the Design Professional and/or Inspector.

B. Air-Entraining Admixture: ASTM C 260.

C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 VAPOR RETARDERS

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

2.7 FLOOR AND SLAB TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTMO M 182, Class2, burlap cloth made from jute or kenaf, weighing approx. 9oz./sq.yd. when dry.

C. Moisture Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable (It shall be the contractors responsibility to verify availability of potable water. If potable water is NOT available at project site, contractor will be responsible for providing water tanks).

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Maximum VOC emission of 350 g/L or less. Product shall not interfere with bonding of floor covering where used.

2.9 RELATED MATERIALS

A. Contraction Joint (C.J.)

1. Preformed two-piece plastic strip with a depth of 2".
2. Manufacturer/Catalog Number: W.R. Meadows Sealtight catalog #324, Speed-E-Joint.

B. Keyed Construction Joint (K.C.J.)

1. ¼" wide by the full thickness of concrete slab asphaltic type with centered key having pre-punched openings at 24"o.c. for steel stakes. Stakes shall be minimum 18 gauge steel, 3/8" channel type by 15" long.
2. Manufacturer/Catalog Number: W.R. Meadows Sealtight catalog #321, Premoulded Tongue and Groove Joint.

C. Expansion Joint (E.J./E.E.J.)

1. ½" wide by the full thickness of concrete slab, asphaltic self-sealing type and shall conform to ASTM D 994.
2. Manufacturer/Catalog Number: W.R. Meadows Sealtight catalog #320 Asphaltic Expansion Joint.

2.10 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
2. Use water-reducing, high range water-reducing or plasticizing admixture in concrete as required for placement and workability.
3. Use water-reducing and retarding admixture when required by high temperature. Low humidity or other adverse placement conditions.
4. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structural slabs, concrete required to be watertight and concrete with a water-cementitious materials ratio below .50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Cementitious Materials Content: 0.45.
3. Slump Limit: 4 inches plus or minus 1 inch.

B. Foundation Walls, Grade Beams, Column Piers: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Cementitious Materials Content: 0.45.
3. Slump Limit: 4 inches plus or minus 1 inch.
4. Air Content: When determined necessary, 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum Cementitious Materials Content: 0.50.
3. Slump Limit: 4 inches plus or minus 1 inch.
4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

D. Sidewalks:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Cementitious Materials Content: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

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

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

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

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/4 inch for rough-formed finished surfaces.

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

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

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

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

H. Do not chamfer exterior corners and edges of permanently exposed concrete.

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

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

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

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

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

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

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

3.4 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

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

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

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

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

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

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

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

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

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete. Contractor shall contact the Government Inspector at least 24 hours prior to a pour to schedule all necessary inspections. Contractor shall not proceed with a concrete pour without the knowledge of the Inspector and/or Design Professional.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by the Inspector and/or Design Professional.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 and only under supervision of the on-site Inspector.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

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

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

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

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

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

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

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

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces approved for “broom” finish by the Design Professional. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.10 MISCELLANEOUS CONCRETE ITEMS

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

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

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

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

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

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

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-for spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-in lap over adjacent absorptive covers

2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer’s written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
3. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer, unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Do not fill joints until construction traffic has permanently ceased.

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

3.13 CONCRETE SURFACE REPAIRS

A. General Note: It will be at the Inspector's or Design Professional's discretion to request the repair of an area due to damage and/or flaws in materials or installation. A repair will only be granted to areas smaller than 100 sf. Areas in excess of 100 sf. will be evaluated by the Government and determined if necessary to completely remove and replace the defective area. At no time will the cost of repair and/or replacement be the burden of the Government.

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

C. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

E. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor

elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

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

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Contractor shall engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Contractor shall notify the Inspector and/or Design Professional at least 24 hours prior to a concrete pour. The Government Inspector will provide an inspection of the pour area and determine if all aspects are suitable for the pouring of concrete. The following is a lists of items that will be included in the Government’s Pre-Pour Inspection:

1. Steel Reinforcement Placement (Rebar and/or Welded Wire Fabric).
2. Reinforcement Welds
3. Headed Bolts
4. Forms
5. Stone Base (Thickness and Compaction)
6. Pour area is clear of all foreign materials, water, mud, etc.
7. Verification of Design Mix
8. Approval of placement procedure.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Testing Frequency: It shall be at the discretion and right of the On-Site Government Inspector to request testing at closer intervals based on visible inconsistencies in product and/or climate conditions.
4. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
5. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

   Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure tow sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure one set of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to the Inspector, Design Professional, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Inspector but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by the Inspector.
13. Additional testing at Contractor's expense will be performed to determine compliance of replaced or additional work with specified requirements.

14. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

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

END OF SECTION

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Temporary erosion and sedimentation control.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 QUALITY ASSURANCE

A. Topsoil Stripping and Stockpiling: Prepare dimensioned diagrams for placement and protection of stockpiles.

B. Rock Stockpiling Program: Prepare dimensioned diagrams for placement and protection of stockpiles.

1.5 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Salvageable Improvements: Carefully clear around fence, gates, pipes, and other areas to remain. It is the contractors responsibility to restore damage to improvements designated to remain.

C. Utility Locator Service: Make notification per notes on the Drawings.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

E. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

3.4 EXISTING UTILITIES

A. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Grind down stumps and remove roots larger than 2 inches (50 mm) in diameter, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm) and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove any sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
1. Stockpile surplus topsoil to allow later use by the Owner at Johnson Trail site.

3.7 STOCKPILING ROCK

A. Remove from construction area naturally formed rocks that measure more than 1 foot (300 mm) across in least dimension. Do not include excavated or crushed rock.

B. Stockpile rock without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
1. Stockpile surplus rock to allow later use by the Owner at Johnson Trail site.

3.8 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Burning tree, shrub, and other waste is NOT permitted.

END OF SECTION 311000

SECTION 312000

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The specifications sections “General Conditions of the Construction Contract”, and “Special Conditions”, and “Division 1 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

A. This Section includes the following:
   1. Preparing sub-grades for swales, roads, fence, and grasses.

B. Related Sections include the following:
   1. Section "Turf and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the sub-base course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated sub-grade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above sub-grade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below sub-grade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
   2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.

3. Unauthorized Excavation: Excavation below sub-grade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf ; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

I. Sub-base Course: Course placed between the sub-grade and base course for hot-mix asphalt pavement, or course placed between the sub-grade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

1.4 SUBMITTALS

A. Make submissions in accordance with 'SCHEDULE OF MATERIAL SUBMITTALS', attached to the Specifications.

B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.

C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

1.5 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: The contractor will hire an independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, compaction testing and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548. All materials under this Section shall be factory certified, first run material, seconds will not be permitted.

B. Non-Compliant Materials - Any material found not to be in compliance with the requirements of this Section, through testing and/or other means, whether installed individually and/or as a

part of a system or not, shall be immediately removed from the job site and replaced with compliant materials at no additional cost to the Contract.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.
   3. Compaction Density Test Reports according to ASTM D 2922 – Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

D. Aggregate Material Tests: Conduct aggregate material quality tests in accordance with the following:
   1. PDT Section 703.1, Fine Aggregate
   2. PDT Section 703.2, Coarse Aggregate
   3. PDT Section 703.3 Select Granular Material (2RC)

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Department not less than three days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Department's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS
DISCLAIMER:

2.1 Items specified by specific name of a manufacturer is only to provide a guide to type, performance quality, characteristics, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items **must** be used in order to be compatible with existing systems.

2.2 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3, or a combination of

these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of sub-grade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.

D. Provide protective insulating materials to protect sub-grades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared sub-grades, and from flooding Project site and surrounding area.

B. Protect sub-grades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep sub-grades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Explosives may not be used for any part of this project.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to sub-grade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
   2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and sub-grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: As indicated on contract drawings or as recommended by the manufacturer.

C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

3.8 EXCAVATION FOR SWALES

A. Channel must be over excavated a sufficient amount to allow for the volume of rock placed within the channel while providing the specified finished dimensions.

3.9 SUBGRADE INSPECTION

A. Notify Department when excavations have reached required sub-grade.

B. If the contractor encounters unforeseen sub-grade conditions that are considered unsatisfactory for construction or that do not meet compaction requirements, they will notify the department prior to any further excavation or site construction. If the Department determines that unforeseen unsatisfactory sub-grade is present, they will determine the additional work to be completed and submit a change order request through the contracting officer.

C. Proof-roll sub-grade below the pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated sub-grades.
   1. Completely proof-roll sub-grade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph .
   2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons .
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

E. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Department, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi , may be used when approved by Department.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Department.

3.11 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on sub-grades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

D. Place and compact final backfill of satisfactory soil to final sub-grade elevation.

E. Install warning tape directly above utilities, 12 inches (300 mm) above top of pipe, except 6 inches (150 mm) below sub-grade under pavements and slabs.

F. Utility Trenches that are located at or near finished pavement or structures will be tested for compaction, according to ASTM D 2922. Backfill will not exceed 6” lifts at these locations.

3.13 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Surveying locations of underground utilities for Record Documents.
   2. Removing trash and debris.
   3. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   4. Testing and inspecting underground utilities.
   5. Removing concrete formwork.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on sub-grades free of mud, frost, snow, or ice.

3.14 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under walks and pavements, use satisfactory soil material.

C. Place soil fill on sub-grades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
   1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 12 inches of existing sub-grade and each layer of backfill or fill soil material at 95 percent.
   2. Under walkways, scarify and re-compact top 6 inches below sub-grade and compact each layer of backfill or fill soil material at 92 percent.
   3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below sub-grade and compact each layer of backfill or fill soil material at 85 percent.
   4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent. Utility trenches within a pavement area shall be compacted according to #1 above.

3.17 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Grading inside Building Lines: Finish sub-grade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish sub-grades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1/2 inch.
   2. Walks: Plus or minus 1/2 inch .
   3. Pavements: Plus or minus 1/4 inch.

3.18 SUBBASE AND BASE COURSES

A. Place sub-base and base course on sub-grades free of mud, frost, snow, or ice.

B. On prepared sub-grade, place sub-base and base course under pavements and walks as follows:
   1. Install separation geotextile on prepared sub-grade according to manufacturer's written instructions, overlapping sides and ends.
   2. Place base course material over sub-base course under hot-mix asphalt pavement.
   3. Shape sub-base and base course to required crown elevations and cross-slope grades.
   4. Place sub-base and base course 6 inches or less in compacted thickness in a single layer.
   5. Place sub-base and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   6. Compact sub-base and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test sub-grades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by the Department.

D. Testing agency will test compaction of soils in place according to ASTM D 2922 as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At sub-grade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

E. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

F. The contractor will provide the Department with copies of all test reports prior to final backfill and certification of calibration of nuclear density gauge.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Department's property.
   1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Department's property.
   2. The Department will retain all satisfactory soils originated from Ft. Indiantown Gap.

END OF SECTION

SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.3 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt paving overlay.
3. Pavement-marking paint.

B. Related Sections include the following:

1. Section 312000 "Earthwork" for aggregate sub-base and base courses and for aggregate pavement shoulders.

1.4 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

B. DOT: Department of Transportation.

1.5 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT.

1. Standard Specification: PENNDOT SPECIFICATION 408
2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 SUBMITTALS

A. Make submissions in accordance with 'SCHEDULE OF MATERIAL SUBMITTALS', attached at end of the Specifications.

B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.

C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: PENNDOT APPROVED.

B. Testing Agency Qualifications: All tests and reports shall be in accordance with PENNDOT Section 408 Specification.

C. Regulatory Requirements: Comply with PENNDOT 408 for asphalt paving work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 40 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F .

PART 2 - PRODUCTS

2.1 DISCLAIMER: Items specified by specific name of a manufacturer is only to provide a guide to type, performance quality, characteristics, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items **must** be used in order to be compatible with existing systems.

2.2 ASPHALT MATERIALS

A. Prime Coat: Asphalt emulsion prime complying with PENNDOT 408, Section 461

1. Class AE-P.

B. Tack Coat: PENNDOT 408, Section 460 - TACK.

1. Temperature: Min 90 deg F – Max 150 deg F.

C. Water: Potable.

D. Undersealing Asphalt: ASTM D 3141, pumping consistency.

2.3 AUXILIARY MATERIALS

E. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

F. Sand: ASTM D 1073, Grade Nos. 2 or 3.

G. Paving Geotextile: PENNDOT Pub. 408, Section 467, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications. Thickness = 0.135” (min), weight = 0.8 lbs/sf (min.), Tensile Strength = 2000 psi (min), elongation = 20% min.

H. Joint Sealant: Joint Sealant: ASTM D 6690 or AASHTO M 324, Type III, as directed, hot-applied, single-component, polymer-modified bituminous sealant.

1. Recommended: Seal Master - Crack Master 3405 or Approved Equal

I. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 249, Type N.

1. Color:
   a. White. (Standard Parking Spaces and Traffic Indicators)
   b. Blue: (All Handicap Accessible symbols and signage)
   c. Yellow: (Taxiway Lines & Markings)

J. Glass Beads: AASHTO M247, Type 1

2.4 MIXES

K. PENNDOT Superpave: Hot Mixed Asphalt (HMA) - Virgin Mix, Mix Containing 5% to 15% RAP. Furnish material conforming to the requirements of Standard Specifications for Performance-Graded Asphalt Binder using Multiple Stress Creep Recovery (MSCR) Test, AASHTO M 332, except as revised in Bulletin 25. Obtain material from a source listed in Bulletin 15 for the specified grade.

1. Surface Course: PENNDOT 12.5mm HMA – PG64E-22
2. Base Course: PENNDOT 25mm HMA – PG64E-22

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that sub-grade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll sub-base using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared sub-grade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Tack Coat: Apply uniformly to surfaces of existing pavement and sub-base at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 HOT MIXED ASPHALT PLACING

A. Machine place HMA asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place HMA asphalt base course in number of lifts and thicknesses indicated.

2. Place HMA asphalt surface course in single lift.
3. Spread mix at minimum temperature of 275 deg F or as specified by PENNDOT pavement mix design.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of WMA asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches .
4. Construct transverse joints as described in PENNDOT 409.3(k).
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct lay-down and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

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

3.6 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch .
2. Surface Course: Plus 1/4 inch , no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch .
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch .

3.7 PAVEMENT MARKING – N.I.C.

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Department.

B. Allow paving to age for 15 days before starting pavement marking, unless otherwise specified by the manufacturer.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

3.9 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

END OF SECTION

SECTION 323113

CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions

1.3 SUMMARY

A. Section Includes:

1. Chain-Link Fences.
2. Cantilever Gates.
3. Swing operators.
4. Cast-in-Place Concrete Post Footings.

B. Related Sections:

1. Division 31 Section "Earth Moving” for site excavation, fill, and backfill where chain-link fences and gates are located.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to:

1. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:

a. Wind Loads: 80 mph.
b. Exposure Category: B.
c. Fence Fabric Height: 7 feet.
d. Max. Post Spacing: 10 feet.
e. Material Group: IA, ASTM F 1043, Schedule 40 steel pipe.

1.5 SUBMITTALS

A. Make submissions in accordance with Section 013000 Submittals and Form 66.

B. No deviations, substitutions or changes of materials, to be incorporated into this project shall be made after approval by the Department, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Department.

C. The Department retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

D. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

E. Shop Drawings: Include plans, elevations, sections, details, operational clearances, and attachments to other work. Show locations of fences, gates, posts, rails, tension wires, and operational clearances, details of extended posts, post anchorage, bracing, extension arms, gate swing, or other operational hardware and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components.

F. Product Certificates: For each type of chain-link fence and gate from manufacturer.

G. Product Test Reports: For framing strength according to ASTM F 1043.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on the Contract Drawings in relation to existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

DISCLAIMER:

2.1 Items specified by specific name of a manufacturer are only to provide a guide to type, performance quality, characteristics, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items must be used to be compatible with existing systems.

2.2 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: Seven (7) feet, with mill finished, and 9 gauge wire.

   a. Aluminum-Coated Fabric: ASTM A 491, Type I, 0.35 oz./sq. ft. (107 g/sq. m)]

2. Mesh Size: 2 inches.

3. Selvage: Twisted at both selvages.

2.3 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:

1. Fence Height: 84 inches.
2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.
   a. Line Post: 3 inches outside diameter (O.D.).
   b. End, Corner and Pull Post: 3 inches outside diameter (O.D.).

3. Horizontal Framework Members: Top rails complying with ASTM F 1043.

   a. Top Rail: N/A.

4. Brace Rails: Comply with ASTM F 1043.
5. Metallic Coating for Steel Framing:
   a. Type C, Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. coating.

2.4 TENSION WIRE

A. General: Provide horizontal tension wire along bottom and top of fence fabric.

B. Type I, aluminum coated (aluminized).: 0.192-inch diameter tension wire, mill finished, complying with ASTM B 211, Alloy 6061-T94 with 50,000-psi minimum tensile strength.

2.5 HORIZONTAL-SLIDE GATES

A. General: Comply with ASTM F 1184 for gate posts and single sliding gate types.

1. Classification: Type II Cantilever Slide, Class 1 with external roller assemblies.

   a. Gate Frame Width and Height: More than 48 inches wide by 96 inches height.

B. Pipe and Tubing:

1. Zinc-Coated Steel: Protective coating and finish to match fence framing
2. Gate Posts: Comply with ASTM F 1184. Provide round tubular steel.
3. Gate Frames and Bracing: Round tubular steel.

C. Frame Corner Construction: Welded.

D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate framed as required to attach barbed wire assemblies.

E. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.

F. Hardware:

1. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
2. Lock: Manufacturer's standard.
3. Hangers, roller assemblies, and stops fabricated from Grade 319 aluminum-alloy casting with stainless-steel fasteners.

2.6 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and single swing gate types.

1. Gate Leaf Width: 36 inches.
2. Gate Fabric Height: 7 Feet.

B. Pipe and Tubing:

1. Zinc-Coated Steel: Protective coating and finish to match fence framing.
2. Gate Posts: Round tubular steel.
3. Gate Frames and Bracing: Round tubular steel.

C. Frame Corner Construction: Welded.

D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches to attach barbed wire assemblies.

E. Hardware:

1. Hinges: 360-degree inward and outward swing.
2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
3. Closer: Manufacturer's standard.

2.7 FITTINGS

A. General: Comply with ASTM F 626.

B. Post Caps: Provide for each post.
   1. Caps must be permanently affixed to post by weld, peening or other approved means.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:
   1. Rail Clamps: Line and corner boulevard clamps for connecting intermediate rails in the fence line-to-line posts.

E. Tension and Brace Bands: Aluminum Alloy 6063.

F. Tension Bars: Aluminum, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Mill-finished aluminum rod and turnbuckle or other means of adjustment.

H. Barbed Wire Arms: Aluminum with clips, slots, or other means for attaching strands of barbed wire and means for attaching to posts for each post unless otherwise indicated, and as follows:

   1. Provide line posts with arms that accommodate top rail or tension wire.
   2. Provide corner arms at fence corner posts, unless extended posts are indicated.
   3. Type I, single slanted arm.

I. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

   1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
      a. Aluminum: ASTM B 211; Alloy 1350-H19; 0.148-inch diameter, mill-finished wire.

J. Finish:

   1. Aluminum: Mill finish.

2.8 BARBED WIRE

A. Steel Barbed Wire: Comply with ASTM A 121, for two-strand barbed wire, 0.099-inch diameter line wire with 0.080-inch diameter, four-point round barbs spaced not more than 5 inches o.c.

   1. Aluminum Coating: Type A.

2.9 CAST-IN-PLACE CONCRETE POST FOOTINGS

A. Class A concrete conforming to PennDOT Pub. 408 and placed as indicated on the Contract Drawings.

2.9 GROUT AND ANCHORING CEMENT

A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.10 FENCE GROUNDING

A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

1. Material above Finished Grade: Copper.
2. Material on or below Finished Grade: Copper.
3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

B. Connectors and Grounding Rods: Comply with UL 467.

4. Connectors for Below-Grade Use: Exothermic welded type.
5. Grounding Rods: Copper-clad steel, 3/4 by 120 inches .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with the Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by the Department.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.

C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

D. Line Posts: Space line posts uniformly at 10 feet o.c.

E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at mid-height of fabric 72 inches or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along the bottom of fence fabric. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Intermediate and Bottom Rails: Install and secure to posts with fittings.

I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.

K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Wire should be wrapped 360 degrees around line post or brace, securing fabric to post, with twisted connection placed on the secure side of the fence. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 15 inches o.c. and to braces at 24 inches o.c.

L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

M. Barbed Wire: Install barbed wire uniformly spaced angled toward security side of fence. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

3.5 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 GROUNDING AND BONDING

A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:

1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.

a. Gates and Other Fence Openings: Ground fence on each side of opening.

1) Bond metal gates to gate posts.
2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.

C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.

D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:

1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.

E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

F. Connections: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

G. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

3.7 FIELD QUALITY CONTROL

A. Grounding-Resistance Testing: The contractor will hire a qualified testing agency to perform tests and inspections.

1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance no fewer than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
2. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify Architect promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
3. Report: Prepare test reports certified by a testing agency of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.

3.8 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

END OF SECTION

SECTION 329200

TURFS and GRASSES

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1 – General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.3 SUMMARY

A. This Section includes the following:

1. Seeding.
2. Soil amendments.
3. Fertilizer.
4. Mulch
5. Turf reinforcing matting.

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

1.4 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Sub-grade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.5 SUBMITTALS

A. Make submissions in accordance with 'SCHEDULE OF MATERIAL SUBMITTALS' attached at end of the Specifications.

B. No deviations, substitutions or changes of materials, to be incorporated into this project, shall be made after approval by the Government, except for written direction by and the approval of the manufacturer of a specific item and re-approval by the Government.

C. The Government retains the right to require additional items not specifically denoted to be submitted for approval and/or additional clarification.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Government of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.8 SCHEDULING

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.9 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 60 days from date of Substantial Completion.

    a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches (100 mm).

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch (25 mm) per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow grass 2 to 3 inches (38 to 50 mm) high.

E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to lawn area.

PART 2 - PRODUCTS

2.1 DISCLAIMER: Items specified by specific name of a manufacturer is to only provide a standard for characteristics, type, quality, performance, etc. Equal products by manufacturers not specified will be considered for inclusion into this project provided that they are submitted with sufficient supporting data/ information on which to base a decision for approval. In certain cases, which will be so noted, specific items **must** be used in order to be compatible with existing systems.

2.2 Manufacturers

A. Seedway, Inc.

B. North American Green

C. Or Approved Equal

2.3 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

1. Seed Mix: PENNDOT 408, Section 804 – Formula L

2.4 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 2 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Off-site Topsoil will be required. Verify suitability of topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land**,** bogs or marshes.

2.5 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36-mm) sieve and a minimum 75 percent passing through No. 60 (0.25-mm) sieve.

2.6 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

2.8 TURF REINFORCEMENT MATTING

A. Machine produced mat of 70% agricultural straw and 30% coconut fiber with functional longevity of 24 months meeting Type 3.B requirements of the FHWA FP-03 Section 717.17. To withstand minimum unvegetated shear of 2.0 psf and unvegetated velocity of 8.0 fps.

B. To be placed on all slopes 3:1 or steeper.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Government's property.

1. Apply fertilizer directly to subgrade before loosening.
2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil mix to a depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil mix.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

B. Sow seed at the rate of 3 to 4 lb/1000 sq. ft. (1.4 to 1.8 kg/92.9 sq. m).

C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 4:1 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 6:1 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

F. Protect vegetated swale with erosion control matting installed per manufacturer’s specifications.

3.5 SATISFACTORY LAWNS

A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION